5.7 Detailed Landuse and Activity Distribution, MBMC

5.7.1 Residential land use

The Residential Use under the ESZ in MBMC is spread over 31.285 Ha, out of which more than 90% are primarily residential, remaining are either Gated complexes or Residential and commercial mixed activities. These are activities which are regulated as per the ESZ Notification 2016.

Residential Land use – Sub Class	Total Area (Ha)
Residential/Commercial	1.602
Residential Area/ Colony	29.683
Total	**31.285**

Source: Consultant Analysis

5.7.2 Slums

There are large number of slums in the ESZ and the area under slums within the MBMC exceeds that under the Residential use. As per the ESZ notification 2016, New slums and encroachments are prohibited activities within the ESZ. 9.672 Ha of area under ESZ in MBMC falls under Slums.

Slum	Total Area (Ha)
Total	**9.672**

Source: Consultant Analysis

5.7.3 Commercial land use

Within the ESZ lies land of about 17.916 Ha is being utilised for commercial uses such as Resorts, General Business and Hotel/Lodges or Restaurants. The uses are complementing to the Residential use within the ESZ. In MBMC area,17.916 Ha of area fall under Commercial land use. The table below gives sub class wise existing Land use.

Commercial Land use - Sub Class	Total Area (Ha)
General Business	8.384
Hotel/ Lodge/ Restaurant	4.011
Petrol Pump/ LPG Filling Station	0.311
Private Offices	0.083
Resort	4.942
Shopping Centre/ Mall	0.185
Total	**17.916**

Source: Consultant Analysis

5.7.4 Eco-sensitive area

Mangrove forms part of the eco-sensitive area as undeveloped portion which is spread across an area of 25.392 Ha. in the Versave village area and National Park area of 126.782 Ha as undeveloped portion within ESZ in MBMC Jurisdiction.

5.7.5 Social Infrastructure

Social infrastructure is a subset of the infrastructure sector and typically includes assets that accommodate social services to people. These include healthcare

(medical facilities and ancillary infrastructure), education (schools, universities and student accommodation), and housing.

5.7.5.1 Educational facilities

Educational facilities in existing land use refer to the classification and allocation of land for schools, colleges, universities, and other learning institutions within a given area. These facilities play a crucial role in urban and regional planning as they influence population distribution, infrastructure development, and community accessibility.

Major school is present in the Mire area in MBMC. Pharmaceutical training centre in Versave is also present.

Educational Facilities – Sub Class	Total Area (Ha)
School	2.584
Training Institute	0.109
Total	**2.693**

Source: Consultant Analysis

5.7.5.2 Health facilities

Health care services in existing land use refer to the planning and allocation of land for medical and wellness facilities. These facilities are essential for public health, emergency response, and community well-being. Integrating them effectively into urban and regional planning ensures accessibility, efficiency, and sustainability. No major health facilities are found in the MBMC area under ESZ.

Health Facilities – Sub Class	Total Area (Ha)
Clinic/Dispensary	0.058
Total	**0.058**

Source: Consultant Analysis

5.7.5.3 Other Public-Semi-Public

A Public & Semi-Public (PSP) Zone in land use planning refers to areas designated for facilities that serve the general public or specific community needs. These zones include essential public services which caters to the public. In this case, community hall, guest house, and auditorium are present. The total area under such facilities is 1 Ha. Hajiyani Ayshaben Kasambhai Balesariya Memorial Cultural Center is present in Versave and Bharat Ratna Gaansamragyi Lata Mangeshkar Natya Gruha Auditorium is present in Mire in MBMC.

Public – Semi-Public Facilities – Sub Class	Total Area (Ha)
Community hall	0.709
Guest House	0.037
Auditorium/Town hall/ Multipurpose Hall/Drama theatre	0.271
Public/Community Toilet	0.003
Total	**1.020**

Source: Consultant Analysis

5.7.5.4 Religious

Religious places are an essential component of land use planning, categorized under Public and Semi-Public (PSP) zones in many urban and regional plans. These spaces

serve as centers for worship, cultural activities, community gatherings, and social services. There are 8 temples, 2 mosques, 1 church and 1 other religious place that falls in the Eco-Sensitive Zone across MBMC jurisdiction.

Religious – Sub Class	Total Area (Ha)
Church	0.022
Mosque	0.537
Others	5.014
Temple	0.845
Total	**6.418**

Source: Consultant Analysis

5.7.5.5 Government property

There is presence of central government property office in MBMC jurisdiction of ESZ. There is also state government property offices and quarters in MBMC jurisdiction.

Government Property – Sub Class	Total Area (Ha)
Central Government Property – Office	0.357
State Government Property – Office	0.030
State Government Property - Quarter	3.052
Total	**3.439**

Source: Consultant Analysis

5.7.5.6 Recreational use

Recreational places in land use planning refer to areas designated for leisure, sports, cultural activities, and outdoor enjoyment. These spaces contribute to the well-being of communities by promoting physical activity, social interaction, and environmental sustainability. It enhances mental and physical well-being by providing spaces for relaxation and exercise. It also improves the visual appeal of cities and promotes green infrastructure. Parks, Gardens and Playground forms the majority of the portion of the recreational facilities with clubs, gymnasium and others to follow.

Recreational Facilities – Sub Class	Total Area (Ha)
Others	2.524
Park	0.460
Garden	0.004
Total	**2.988**

Source: Consultant Analysis

5.7.6 Industrial use

Industrial activities are being carried out in the Eco Sensitive Zone of the SGNP. About 32 Ha of land is under Industrial use, some polluting and some Non-Polluting industries. There is huge amount of manufacturing industries in Chene area in MBMC. Industrial Activities are regulated and polluting industrial activities are prohibited in the ESZ. MPCB categorization of industries is given in bracket below.

Industrial - Sub Class	Total Area (Ha)
Manufacturing (Red)	26.017
Other Industries (Red)	1.232
Storage Godown (Green)	2.148

Service (Red/Green/Orange)	0.392
Pharmaceutical (Red)	0.399
Warehouse (Green)	2.035
Total	**32.223**

Source: Consultant Analysis

5.7.7 Traffic and transportation

A Traffic and Transportation use in existing land use refers to areas designated for transportation infrastructure and movement of people and goods. These includes a network of Internal and Collector Road Network in MBMC area. Small stretches of Arterial Road also form a part of the ESZ like Western Express Highway and Ghodbunder Road.

Traffic and Transportation – Sub Class	Total Area (Ha)
Right of Way	1.075
Roads	24.924
Median/ Divider	0.147
Traffic Island	0.258
Bus stand/ Terminus	0.680
Total	**27.084**

Source: Consultant Analysis

Total length in ESZ in MBMC is 27.962 Kms with majority of roads having width less than 9 Metres. Width wise Length distribution within ESZ in MBMC is given below.

Table 5-11 Length of roads as per road widths, MBMC

S. No	Road Width (Metres)	Length (Km)
1	Upto 6	13.157
2	6-9	6.666
3	9-12	2.358
4	12-15	0.788
5	15-18	0.323
6	18-24	2.483
7	24-30	1.497
8	30 and above	0.690
9	**Grand Total**	**27.962**

Source: Consultant Analysis

5.7.8 Agriculture Use

An Agriculture Zone in existing land use refers to areas designated for farming, livestock rearing, and other agricultural activities. There is a huge presence of fallow/barren/pad land in the Kashi, Chenne and Mire area in MBMC jurisdiction within the ESZ. A plant nursery is located in Ghodbunder area.

Agriculture Use – Sub Class	Total Area (Ha)
Plantations	2.009
Plant Nursery	0.238
Fallow land/Barren land/ Pad land	51.760

Total	54.007

Source: Consultant Analysis

5.7.9 Specific Use

Under specific land use, a very little portion of hill/mountain falls in the MBMC jurisdiction.

Specific Use – Sub Class	Total Area (Ha)
Hill/ Mountain	0.054
Total	**0.054**

Source: Consultant Analysis

5.7.10 Other Use

This zone consists of area which are Tree Clad, water Bodies and Cow Sheds, Dairy Farm etc. Significant amount of area is covered under green areas under tree which helps in maintaining ecological balance in the Eco-sensitive zone. Waterbodies in forests play a vital role in supporting wildlife by providing drinking water, maintaining biodiversity, and sustaining the ecosystem. Tree Clad Area dominates the other uses in MBMC.

Other Zone	Total Area (Ha)
Green Area (Tree Clad Area)	56.468
National Park (Division)	126.782
Water Bodies	18.168
Cow Shed	1.336
Dairy Farm	3.998
Vacant Land	34.832
Protected Forest/ Notified Forest	0.255
Nursery	2.113
Total	**243.952**

Source: Consultant Analysis

5.7.11 Public Utilities

An area of 0.628 Ha is utilised for the provision of Public Utilities and or Infrastructure. There is no major public utility infrastructure in ESZ in MBMC jurisdiction.

Public Utilities – Sub Class	Total Area (Ha)
Crematorium Burial Ground / Grave Yard	0.239
Electric Sub-Station	0.006
Ground Level Reservoir	0.029
Recycling Plant	0.317
Satellite and Telecommunication Centre	0.036
Total	**0.628**

Source: Consultant Analysis

5.8 Existing Land use & Activities – VVCMC

Vasai Virar City Municipal Corporation covers about 5.5% of area of ESZ. The land use covered in this portion is diverse.

About 80% of the Eco Sensitive Zone extent within the VVCMC jurisdiction consists of undeveloped area i.e., having Agricultural uses, natural areas, forest, water bodies and vacant land etc. Fair Amount of Residential, Commercial, Public-Semi Public and Traffic and Transportation cover the developed area.

Table 5-12 Village wise predominant Existing Land use in VVCMC, 2024

Sr. No	Village	Area	Predominant Land Use
1	Juchandra	Mori	Warehouse and Mangroves
2	Kaman	Kaman	Agriculture land and Private Vacant
3	Bapane	Bapane	Waterbody
4	Sasunavghar	Sasunavghar	Tree Clad and Agricultural land
5	Malji Pada	Chene	Tree Clad and Training Institute

Source: Consultant Analysis

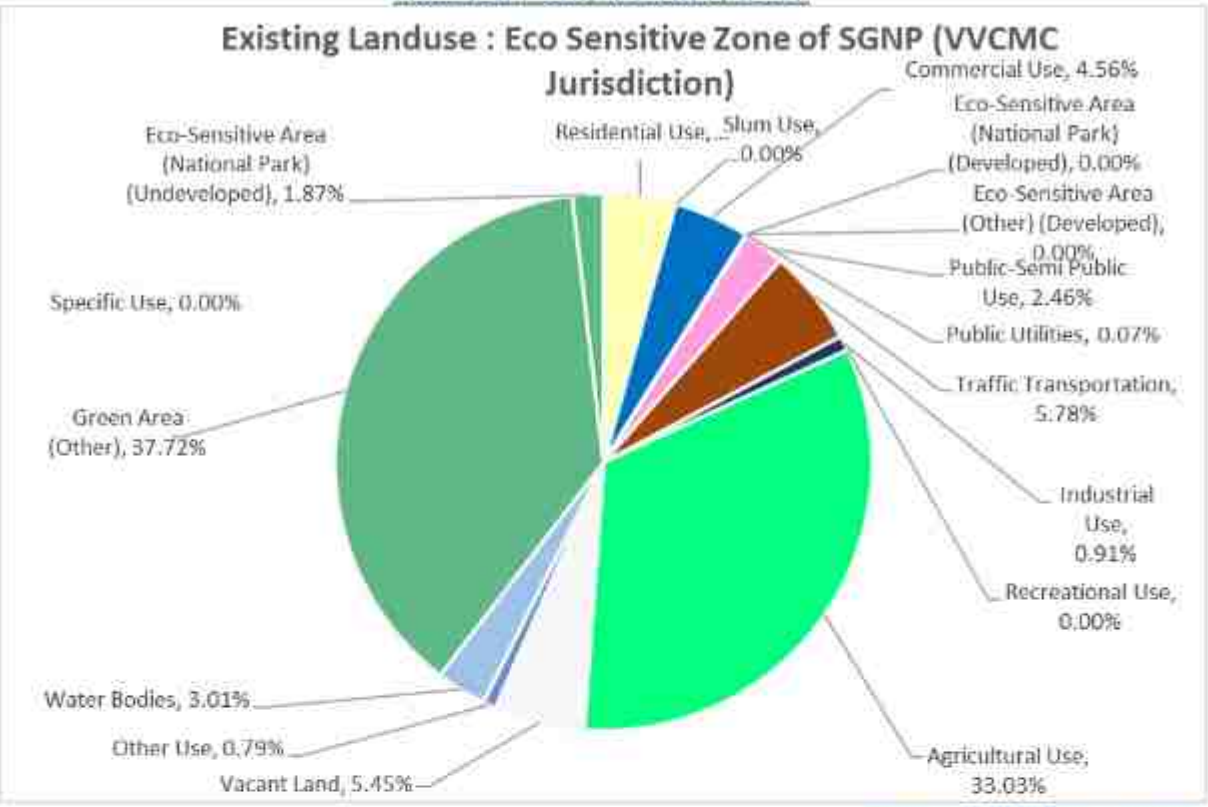
Table 5-13: Existing Land use Account of Eco-Sensitive Zone of Sanjay Gandhi National Park in VVCMC jurisdiction, 2024[6]

Land use	Area (Ha)	Percentage of Developed Area	Percentage of Total Area
Residential Use	14.392	23.96%	4.34%
Slum Use	0.000	0.00%	0.00%
Commercial Use	15.104	25.15%	4.56%
Eco-Sensitive Areas (Other)	0.000	0.00%	0.00%
Eco-Sensitive Areas (NP)	0.000	0.00%	0.00%
Public Utilities	0.245	0.41%	0.07%
Public-Semi Public Use	8.156	13.58%	2.46%
Traffic and Transportation	19.147	31.88%	5.78%
Industrial Use	3.013	5.02%	0.91%
Recreational Use	0.000	0.00%	0.00%
Developed Area	**60.057**	**100.00%**	**18.13%**
Agricultural Use	109.442		33.03%
Vacant Land	18.052		5.45%
Other Use	2.617		0.79%
Water Bodies	9.981		3.01%
Green Area (Forest)	124.964		37.72%
Eco-Sensitive Areas (Other+NP)	6.184		1.87%
Specific Use	0.000		0.00%
Undeveloped Area	**271.240**		**81.87%**
Total Area	**331.297**		**100.00%**

Source: Consultant Analysis

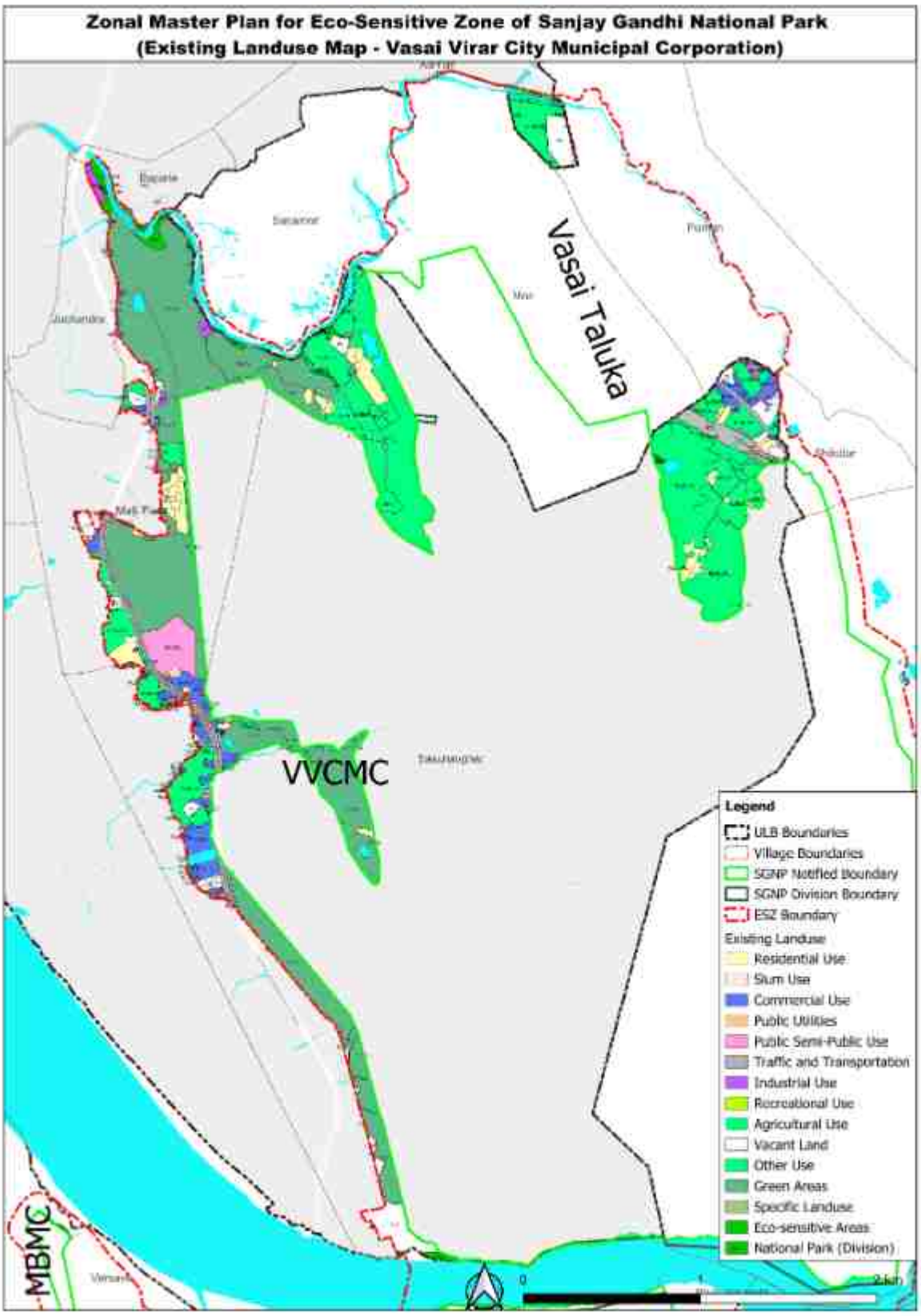
[6] Existing Landuse and Activity survey has been carried out in 2022-23. It has been updated for year 2024-25.

Figure 5-16 Existing Landuse Distribution of Eco-Sensitive Zone of Sanjay Gandhi National Park, VVCMC, 2024



Source: Consultant Analysis

Figure 5-17 Existing Land use Map for Eco-Sensitive Zone for Sanjay Gandhi National Park, 2024, VVCMC



Source: Consultant Analysis

5.9 Detailed Landuse and Activity Distribution, VVCMC

5.9.1 Residential land use

The Residential Use under the ESZ in VVCMC is spread over 14.392 Ha, out of which more than 90% are primarily residential, remaining are Residential and commercial mixed activities. These are activities which are regulated as per the ESZ Notification 2016.

Residential Land use – Sub Class	Total Area (Ha)
Residential/Commercial	0.237
Residential Area/ Colony	14.155
Total	**14.392**

Source: Consultant Analysis

5.9.2 Slums

Within Vasai - Virar City Municipal Corporation limits there are no slums present in the ESZ.

5.9.3 Commercial land use

Within the ESZ lies land of about 15.104 Ha is being utilised for commercial uses such as General Business, Hotel/Lodges or Restaurants and Resorts. The uses are complementing to the Residential use within the ESZ. The table below gives sub class wise Existing Land use.

Commercial Land use - Sub Class	Total Area (Ha)
General Business	6.494
Hotel/ Lodge/ Restaurant	6.977
Informal Shops	0.295
Petrol Pump/ LPG Filling Station	0.060
Private Offices	0.169
Resort	0.905
Retail	0.204
Total	**15.104**

Source: Consultant Analysis

5.9.4 Eco-sensitive area

Mangrove forms part of the eco-sensitive area which is spread across an area of 6.010 Ha. in the Juchandra, Bapane and Sasunavghar village area as form of undeveloped portion within ESZ in VVCMC jurisdiction.

5.9.5 Social Infrastructure

Social infrastructure is a subset of the infrastructure sector and typically includes assets that accommodate social services to people. These include healthcare (medical facilities and ancillary infrastructure), education (schools, universities and student accommodation), and housing.

5.9.5.1 Educational facilities

Educational facilities in existing land use refer to the classification and allocation of land for schools, colleges, universities, and other learning institutions within a given area. These facilities play a crucial role in urban and regional planning as they

influence population distribution, infrastructure development, and community accessibility.

Major training institute, Indian Council of Medical Research in Maljipada is also present.

Educational Facilities – Sub Class	Total Area (Ha)
School	0.031
Training Institute	7.241
Total	**7.272**

Source: Consultant Analysis

5.9.5.2 Health facilities

Health care services in existing land use refer to the planning and allocation of land for medical and wellness facilities. These facilities are essential for public health, emergency response, and community well-being. Integrating them effectively into urban and regional planning ensures accessibility, efficiency, and sustainability. One primary health care centre is found in the Kaman area under ESZ.

Health Facilities – Sub Class	Total Area (Ha)
Primary/ Community/ Urban Health Centre by ULB. / Govt	0.298
Total	**0.298**

Source: Consultant Analysis

5.9.5.3 Other Public-Semi-Public

A Public & Semi-Public (PSP) Zone in land use planning refers to areas designated for facilities that serve the general public or specific community needs. These zones include essential public services which caters to the public. In this case, Dharamshala is present. The total area under such facility is 0.086 Ha.

Public – Semi-Public Facilities – Sub Class	Total Area (Ha)
Dharamshala	0.086
Total	**0.086**

Source: Consultant Analysis

5.9.5.4 Religious

Religious places are an essential component of land use planning, categorized under Public and Semi-Public (PSP) zones in many urban and regional plans. These spaces serve as centers for worship, cultural activities, community gatherings, and social services. There are 6 temples that falls in the Eco-Sensitive Zone across VVCMC jurisdiction.

Religious – Sub Class	Total Area (Ha)
Temple	0.500
Total	**0.500**

Source: Consultant Analysis

5.9.5.5 Government property

There is no presence of central government or state government property offices and quarters in VVCMC jurisdiction of ESZ.

5.9.5.6 Recreational use

There are no recreational places present in the Vasai - Virar City Municipal Corporation jurisdiction in ESZ area.

5.9.6 Industrial use

Industrial activities are being carried out in the Eco Sensitive Zone of the SGNP. About 3.013 Ha of land is under Industrial use, some polluting and some Non-Polluting industries. There is presence of industries along the Mumbai-Ahmedabad Highway as well as in the Poman area in Royal Industrial Hub. Industrial Activities are regulated and polluting industrial activities are prohibited in the ESZ. MPCB categorization of industries is given in bracket below.

Industrial - Sub Class	Total Area (Ha)
Manufacturing (Red)	1.886
Other Industries (Red)	0.165
Storage Godown (Green)	0.061
Warehouse (Green)	0.901
Total	**3.013**

Source: Consultant Analysis

5.9.7 Traffic and transportation

A Traffic and Transportation use in existing land use refers to areas designated for transportation infrastructure and movement of people and goods. These includes a network of Internal and Collector Road Network in VVCMC area. Small stretches of Portion of Mumbai-Ahmedabad Highway also form a part of the ESZ.

Traffic and Transportation – Sub Class	Total Area (Ha)
Right of Way	0.866
Roads	12.88
Median/ Divider	1.056
Traffic Island	0.042
Railway Track	4.303
Total	**19.147**

Source: Consultant Analysis

Total length in ESZ in VVCMC is 14.32 Kms with majority of roads having width less than 6 Meters. Width wise Length distribution within ESZ in VVCMC is given below.

Table 5-14 Length of roads as per road widths, VVCMC

S. No	Road Width (Metres)	Length (Km)
1	Upto 6	10.156
2	6-9	1.533
3	9-12	0.185
4	12-15	0.400
5	15-18	0.000
6	18-24	0.800
7	24-30	0.000
8	30 and above	1.297

9	Grand Total	14.371

Source: Consultant Analysis

5.9.8 Agriculture Use

An Agriculture Zone in existing land use refers to areas designated for farming, livestock rearing, and other agricultural activities. There is a huge presence of fallow/barren/pad land in the Sasunavghar area in VVCMC jurisdiction within the ESZ. 2 plant nurseries are located alongside west of Mumbai-Ahmedabad Highway in Sasunavghar area.

Agriculture Use – Sub Class	Total Area (Ha)
Cropland	3.782
Plantations	1.840
Plant Nursery	0.192
Fallow land/Barren land/ Pad land	103.628
Total	**109.442**

Source: Consultant Analysis

5.9.9 Other Use

This zone consists of area which are Tree Clad, water Bodies and Cow Sheds, Dairy Farm etc. Significant amount of area is covered under green areas under tree which helps in maintaining ecological balance in the Eco-sensitive zone. Waterbodies in forests play a vital role in supporting wildlife by providing drinking water, maintaining biodiversity, and sustaining the ecosystem. Tree Clad Area dominates the other uses in VVCMC in Malji Pada and Sasunavghar area.

Other Zone – Sub Class	Total Area (Ha)
Green Area (Tree Clad Area)	124.961
National Park (Division)	0.174
Protected Forest/Notified Forest	0.003
Water Bodies	9.981
Dairy Farm	1.273
Vacant Land	18.052
Others	1.344
Total	**155.788**

Source: Consultant Analysis

5.9.10 Public Utilities

An area of 0.245 Ha is utilised for the provision of Public Utilities and or Infrastructure. There is no major public utility infrastructure apart from an Electric substation which mark its presence in Sasunavghar in ESZ in VVCMC jurisdiction.

Public Utilities – Sub Class	Total Area (Ha)
Crematorium Burial Ground / Grave Yard	0.028
Electric Sub-Station	0.181
Ground Level Reservoir	0.036
Total	**0.245**

Source: Consultant Analysis

5.10 Existing Land use & Activities – Vasai Taluka

Vasai Taluka covers about 5.5% of area of ESZ. The land use covered in this portion is diverse.

About 80% of the Eco Sensitive Zone extent within the VVCMC jurisdiction consists of undeveloped area i.e. having Agricultural uses, natural areas, forest, water bodies and vacant land etc. Fair Amount of Residential, Commercial, Public-Semi Public and Traffic and Transportation cover the developed area.

Table 5-15 Village wise predominant Existing Land use in **Vasai Taluka**, 2024

Sr. No	Village	Area	Predominant Land Use
1	Nagale	Nagale	Tree Clad and Agriculture
2	Shillotar	Shillotar	Agriculture
3	Poman	Poman	Industrial
4	Sarjamori	Sarjamori	Mangrove and Agriculture
5	Mori	Mori	Industrial and Agriculture

Source: Consultant Analysis

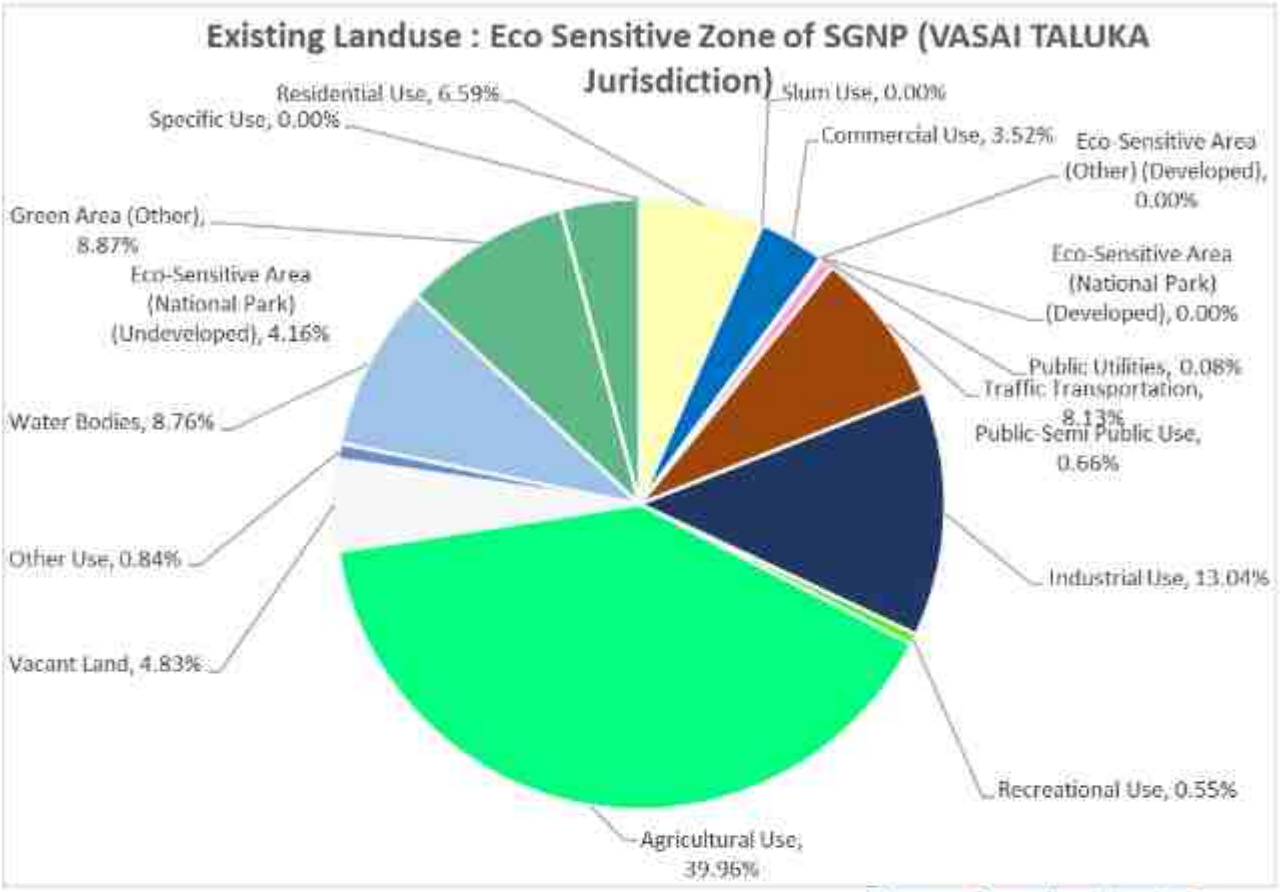
Table 5-16: Existing Land use distribution of Eco-Sensitive Zone of Sanjay Gandhi National Park in Vasai-Taluka jurisdiction, 2024[7]

Land use	Area (Ha)	Percentage of Developed Area	Percentage of Total Area
Residential Use	22.149	20.25%	6.59%
Slum Use	0.000	0.00%	0.00%
Commercial Use	11.819	10.80%	3.52%
Eco-Sensitive Areas (Other)	0.000	0.00%	0.00%
Eco-Sensitive Areas (NP)	0.000	0.00%	0.00%
Public Utilities	0.273	0.25%	0.08%
Public-Semi Public Use	2.200	2.01%	0.66%
Traffic and Transportation	27.308	24.96%	8.13%
Industrial Use	43.782	40.02%	13.04%
Recreational Use	1.862	1.70%	0.55%
Developed Area	**109.393**	**100.00%**	**32.57%**
Agricultural Use	134.225		39.96%
Vacant Land	16.223		4.83%
Other Use	2.829		0.84%
Water Bodies	29.416		8.76%
Green Area (Forest)	29.803		8.87%
Eco-Sensitive Areas (Other+NP)	13.986		4.16%
Specific Use	0.000		0.00%
Undeveloped Area	**226.482**		**67.43%**
Total Area	**335.875**		**100.00%**

Source: Consultant Analysis

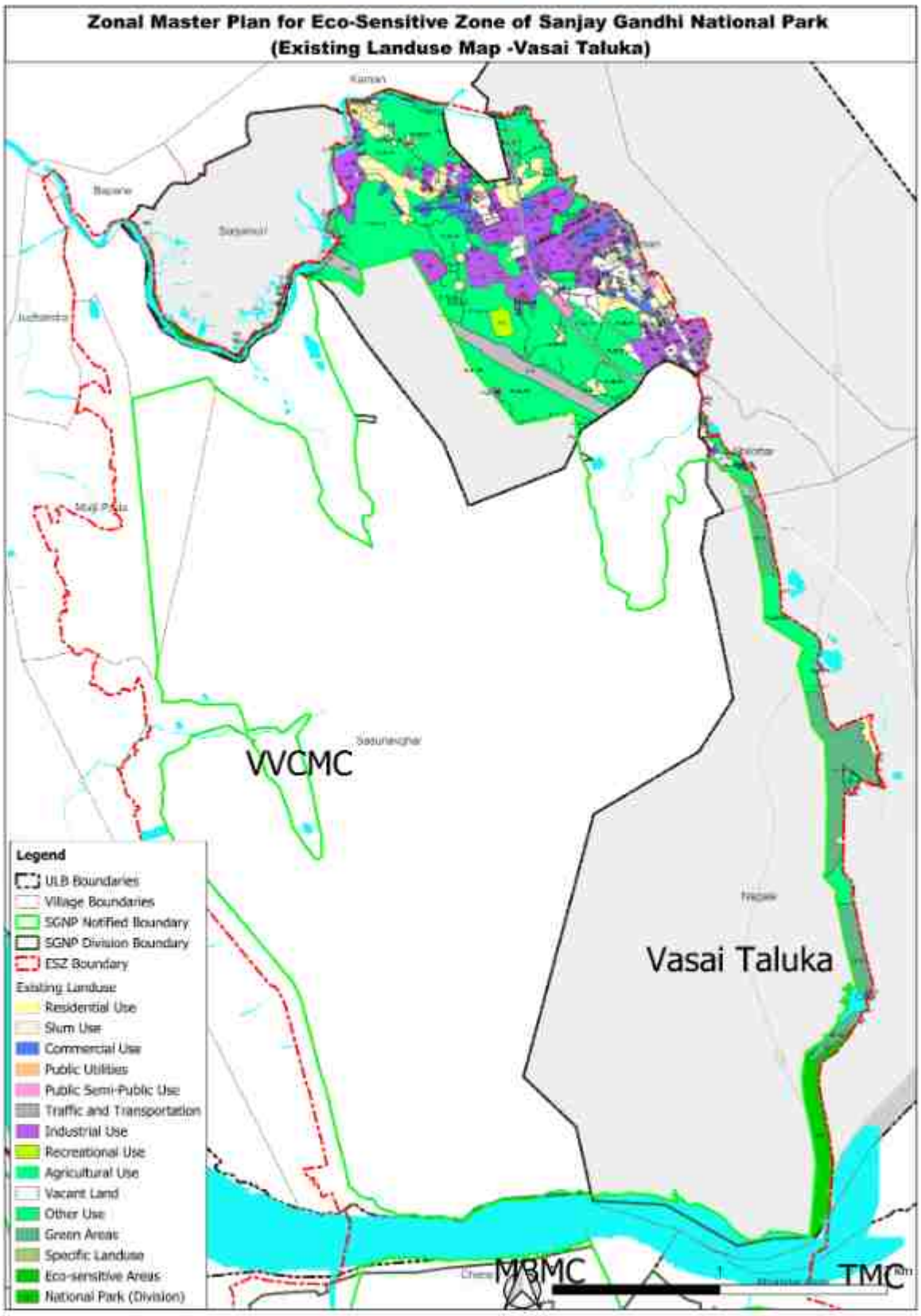
[7] Existing Landuse and Activity survey has been carried out in 2022-23. It has been updated for year 2024-25.

Figure 5-18: Existing Landuse Distribution of Eco-Sensitive Zone of Sanjay Gandhi National Park, Vasai-Taluka, 2024



Source: Consultant Analysis

Figure 5-19 Existing Land use Map for Eco-Sensitive Zone for Sanjay Gandhi National Park, 2024, Vasai Taluka



Source: Consultant Analysis

5.11 Detailed Landuse and Activity Distribution, Vasai Taluka

5.11.1 Residential land use

The Residential Use under the ESZ in Vasai Taluka is spread over 22.149 Ha, out of which more than 80% are primarily residential, remaining are Residential and commercial mixed activities. These are activities which are regulated as per the ESZ Notification 2016.

Residential Land use – Sub Class	Total Area (Ha)
Residential/Commercial	4.770
Residential Area/ Colony	17.379
Total	**22.149**

Source: Consultant Analysis

5.11.2 Slums

Within Vasai Taluka limits there are no slums present in the ESZ.

5.11.3 Commercial land use

Within the ESZ lies land of about 11.819 Ha is being utilised for commercial uses such as General Business, Hotel/Lodges or Restaurants and Retail. The uses are complementing to the Residential use within the ESZ. The table below gives sub class wise Existing Land use.

Commercial Land use - Sub Class	Total Area (Ha)
General Business	10.643
Hotel/ Lodge/ Restaurant	0.883
Private Offices	0.125
Retail	0.168
Total	**11.819**

Source: Consultant Analysis

5.11.4 Eco-sensitive area

Mangrove forms part of the eco-sensitive area which is spread across an area of. 13.986 Ha. in the Nagale and Sarajamori village area as form of undeveloped portion within ESZ in Vasai Taluka jurisdiction.

5.11.5 Social Infrastructure

Social infrastructure is a subset of the infrastructure sector and typically includes assets that accommodate social services to people. These include healthcare (medical facilities and ancillary infrastructure), education (schools, universities and student accommodation), and housing.

5.11.5.1 Educational facilities

Educational facilities in existing land use refer to the classification and allocation of land for schools, colleges, universities, and other learning institutions within a given area. These facilities play a crucial role in urban and regional planning as they influence population distribution, infrastructure development, and community accessibility.

Educational Facilities – Sub Class	Total Area (Ha)
School	0.145
Total	**0.145**

Source: Consultant Analysis

5.11.5.2 Health facilities

Health care services in existing land use refer to the planning and allocation of land for medical and wellness facilities. These facilities are essential for public health, emergency response, and community well-being. Integrating them effectively into urban and regional planning ensures accessibility, efficiency, and sustainability. **One primary health care centre is found in the Poman area under ESZ.**

Health Facilities – Sub Class	Total Area (Ha)
Primary/ Community/ Urban Health Centre by ULB. / Govt	0.496
Total	**0.496**

Source: Consultant Analysis

5.11.5.3 Other Public-Semi-Public

A Public & Semi-Public (PSP) Zone in land use planning refers to areas designated for facilities that serve the general public or specific community needs. These zones include essential public services which caters to the public. In this case, Police Station/Chowki is present. The total area under such facility is 0.025 Ha.

Public – Semi-Public Facilities – Sub Class	Total Area (Ha)
Police Station/Chowki	0.023
Public/Community Toilet	0.002
Total	**0.025**

Source: Consultant Analysis

5.11.5.4 Religious

Religious places are an essential component of land use planning, categorized under Public and Semi-Public (PSP) zones in many urban and regional plans. These spaces serve as centers for worship, cultural activities, community gatherings, and social services. There are 3 temples that falls in the Eco-Sensitive Zone across Vasai-Taluka jurisdiction.

Religious – Sub Class	Total Area (Ha)
Temple	1.469
Total	**1.469**

Source: Consultant Analysis

5.11.5.5 Government property

There is no presence of central government property office in Vasai-Taluka jurisdiction of ESZ. There is also ---- state government property offices in Vasai-Taluka jurisdiction.

Government Property – Sub Class	Total Area (Ha)
Central Government Property – Office	-
State Government Property – Office	0.065
State Government Property - Quarter	-
Total	**0.065**

Source: Consultant Analysis

5.11.5.6 Recreational use

Recreational places in land use planning refer to areas designated for leisure, sports, cultural activities, and outdoor enjoyment. These spaces contribute to the well-being of communities by promoting physical activity, social interaction, and environmental sustainability. It enhances mental and physical well-being by providing spaces for relaxation and exercise. It also improves the visual appeal of cities and promotes green infrastructure. Parks, Gardens and Playground forms the majority of the portion of the recreational facilities with clubs, gymnasium and others to follow. **There is just 1 playground as recreational places present in the Vasai Taluka.**

Recreational Facilities – Sub Class	Total Area (Ha)
Play Ground	1.862
Total	**1.862**

Source: Consultant Analysis

5.11.6 Industrial use

Industrial activities are being carried out in the Eco Sensitive Zone of the SGNP. About 43.782 Ha of land is under Industrial use, some polluting and some Non-Polluting industries. There is huge amount of manufacturing industries in Poman area in Vasai Taluka. Industrial Activities are regulated and polluting industrial activities are prohibited in the ESZ. MPCB categorization of industries is given in bracket below.

Industrial - Sub Class	Total Area (Ha)
Agro based and Food Processing (Orange)	0.079
Manufacturing (Red)	21.281
Other Industries (Red)	16.605
Storage Godown (Green)	4.276
Warehouse (Green)	1.541
Total	**43.782**

Source: Consultant Analysis

5.11.7 Traffic and transportation

A Traffic and Transportation use in existing land use refers to areas designated for transportation infrastructure and movement of people and goods. These includes a network of Internal and Collector Road Network in Vasai Taluka area. Small stretches of Chinchoti Anjur Phata Marg passes through Vasai Taluka.

Traffic and Transportation – Sub Class	Total Area (Ha)
Right of Way	0.107
Roads	15.464
Traffic Island	0.009
Railway Track	11.728
Total	**27.308**

Source: Consultant Analysis

Total length in ESZ in VT is 25.38 Kms with majority of roads having width less than 6 Metres. Width wise Length distribution within ESZ in VVCMC is given below.

Table 5-17 Length of roads as per road widths, Vasai Taluka

S. No	Road Width (Metres)	Length (Km)
1	Upto 6	17.689
2	6-9	2.203
3	9-12	3.372
4	12-15	2.459
5	15-18	0.000
6	18-24	0.000
7	24-30	0.000
8	30 and above	0.000
9	**Grand Total**	**25.723**

Source: Consultant Analysis

5.11.8 Agriculture Use

An Agriculture Zone in existing land use refers to areas designated for farming, livestock rearing, and other agricultural activities. There is a huge presence of fallow/barren/pad land in the Mori village area in Vasai Taluka jurisdiction within the ESZ.

Agriculture Use – Sub Class	Total Area (Ha)
Cropland	10.493
Fallow land/Barren land/ Pad land	123.650
Plant Nursery	0.082
Total	**134.225**

Source: Consultant Analysis

5.11.9 Specific Use

Under specific land use, No area falls in the VT jurisdiction.

5.11.10 Other Use

This zone consists of area which are Tree Clad, water Bodies and Cow Sheds, Dairy Farm etc. Significant amount of area is covered under green areas under tree which helps in maintaining ecological balance in the Eco-sensitive zone. Waterbodies in forests play a vital role in supporting wildlife by providing drinking water, maintaining biodiversity, and sustaining the ecosystem. Tree Clad Area dominates the other uses in Vasai Taluka where less portion of area falls under National Park area.

Other Use – Sub Class	Total Area (Ha)
Green Area (Tree Clad Area)	29.803
National Park (Division)	0.000
Brick Kiln	2.829
Water Bodies	29.416
Vacant Land	16.223
Total	**78.271**

Source: Consultant Analysis

5.11.11 Public Utilities

An area of 0.273 Ha is utilised for the provision of Public Utilities and or Infrastructure. There is no major public utility infrastructure in ESZ in Vasai-Taluka jurisdiction.

Public Utilities – Sub Class	Total Area (Ha)
Others	0.273
Total	**0.273**

Source: Consultant Analysis

5.12 Existing Land use & Activities – TMC

Thane Municipal Corporation covers about 19.72 % of area of ESZ. The land use covered in this portion is diverse.

About 75% of the Eco Sensitive Zone extent within the TMC jurisdiction consists of undeveloped area i.e., having Agricultural uses, natural areas, forest, water bodies and vacant land etc. Fair Amount of Residential, Commercial, Public-Semi Public, Industrial and Traffic and Transportation cover the developed area.

Table 5-18 Village wise predominant Existing Land use in TMC, 2024

Sr. No	Village	Area	Predominant Land Use
1	Wadwali	Wadwali	Residential
2	Majiwade	Majiwade	Industrial, Defense area
3	Owala	Owala	Tree Clad, Agriculture
4	Kolshet	Kolshet	Tree Clad, Public Utility
5	Chitalsar manpada	Chitalsar manpada	National Park Division and Industrial
6	Boriwade	Boriwade	National Park Division
7	Kavesar	Kavesar	Residential
8	Pachpakhadi	Pachpakhadi	Industrial, Slum
9	Bhaindar pada	Bhaindar pada	National Park Division
10	Yeur	Yeur	Resort, Agriculture

Source: Consultant Analysis

Table 5-19: Existing Land use distribution of Eco-Sensitive Zone of Sanjay Gandhi National Park in TMC jurisdiction, 2024[8]

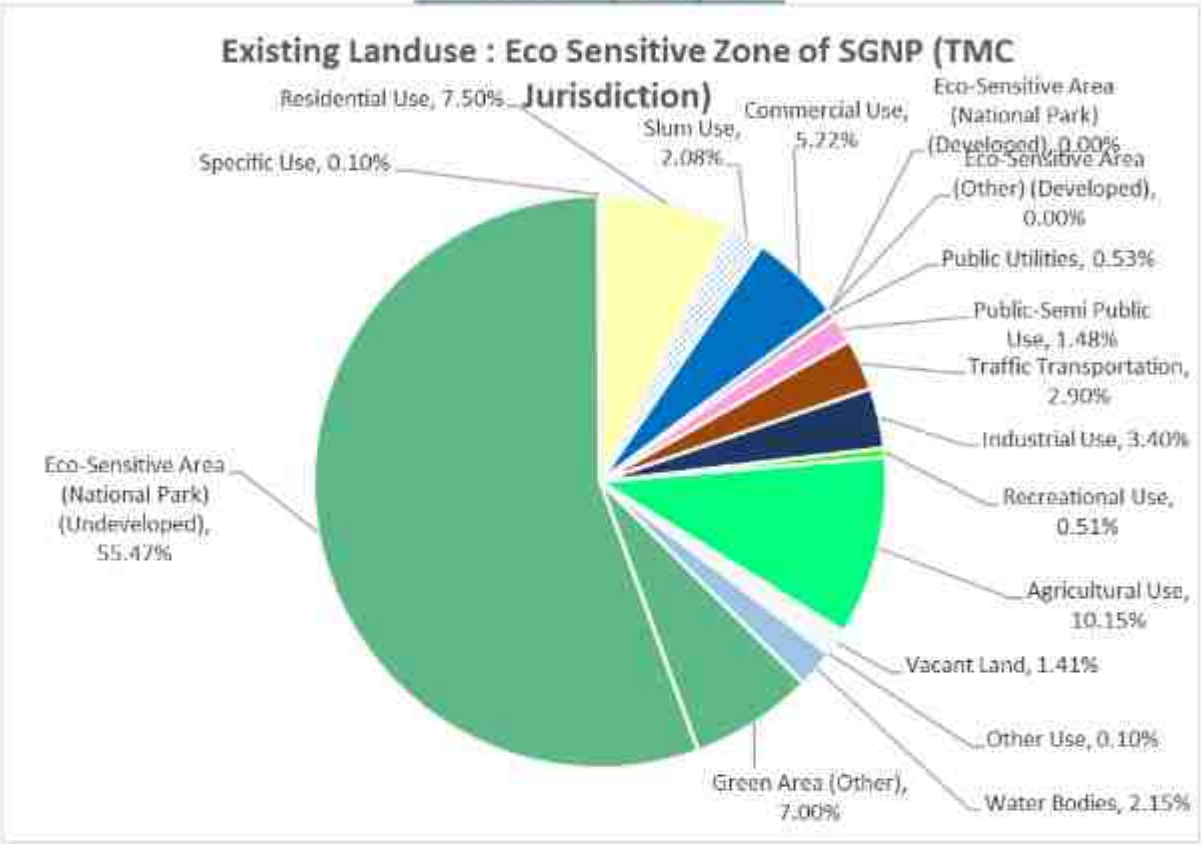
Land use	Area (Ha)	Percentage of Developed Area	Percentage of Total Area
Residential Use	92.914	31.75%	7.50%
Slum Use	25.702	8.78%	2.08%
Commercial Use	64.637	22.09%	5.22%
Eco-Sensitive Areas (Other)	0.023	0.01%	0.00%
Eco-Sensitive Areas (NP)	0.000	0.00%	0.00%
Public Utilities	6.619	2.26%	0.53%
Public-Semi Public Use	18.283	6.25%	1.48%
Traffic and Transportation	35.959	12.29%	2.90%
Industrial Use	42.153	14.41%	3.40%
Recreational Use	6.320	2.16%	0.51%
Developed Area	**292.610**	**100.00%**	**23.63%**
Agricultural Use	125.704		10.15%
Vacant Land	17.428		1.41%
Other Use	1.225		0.10%
Water Bodies	26.585		2.15%
Green Area (Forest)	86.631		7.00%
Eco-Sensitive Areas (Other+NP)	686.737		55.47%
Specific Use	1.197		0.10%

[8] Existing Landuse and Activity survey has been carried out in 2022-23. It has been updated for year 2024-25.

Undeveloped Area	**945.507**		**76.37%**
Total Area	**1238.117**		**100.00%**

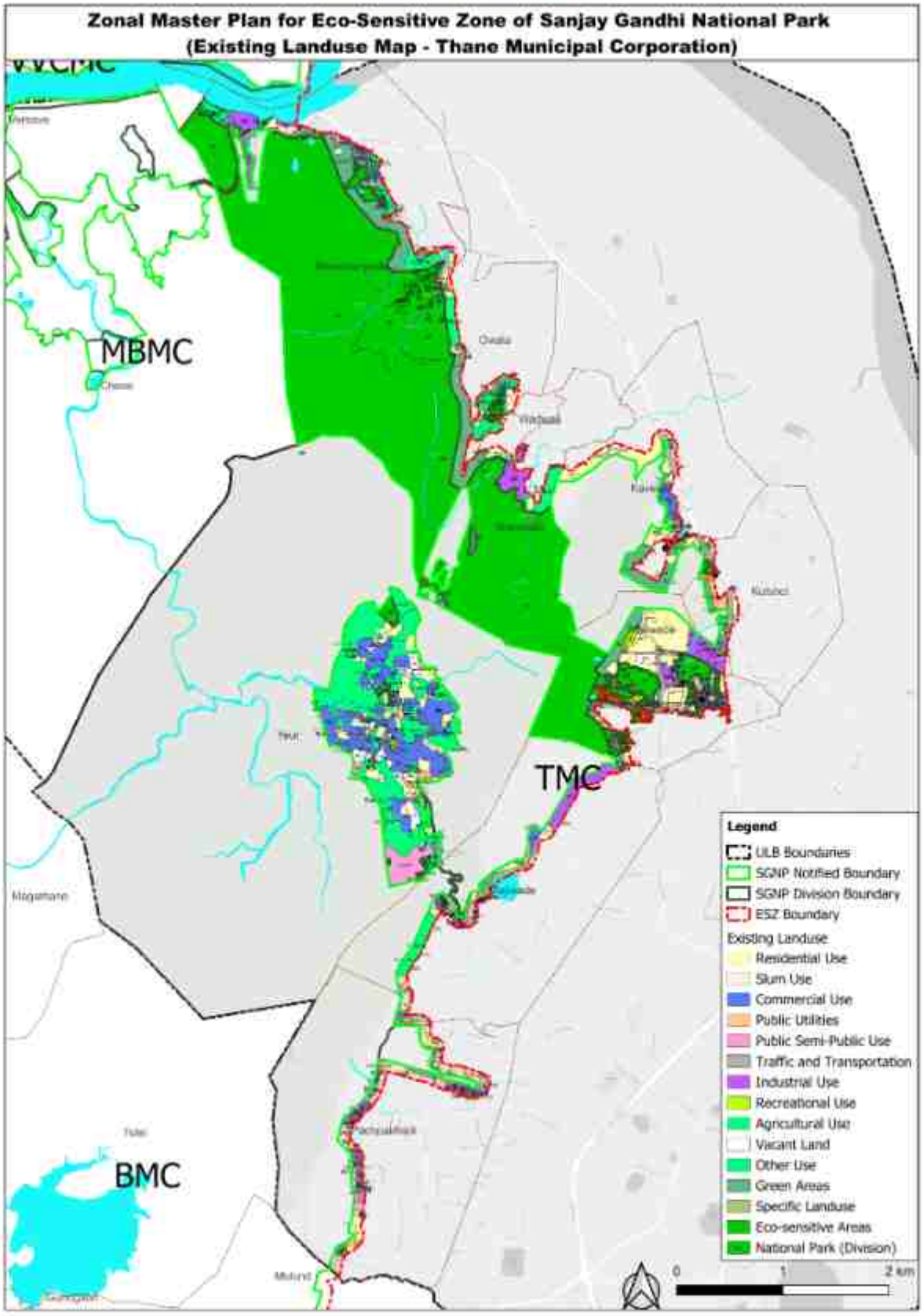
Source: Consultant Analysis

Figure 5-20: Existing Landuse Distribution of Eco-Sensitive Zone of Sanjay Gandhi National Park, TMC, 2024



Source: Consultant Analysis

Figure 5-21 Existing Land use Map for Eco-Sensitive Zone for Sanjay Gandhi National Park, 2024, TMC



Source: Consultant Analysis

5.13 Detailed Landuse and Activity Distribution, TMC

5.13.1 Residential land use

The Residential Use under the ESZ in TMC is spread over 80.798 Ha, out of which more than 90% are primarily residential, remaining are Residential and commercial mixed activities. These are activities which are regulated as per the ESZ Notification 2016.

Residential Land use – Sub Class	Total Area (Ha)
Residential/Commercial	1.397
Residential Area/ Colony	89.529
Township	1.988
Total	**92.914**

Source: Consultant Analysis

5.13.2 Slums

Within TMC limits there are 11 slums present in the ESZ details of which are given in the section 6.4.

Slums	Total Area (Ha)
Slums	25.702
Total	**25.702**

5.13.3 Commercial land use

Within the ESZ lies land of about 64.637 Ha is being utilised for commercial uses such as General Business, Hotel/Lodges or Restaurants and Resorts. The uses are complementing to the Residential use within the ESZ. The table below gives sub class wise Existing Land use.

Commercial Land use - Sub Class	Total Area (Ha)
Function Hall/ Marriage Garden	3.994
General Business	5.089
Hotel/ Lodge/ Restaurant	27.427
Petrol Pump/ LPG Filling Station	0.149
Private Offices	1.214
Resort	26.660
Shopping Centre/ Mall	0.010
Banks	0.094
Total	**64.637**

Source: Consultant Analysis

5.13.4 Eco-sensitive area

Mangrove forms part of the eco-sensitive area which is spread across an area of 1.101 Ha. in the Gaimukh area .

5.13.5 Social Infrastructure

Social infrastructure is a subset of the infrastructure sector and typically includes assets that accommodate social services to people. These include healthcare

(medical facilities and ancillary infrastructure), education (schools, universities and student accommodation), and housing.

5.13.5.1 Educational facilities

Educational facilities in existing land use refer to the classification and allocation of land for schools, colleges, universities, and other learning institutions within a given area. These facilities play a crucial role in urban and regional planning as they influence population distribution, infrastructure development, and community accessibility. A major Government Industrial Training Institute is present in the ESZ area in TMC, There is presence of 8 number of schools also

Educational Facilities – Sub Class	Total Area (Ha)
School	1.093
Anganwadi	0.011
College	0.160
Training Institute	1.697
Total	**2.961**

Source: Consultant Analysis

5.13.5.2 Health facilities

Health care services in existing land use refer to the planning and allocation of land for medical and wellness facilities. These facilities are essential for public health, emergency response, and community well-being. Integrating them effectively into urban and regional planning ensures accessibility, efficiency, and sustainability. There are two govt hospital within ESZ namely Swargiya Meenatai Thakre Prasuti Gruh and ESIC Hospital.

Health Facilities – Sub Class	Total Area (Ha)
Govt. Hospital/ Rural Hospital/ Municipal Hospital	0.310
Primary/ Community/ Urban Health Centre by ULB. / Govt	0.013
Private Hospital	0.323
Total	**0.646**

Source: Consultant Analysis

5.13.5.3 Other Public-Semi-Public

A Public & Semi-Public (PSP) Zone in land use planning refers to areas designated for facilities that serve the general public or specific community needs. These zones include essential public services which caters to the public. There is a defence protected area in form of cantonment/battalion (Air Force Station) in Yeoor.

Public – Semi-Public Facilities – Sub Class	Total Area (Ha)
Cantonment/ Battalion	10.592
Community hall	0.127
Orphanage	0.845
Police Station/Chowki	0.074
Public/ Community Toilet	0.094
Social Welfare Centre	0.024
Total	**11.756**

Source: Consultant Analysis

5.13.5.4 Religious

Religious places are an essential component of land use planning, categorized under Public and Semi-Public (PSP) zones in many urban and regional plans. These spaces serve as centers for worship, cultural activities, community gatherings, and social services. There are 14 temples, 4 mosques, 1 church and 2 gurudwara that falls in the Eco-Sensitive Zone across Thane jurisdiction.

Religious – Sub Class	Total Area (Ha)
Church	0.010
Gurudwara	0.096
Mosque	0.742
Others	0.793
Temple	0.713
Total	**2.354**

Source: Consultant Analysis

5.13.5.5 Government property

There is presence of central government property office TMC jurisdiction of ESZ. There are also state government property offices in TMC jurisdiction. There is Assistant Conservator of Forest office near Yeoor entrance of SGNP in form of Central Govt office. Apart from this, there is Mayor of Thane Bungalow and MSEB Quarters as State Govt properties.

Government Property – Sub Class	Total Area (Ha)
Central Government Property – Office	0.196
State Government Property – Office	0.137
State Government Property - Quarter	0.233
Total	**0.566**

Source: Consultant Analysis

5.13.5.6 Recreational use

Recreational places in land use planning refer to areas designated for leisure, sports, cultural activities, and outdoor enjoyment. These spaces contribute to the well-being of communities by promoting physical activity, social interaction, and environmental sustainability. It enhances mental and physical well-being by providing spaces for relaxation and exercise. It also improves the visual appeal of cities and promotes green infrastructure. Parks, Gardens and Playground forms the majority of the portion of the recreational facilities with clubs, gymnasium and others to follow. Amusement Park, Garden and Sport Centre forms major of recreational areas. There is Tikuji ni wadi present in a form of amusement park within ESZ.

Recreational Facilities – Sub Class	Total Area (Ha)
Amusement/Theme Park	2.222
Garden	2.175
Play Ground	0.173
Sports Centre	0.691
Others	0.780
Park	0.279
Total	**6.320**

Source: Consultant Analysis

5.13.6 Industrial use

Industrial activities are being carried out in the Eco Sensitive Zone of the SGNP. About 42.153 Ha of land is under Industrial use, some polluting and some Non-Polluting industries. There is huge amount of manufacturing industries in Majiwade and Panchpakhadi area in TMC. Industrial Activities are regulated and polluting industrial activities are prohibited in the ESZ. MPCB categorization of industries is given in bracket below.

Industrial - Sub Class	Total Area (Ha)
Agro based and Food Processing (Orange)	0.221
Manufacturing (Red)	37.459
Other Industries (Red)	1.211
Storage Godown (Green)	0.287
Service (Red/Green/Orange)	2.960
Warehouse (Green)	0.015
Total	**42.153**

Source: Consultant Analysis

5.13.7 Traffic and transportation

A Traffic and Transportation use in existing land use refers to areas designated for transportation infrastructure and movement of people and goods. These includes a network of Internal and Collector Road Network in TMC. Proposed Thane Borivali Tunnel starts from TMC. Also, Proposed Gaimukh to Ghodbunder Tunnel is also passing from TMC region.

Traffic and Transportation – Sub Class	Total Area (Ha)
Right of Way	2.460
Roads	32.622
Parking Space/ Area	0.125
Bus stand/ Terminus	0.752
Total	**35.959**

Source: Consultant Analysis

Total length of roads in ESZ in TMC is 36.94 Kms with majority of roads having width less than 6 Metres. Width wise Length distribution within ESZ in VVCMC is given below.

Table 5-20 Length of roads as per road widths, TMC

S. No	Road Width (Metres)	Length (Km)
1	Upto 6	22.138
2	6-9	4.595
3	9-12	3.274
4	12-15	1.032
5	15-18	1.915
6	18-24	1.757
7	24-30	0.348
8	30 and above	2.032

9	Grand Total	37.091

Source: Consultant Analysis

5.13.8 Agriculture Use

An Agriculture Zone in existing land use refers to areas designated for farming, livestock rearing, and other agricultural activities. There is a huge presence of fallow/barren/pad land in the Majiwade and Yeoor are in TMC jurisdiction within the ESZ.

Agriculture Use – Sub Class	Total Area (Ha)
Cropland	0.154
Plantations	0.366
Plant Nursery	0.362
Fallow land/Barren land/ Pad land	124.822
Total	**125.704**

Source: Consultant Analysis

5.13.9 Specific Use

Under specific land use, there is presence of one sand depot in Gaimukh portion of which falls in the TMC jurisdiction.

Specific Use – Sub Class	Total Area (Ha)
Mining Area	1.197
Total	**1.197**

Source: Consultant Analysis

5.13.10 Other Use

This zone consists of area which are Tree Clad, water Bodies and Cow Sheds, Dairy Farm etc. Significant amount of area is covered under green areas under tree which helps in maintaining ecological balance in the Eco-sensitive zone. Waterbodies in forests play a vital role in supporting wildlife by providing drinking water, maintaining biodiversity, and sustaining the ecosystem. Tree Clad Area and National Park dominates the other uses in TMC.

Other Use – Sub Class	Total Area (Ha)
Green Area (Tree Clad Area)	86.63
National Park (Division)	685.636
Reserved Forest	0.001
Water Bodies	26.585
Dairy Farm	1.225
Vacant Land	17.428
Total	**817.505**

Source: Consultant Analysis

5.13.11 Public Utilities

An area of 6.619 Ha is utilised for the provision of Public Utilities and or Infrastructure.

Public Utilities – Sub Class	Total Area (Ha)
Crematorium Burial Ground / Grave Yard	0.734
Electric Sub-Station	3.247
Ground Level Reservoir	1.007
Satellite and Telecommunication Centre	1.454
Others	0.086
Pump House	0.074
Water Pumping Station	0.017
Total	**6.619**

Source: Consultant Analysis

5.14 Existing Infrastructure in ESZ

The physical Infrastructure is spread across each of the ULB's and ESZ forms a significantly smaller part of each Urban local body, for any kind of holistic analysis. However, the section below gives a detail on the physical infrastructure present within the ESZ. Except for Water supply System, where key and critical infrastructure project are located within the SGNP and its ESZ, for all other Infrastructure the key asset locations are outside the ESZ.

5.14.1 Status of Physical Infrastructure

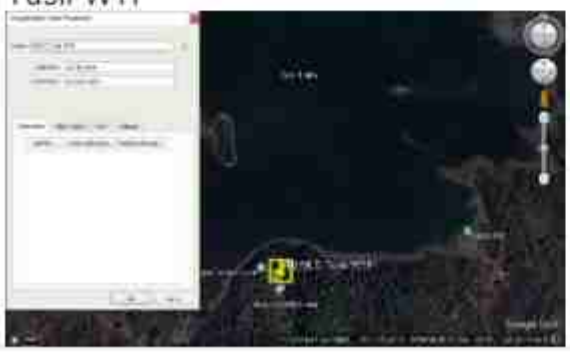
5.14.1.1 Existing and Proposed Water supply Infrastructure in SGNP and ESZ

5.14.1.1.1 Water Treatment Plants and Intake Works

BMC has its three Water Supply assets within the SGNP and the ESZ. One is the Tulsi Water Treatment Plant and other is the Bhandup Water Treatment Complex. Intake and pumping station of Vihar Lake also falls in the ESZ Each of these utilities are critical to the supply of the Potable water to entire Mumbai.

1. The Tulsi Water Treatment Plant (WTP) has been operational since its commissioning in 1985. Covering an area of approximately 2000–2500 square meters, the plant is located within Sanjay Gandhi National Park and is surrounded by dense forests and trees. It is under upgradation currently
2. Intake and pumping station of Vihar Lake for pumping water to inlet bay of Bhandup Complex WTP.

Tusli WTP



Tusli WTP

New 2000 MLD WTP in Bhandup Complex

Intake and pumping stations at Vihar

Source: BMC

5.14.1.1.2 Water Supply Transmission and Distribution Network

BMC conveys water through a system of large trunk pipelines as well as through Water tunnels which pass underneath the SGNP and ESZ supplying water to ESR and GSR across Mumbai BMC supplies Water Supply through a network of Water distribution pipelines. The map below shows the water Supply Network of Mumbai. Total length is 94.456 km in ESZ

MBMC conveys water through a series of pipelines with diameters ranging from 100mm to 400mm in existing water supply network and diameters ranging from 150mm to 600mm in proposed water supply network. Total length of existing water supply line within ESZ in MBMC is 2.47 Km and of proposed water supply line is 1.48 Km.

VVCMC conveys water through a series of pipelines with diameters ranging from 100mm to 150mm in existing water supply network Total length of existing water supply line within ESZ in VVCMC is 1.95 Km

Existing water supply distribution network in ESZ in MBMC

Diameter of pipe	Length (Km)
100mm	0.74
150mm	1.48
200mm	0.07
250mm	0.06
300mm	0.16
400mm	0.16
Total	2.47

Source: MBMC

Proposed water supply distribution network in ESZ in MBMC

Diameter of pipe	Length (Km)
150mm	0.38
200mm	0.25
300mm	0.4
350mm	0.01

600mm	0.44
Total	1.48

Source: MBMC

Existing water supply distribution network in ESZ in VVCMC

Diameter of pipe	Length (Km)
100mm	0.107
150mm	1.841
Total	1.949

Source: VVCMC

Existing water supply distribution network in ESZ in TMC

Diameter of pipe	Length (Km)
Below 100mm	7.540
100mm	3.808
150mm	3.589
200mm	4.923
250mm	1.630
300mm	2.250
350mm	0.710
400mm	1.750
450mm	1.524
500mm	1.821
600mm	0.631
700mm	0.694
750mm	0.931
900mm	0.996
Total	32.797

Source: TMC

5.14.1.1.3 Proposed water supply infrastructure

1. Bhandup Water Treatment Complex: New 2000 MLD WTP is proposed in Bhandup complex area which currently houses two WTPs of 1910 MLD and 900 MLD capacity.
2. Intake and pumping stations at Vihar Lake.

3. This proposed water supply line connects to the Master Balancing Reservoir present in the Chene village area which fall in the SGNP Forest area.

Source: MBMC

5.14.1.2 Sewerage system

BMC collection the sewerage through a network of Sewer collection network from entire Mumbai including ESZ. The Sewage Treatment Plants and pumping stations are located downstream near the Nallahs and Coastal areas. There are no sewerage assets in ESZ of SGNP. The total length of sewer collection network is 8.634 Km in ESZ

There is very little presence of sewerage system within the ESZ area in MBMC with only approx. 123 meter of sewerage line. Apart from this all-other sewerage line network fall outside ESZ. There are no sewerage assets in ESZ in SGNP in MBMC jurisdiction.

There are no sewerage assets that falls in the VVCMC jurisdiction.

Around 11.017 km of sewage collection network falls in the Eco Sensitive Zone in TMC jurisdiction with pipe dia ranging from 20mm to 450mm.

5.14.1.3 Solid Waste Management

A Construction and Demolition waste processing Plant is located at Kokanipada near Dahisar within the ESZ near to an RMC Plant. The C & D waste processed forms and input to the RMC plant. Map shows the location of the Plant.

There is no asset for the purpose of solid waste management falls within the Eco Sensitive Zone in MBMC as well as VVCMC jurisdiction.

There is a Proposed 100 TPD Organic Waste Composter in TMC in Bhaindarpada village.

5.14.1.4 Storm Water Drain

Around 15.876 km of storm water drain falls in the Eco Sensitive Zone in BMC area and around 4.65 km falls in the Eco Sensitive Zone in MBMC area. There is no storm water network in VVCMC jurisdiction in ESZ. Around 14.66 km of closed storm water drains and 11.59 km of open storm water drains are present in ESZ in TMC jurisdiction.

5.14.2 Status of Traffic and Transportation

3 major road networks are used for vehicular movement in ESZ within BMC area to pass across ESZ. These are Aarey Road, proposed Goregaon Mulund Link Road and proposed Thane Borivali twin tunnel project. All other roads end in the Eco Sensitive Zone area and take the traffic in and out of the ESZ area not across the ESZ area.

Total Length of the Aarey Road which passes through the ESZ is 6.82 Km.

Total Length of Goregaon Mulund Link Road which passes though the ESZ area is 2.82 Km. All of this length passes through as a tunnel below the Sanjay Gandhi National Park and does not affect the ESZ. An additional length of 3.83 Km passes below the Forest area of Sanjay Gandhi National Park.

A twin tunnel is also proposed from Thane to Borivali which will passes below the ESZ area.

Also, Western Express Highway passes through the ESZ with a length of 0.5 Km near Borivali.

Total road length within ESZ in BMC is 129.776 Km. More than 90% of the roads have a width less than 12 meters and are primarily collector roads in BMC.

Also, Western Express Highway passes through the ESZ with a length of 1.19 Km in MBMC.

Ghodbunder road of approx. 3.4 Km length passes through ESZ in MBMC jurisdiction.

Total road length within ESZ is 27.96 Km. More than 90% of the roads have a width less than 12 meters and are primarily collector roads in MBMC.

Mumbai-Ahmedabad Highway of approx. 2.04 Km length passes through ESZ in VVCMC jurisdiction. Around 0.804 Km of Virar Alibag MMC corridor passes through VVCMC.

Total length in ESZ in VVCMC is 14.37 Km with majority of roads having width less than 6 Metres. Width wise Length distribution within ESZ in VVCMC is given below.

Chinchoti-Anjur Phata Marg passes through the Vasai Taluka Region. Total length in ESZ in Vasai Taluka is 25.72 Km with majority of roads having width less than 6 Metres. Around 2.572 Km of Proposed Virar Alibag MMC corridor passes through Vasai Taluka whereas 1.938 Km of Proposed Mumbai Ahmedabad High Speed Rail passes through Vasai Taluka.

Total length in ESZ in TMC is 37.09 Km with majority of roads bring less than 6 metres in width.

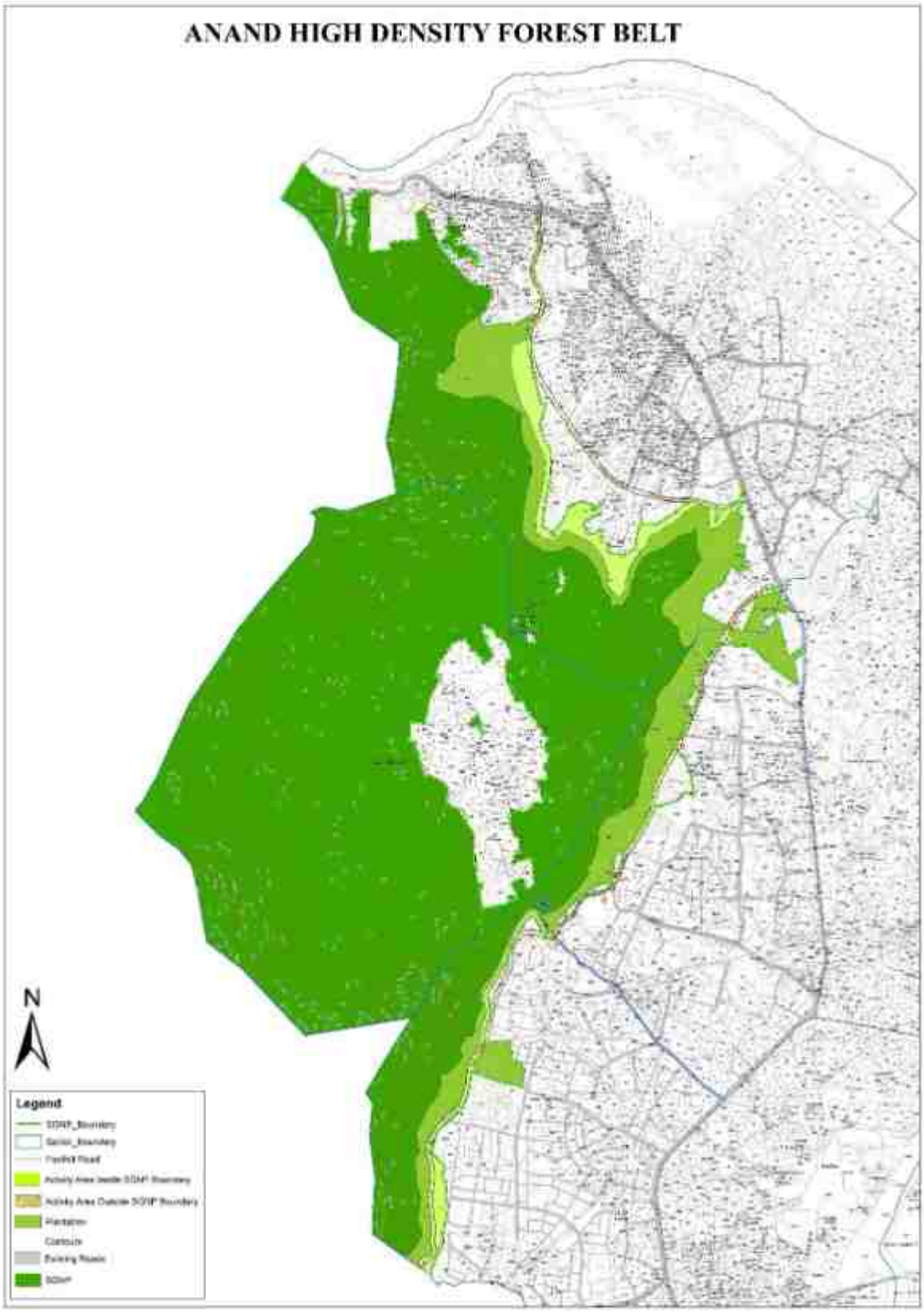
Table 5-21 Road lengths as per width in ESZ

		Length in KM					
S. No	Road Width (Metres)	BMC	MBMC	VVCMC	VasaiTaluka	TMC	Total
1	0-6	66.569	13.157	10.156	17.689	22.138	129.709
2	6-9	39.551	6.666	1.533	2.203	4.595	54.548
3	9-12	16.620	2.358	0.185	3.372	3.274	25.809
4	12-15	3.625	0.788	0.400	2.459	1.032	8.304
5	15-18	2.201	0.323	0.000	0.000	1.915	4.439
6	18-24	0.504	2.483	0.800	0.000	1.757	5.544
7	24-30	0.228	1.497	0.000	0.000	0.348	2.073
8	30 and above	0.478	0.690	1.297	0.000	2.032	4.497
9	**Grand Total**	**129.776**	**27.962**	**14.371**	**25.723**	**37.091**	**234.923**

Source: Consultant Analysis

5.14.3 Proposal within New Development Plans

Figure 5-22 Details of Anand High Density Forest Belt



Source: Thane Municipal Corporation

TMC has proposed green belt around SGNP named Anandwan. This anandwan green belt will act as a buffer to SGNP.

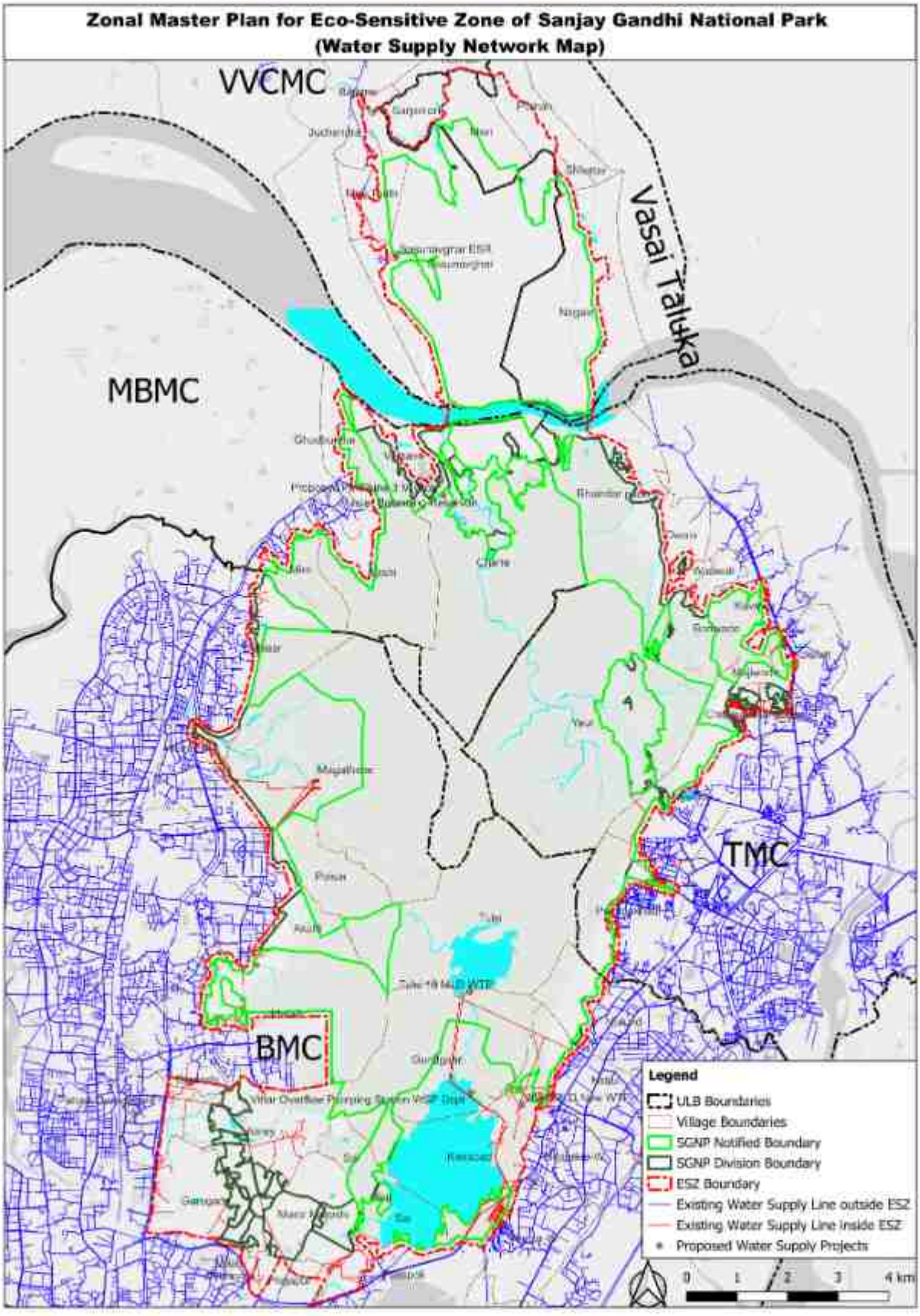
The "TMC Green Belt" refers to a proposed project by the Thane Municipal Corporation (TMC) to develop a green belt along the periphery of Sanjay Gandhi National Park (SGNP) Anandwan. This project is part of a larger effort to create a buffer zone around SGNP, potentially acting as a barrier against urban encroachment and providing recreational spaces. The "Anandwan" mentioned is likely a location within that proposed green belt area.

As part of the proposals within Thane Municipal Corporation region, Anand High Density Forest Belt has been provided within and outside the SGNP Boundary of around 305 Ha area with area for Tourism activities in the form of nature trails of about 108 Ha.

Area Statement for Anand High Density Forest Belt						
Sr No	Section No	Section Of Linear Belt	Chainage (Km)		Area for Tourism Activities (Facilitation Trails	Area for Plantation (Ha)
1	1	North Gate (A) to SGNP Vasor Gate (B)	0 - 4.3	Inside SGNP Boundary	24	57
2	2	SGNP Vasor Gate (B) to Sawand Baug (C)	4.3 - 5.4	Outside SGNP Boundary	6	85
3		Sawand Baug (C) to Kinhavali (D)	5.4 - 6.4	Inside SGNP Boundary	5	
4		Kinhavali (D) To SGNP Tiwjai Ni Wadi Gate (E)	6.4 - 7.6	Outside SGNP Boundary	7	
5		(F) to (F)	7.6 - 7.8	Inside SGNP Boundary	4	
6	3	(I) to (G)	7.8 - 9.2	Outside SGNP Boundary	7	221
7		(G) to New Thane Park (H)	9.2 - 9.5	Inside SGNP Boundary	6	
8		Jung Water Park (I) to Common Hawaiian Bungalow (J)	9.5 - 17.1	Inside SGNP Boundary	51	
9		Common Hawaiian Bungalow (J) to Gidhiig Ground, Thane (K)	17.1 - 18.4	Outside SGNP Boundary	5	
				Total	108	363

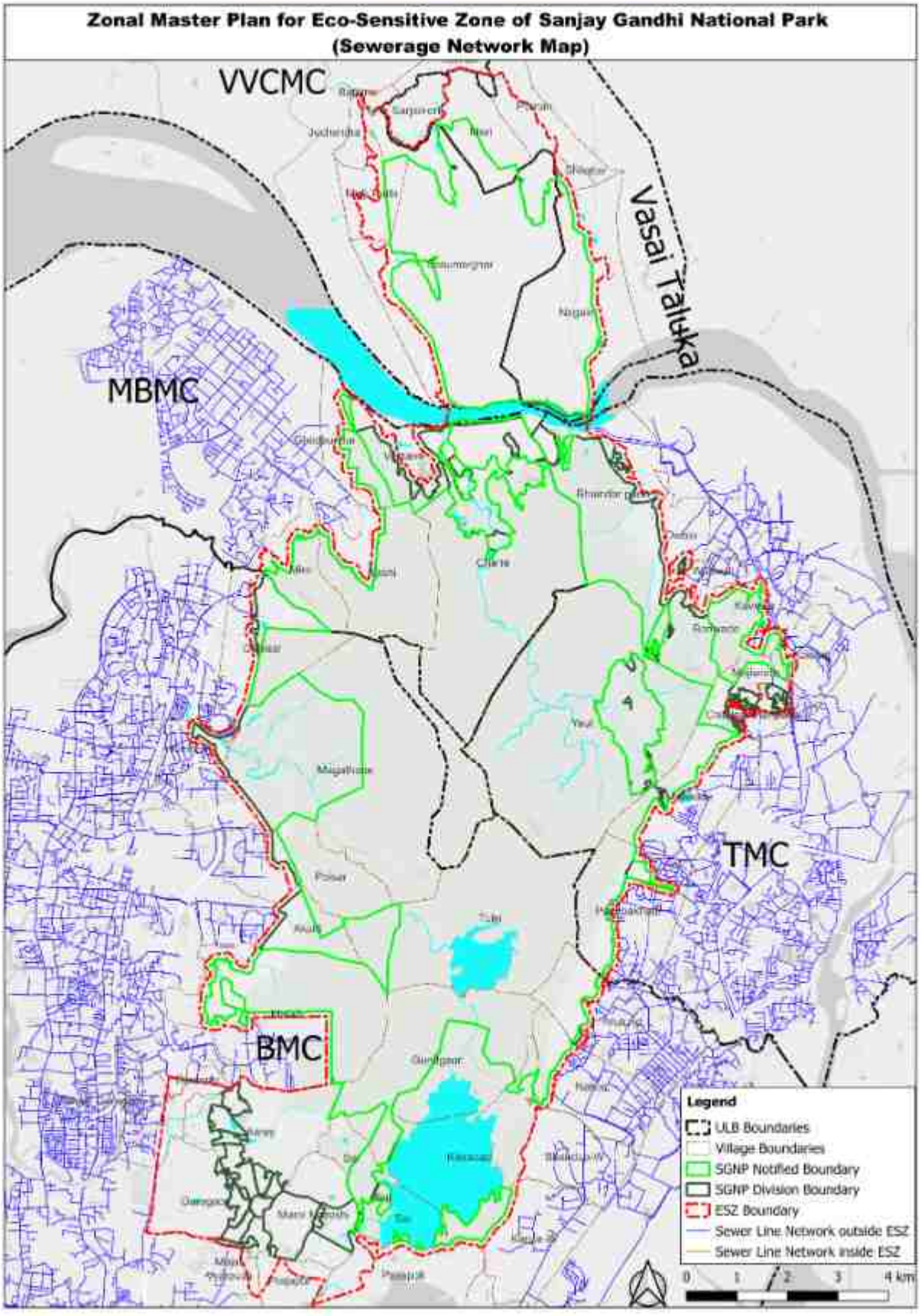
Source: Thane Municipal Corporation

Figure 5-23: Water supply Network in ESZ



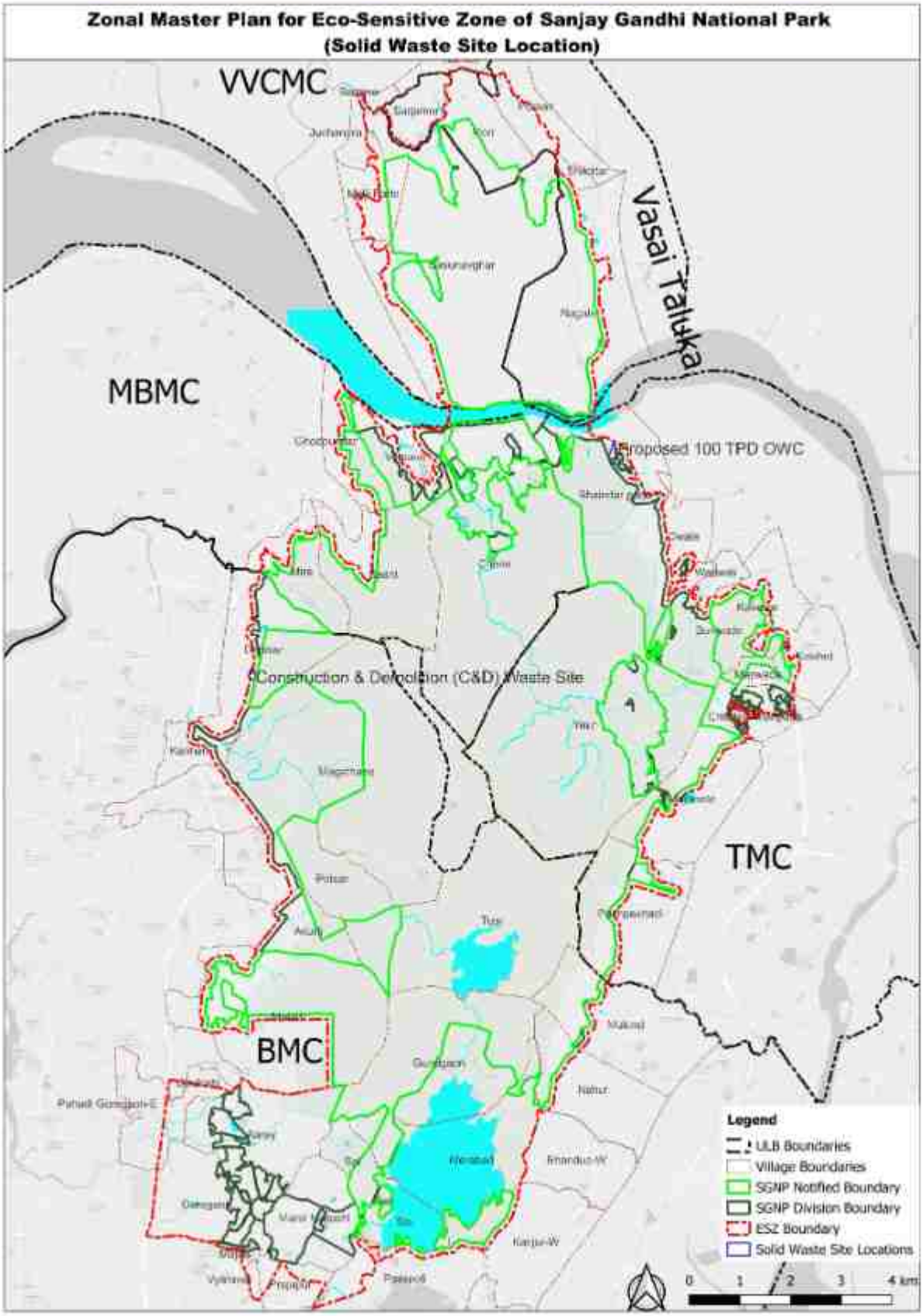
Source: BMC, MBMC, VVCMC and TMC 2024

Figure 5-24: Sewerage Network in ESZ



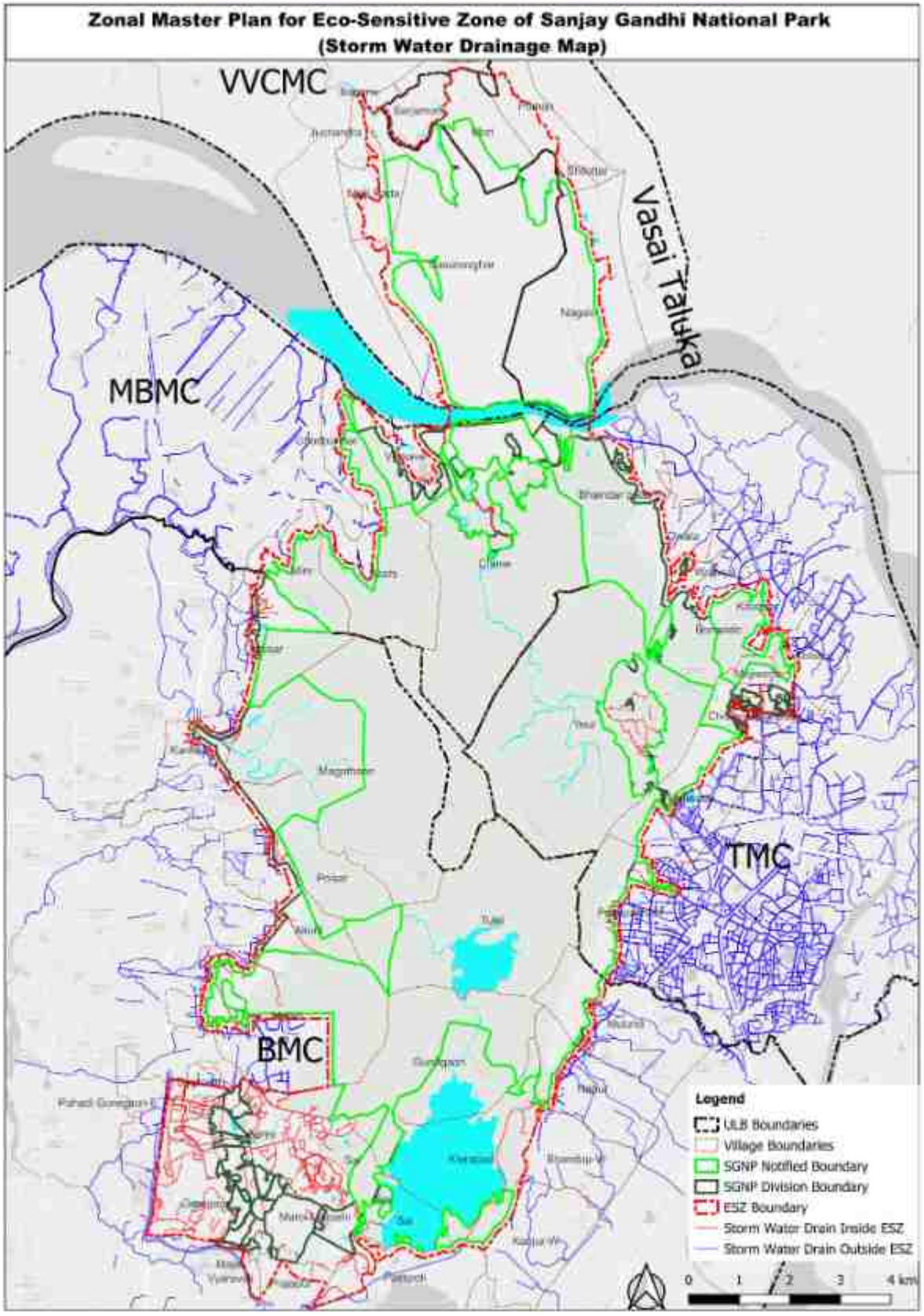
Source: BMC, MBMC, VVCMC and TMC 2024

Figure 5-25: Location of the Solid waste Infrastructure in ESZ, BMC



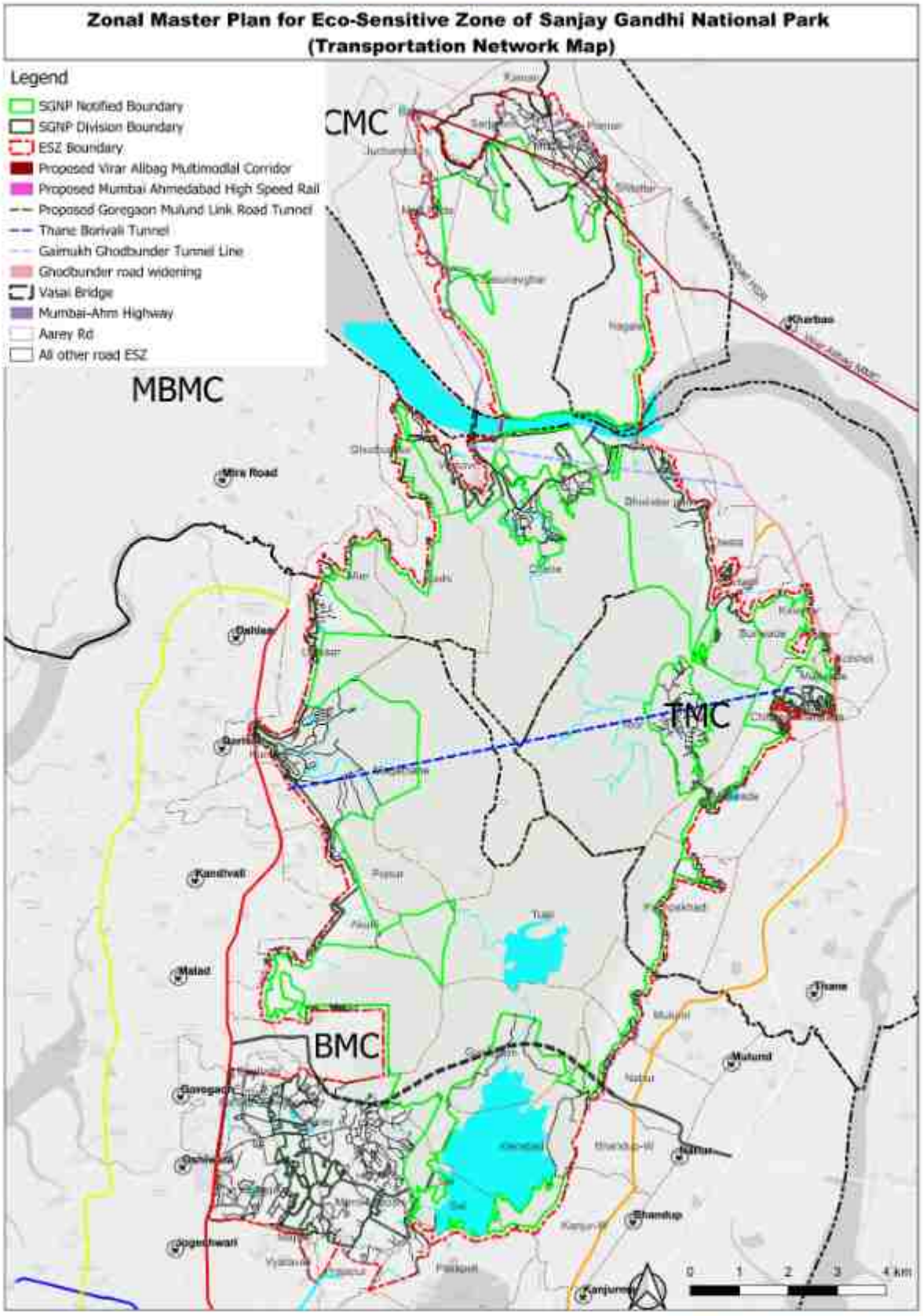
Source: BMC, TMC 2024

Figure 5-26 Storm water drain network within ESZ



Source: BMC, MBMC, VVCMC and TMC 2024

Figure 5-27: Transportation network within ESZ



Source: Consultant Analysis

6 DATA ANALYSIS AND VULNERABILITY IN ESZ

This section consists of conflicts based on the existing land use activities that are being carried out conflicts due to human animal interaction and determination of the vulnerability of the ESZ with respect to its existing conditions using the Multi Criterion Decision making approach. The section builds upon the information collected from lands use and other sources.

6.1 Activities Carried out within ESZ

Based on the activity classification provided in the ESZ notification 2016, 53.42% of the area under the ESZ falls under Promoted category uses, as per the Existing land use survey. 42.30% activities are under Regulated category and around 5% activities by area under the Prohibited category.

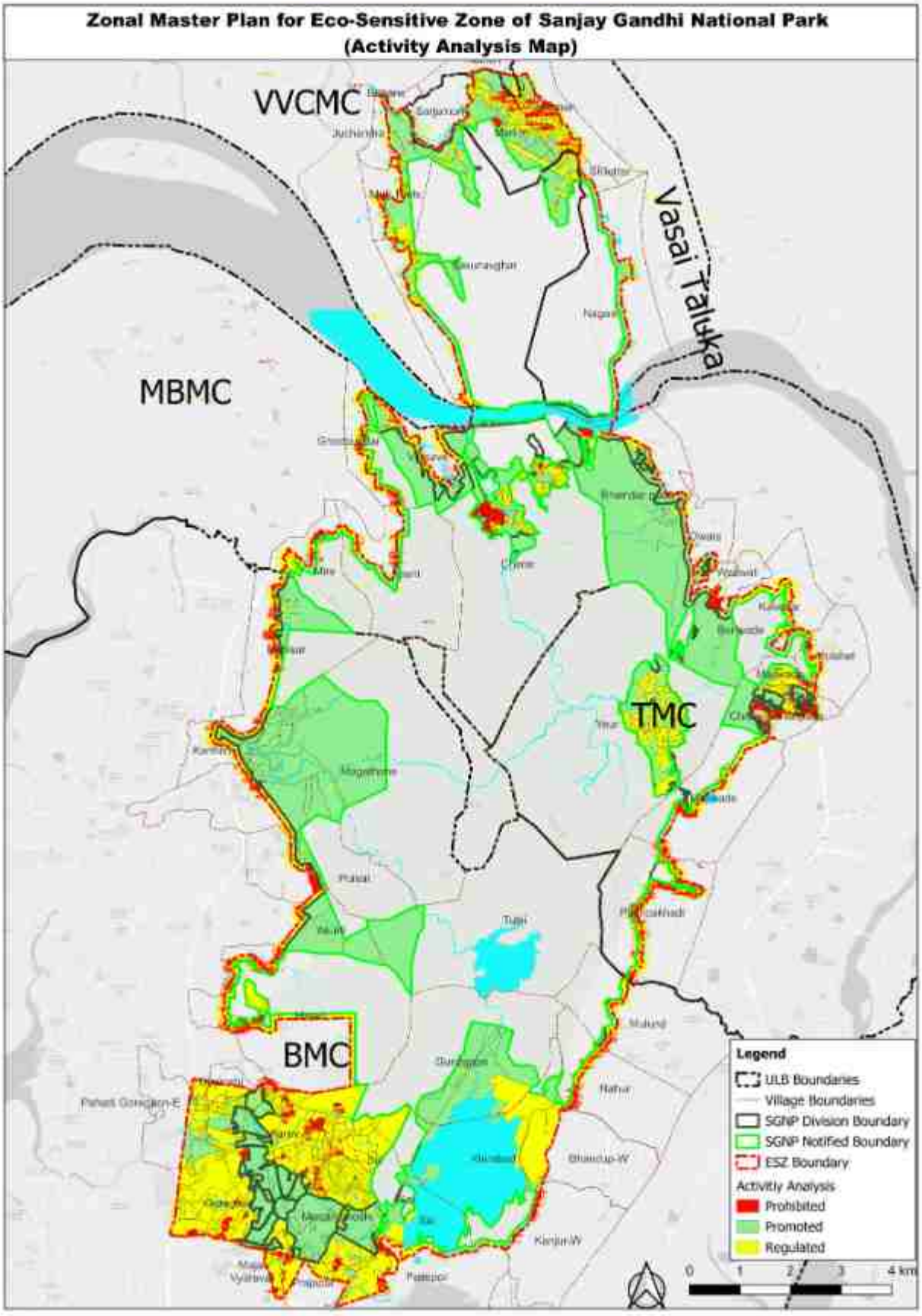
Table 6-1: Category wise Activity analysis within ESZ, as per ESZ notification

Type of Activities	Land Area in Hectare	% Share
Prohibited	254.207	4.28%
Promoted	3,176.387	53.42%
Regulated	2515.006	42.30%
Total	**5945.600**	**100%**

Source: Consultant Analysis

In order to identify new or expansion of conflicting activities with respected to the prohibited activities listed in ESZ Notification 2016, 5th December 2016 shall be considered as the cut-off date.

Figure 6-1 Activity Analysis Map



Source: Consultant Analysis

Table 6-2: Category wise Activity analysis within ESZ, as per ESZ notification, BMC 2024

Type of Activities	Land Area in Hectare	% Share
Prohibited	157.061	4.46%
Promoted	1584.404	45.01%
Regulated	1778.447	50.53%
Total	**3519.912**	**100%**

Source: Consultant Analysis

Table 6-3: Category wise Activity analysis within ESZ, as per ESZ notification, MBMC 2024

Type of Activities	Land Area in Hectare	% Share
Prohibited	39.400	8.59%
Promoted	267.470	58.29%
Regulated	151.959	33.12%
Total	**458.829**	**100%**

Source: Consultant Analysis

Table 6-4: Category wise Activity analysis within ESZ, as per ESZ notification, VVCMC 2024

Type of Activities	Land Area in Hectare	% Share
Prohibited	0.814	0.25%
Promoted	241.863	73.00%
Regulated	88.620	26.75%
Total	**331.297**	**100%**

Source: Consultant Analysis

Table 6-5: Category wise Activity analysis within ESZ, as per ESZ notification, Vasai Taluka 2024

Type of Activities	Land Area in Hectare	% Share
Prohibited	10.726	3.19%
Promoted	179.876	53.55%
Regulated	145.273	43.25%
Total	**335.875**	**100%**

Source: Consultant Analysis

Table 6-6: Category wise Activity analysis within ESZ, as per ESZ notification, TMC 2024

Type of Activities	Land Area in Hectare	% Share
Prohibited	46.206	3.73%
Promoted	902.774	72.92%
Regulated	289.137	23.35%
Total	**1238.117**	**100.00%**

Source: Consultant Analysis

6.2 Challenges & Threats to Wildlife

The wildlife in this area faces several threats, primarily due to habitat destruction caused by encroachment and illicit tree felling. Mining activities, particularly stone quarrying near the park's boundaries, further disrupt the natural habitat. Human-wildlife conflict, especially involving leopards, remains a significant challenge, often leading to dangerous encounters. Additionally, the lack of sufficient space, along with garbage accumulation and the presence of domestic animals in peripheral areas, forces young leopards to stray beyond the protected zone, increasing their mortality risk due to road accidents and other hazards. The presence of 39 tribal settlements (padas) within the SGNP also contributes to disturbances, further impacting the surrounding wildlife and their ecosystem.

6.2.1 Encroachments and informal settlements

Encroachments and informal settlements around Sanjay Gandhi National Park (SGNP) pose one of the most serious threats to its ecological integrity. The Park, situated in the heart of the Mumbai Metropolitan Region, is surrounded by rapidly expanding urban settlements. With over 3 million people living on its fringes, pressure on the park's boundaries has intensified, leading to unauthorized construction and clearing of forest land for housing, agriculture, and infrastructure. These encroachments often occur on land acquired under the Maharashtra Private Forest (Acquisition) Act, 1975, and the Land Acquisition Act, 1894 (amended 1968), where demarcation and enforcement remain weak.

Many of these settlements have evolved into densely populated slums or "hutments," often lacking basic services and formal recognition. As population densities rise, new dwellings continue to push further into the park's buffer and even core zones. This expansion not only reduces forest cover but also fragments wildlife habitats, increases human-wildlife conflict, and degrades ecosystem services. Despite legal action-including Writ Petition No. 305/1995 by the Bombay Environmental Action Group (BEAG)-and various court orders, enforcement remains inconsistent. Encroachments continue to spread, undermining conservation efforts and threatening the long-term sustainability of one of India's most unique urban forests. *(FMP, SGNP, 2024-25 to 2033-34)*

6.2.2 Human-wildlife conflict and conservation challenges

The incidence of human animal conflict in this area is notably high, particularly involving leopards. As leopards stray outside the forest, the dense human settlements surrounding SGNP, both authorized and unauthorized, lead to panic among residents. Several factors contribute to this conflict, including a high leopard population along the park's periphery, their reliance on stray and domestic dogs as primary prey, and the presence of solid waste and garbage, which attract stray dogs and pigs-ultimately drawing leopards into human-inhabited areas.

Due to the large human population in and around the park, leopard attacks on humans have occurred, with the issue becoming particularly severe in 2003-04. However, since then, incidents have declined, with only one reported attack in 2007. Nearly

70% of leopard attacks have taken place within the park, primarily due to the unrestricted movement of encroachers, even during late-night and early-morning hours when leopards are active. Ensuring protection for individuals inside the park under such circumstances remains a significant challenge.

6.2.3 Illegal activities (deforestation, poaching)

Illicit tree felling is a frequent concern, particularly in the Nagla round of the Yeur range. In some cases, this activity is carried out in an organized manner, making it difficult for field staff to prevent such incidents. There have also been instances where timber thieves have attacked staff attempting to stop illegal logging. To address this issue, group patrolling has been initiated.

Poaching of wild animals and plants is not a significant problem in the area. Unauthorized collection of medicinal plants, orchids, and other flora for commercial purposes has not been observed. However, past cases of poaching, primarily involving tribal communities and encroachers, have been recorded.

Grazing by cattle and livestock in the park is minimal and does not pose a major management challenge. The tribal communities residing within the park do not rear livestock, and there are no cattle camps inside the park. While cattle from nearby areas occasionally graze on the park's outer fringes, they do not venture deep into the forest. Grazing within the park's notified area is strictly prohibited under the Wildlife (Protection) Act, 1972.

No formal extraction of fuel, fodder, or minor forest produce takes place within the division. However, tribal communities and encroachers residing within and around the park illegally collect fuelwood, fodder, and minor forest products such as Tad fruits for their daily sustenance.

6.2.4 Waste management

Waste disposal remains one of the most pressing challenges in this area, particularly due to the presence of numerous labour sheds and tribal settlements (padas). The accumulation of solid waste, particularly in and around the park's periphery, attracts stray dogs and other scavengers, which in turn disrupts the natural food chain and increases human-wildlife conflict, particularly with leopards. Improper waste disposal by nearby settlements, encroachers, and visitors further exacerbates the issue, leading to habitat degradation and contamination of water sources. Additionally, the high footfall of visitors contributes to noise pollution, littering, and disturbances to the park's flora and fauna. Krishnagiri Upvan faces severe environmental threats from plastic pollution, as plastic usage within the park has been significantly high.

6.2.5 Mining

In past, numerous stone quarries have operated in close proximity to the outer boundaries of SGNP, causing significant environmental degradation. Continuous and large-scale quarrying activities have led to extensive landscape destruction, deforestation, and loss of wildlife habitat. Additionally, these operations have resulted in severe air and noise pollution, soil erosion, and the depletion of fertile topsoil.

Blasting activities associated with quarrying pose a considerable threat to both human safety and wildlife, further exacerbating ecological disturbances in the region.

6.2.6 Fire Hazard

Forest fires pose a significant threat to Sanjay Gandhi National Park (SGNP), particularly during the dry months of April and May, with some incidents occurring as early as November. These fires are predominantly anthropogenic, often resulting from human activities. The Park has experienced substantial losses due to such fires; between 2009 and 2013, over 43,000 acres of forest land were affected in the Thane circle of SGNP. A notable factor contributing to the increased fire hazard is the gregarious flowering of bamboo species within the park. In 2007 and 2008, extensive flowering of Katang bamboo (Bambusa arundinacea) and Manvel bamboo (Dendrocalamus strictus) was observed across approximately 103.68 square kilometres of SGNP. Post-flowering, these bamboo species naturally die off, leaving behind large quantities of dry biomass that serve as highly flammable material, significantly elevating the risk of forest fires. The accumulation of this dry bamboo biomass has led to severe fire incidents in subsequent years, notably during the fire seasons of 2010 and 2011, resulting in extensive damage to the forest ecosystem. Despite the park's status as a protected area under the Wildlife Protection Act of 1972, which restricts the removal of dead bamboo, the management has recognized the necessity of addressing this issue to mitigate fire risks.

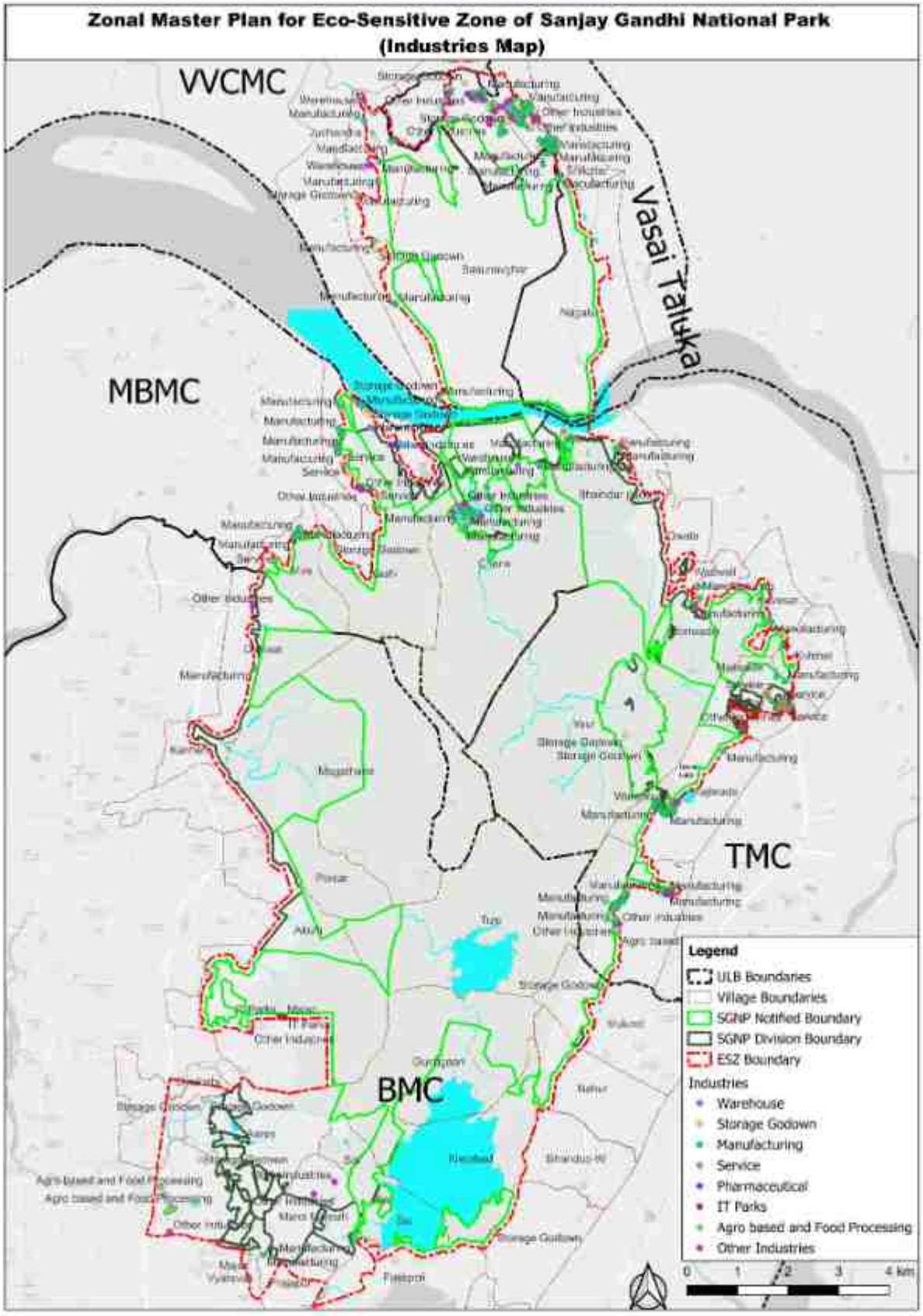
6.3 Conflicts of Activities carried out in ESZ

The ESZ notification lists out activities which are promoted, regulated and prohibited within the ESZ. The analysis of the existing Landuse, development Plan and the ESZ notification resultant in the identification of conflicts which are currently affecting the Eco Sensitive Zones. Cut-off date to be taken as 5th December 2016 which is date of final ESZ notification 2016.

6.3.1 Industries within ESZ

Industrial activities, including Ready-Mix Concrete (RMC) plants, have been found to contribute to pollution and environmental degradation within SGNP. These industries release harmful pollutants into the air and water, affecting the overall health of the park's ecosystem. The following industrial locations have been identified for immediate action under the relevant provision to ensure environmental protection and sustainable conservation of ESZ of SGNP.

Figure 6-2: Industries within ESZ, 2024



Source: Consultant Analysis

Table 6-7: Industrial Activity Conflicts within ESZ, BMC Area, 2024

Sr. No.	Ward	Name of Location	Type of Conflict	Estimated Area (Sq.M)
1	R/North	Konkani Pada, Dahisar East	RMC Plant adjoining the Construction and Debris waste processing Plant of BMC. The Location adjoins the national park	12981.20
2	P/South	Aarey, Jogeshwari East	RMC Plant which is partially within ESZ.	18,479.70
3	P/South	Aarey	Bakery	1,414.81
	K/East	Prajapur		3,748.62

Source: Consultant Analysis

Figure 6-3: Industrial Activity Conflicts within ESZ, BMC Area, 2024

Cement plant at Kokanipada, P North

Cement Plant at Aarey jogeshwari P South

Modern Bakery (Bimbo Bakeries India) at Aarey

Source: Consultant Analysis

Table 6-8 Industrial Activity Conflicts within ESZ, MBMC Area, 2024

Sr.No	Location	Type of Conflict	Estimated Area (sqm)
1	Ghodbunder	RMC	1857.328
2	Ghodbunder	RMC	1019.357
3	Ghodbunder	RMC	8769.421
4	Chene	J Kumar Casting yard	171815.622
5	Ghodbunder	Construction Materials	5452.075
6	Ghodbunder	Construction Materials	225.621
7	Chene	Construction Materials	31236.659
8	Versave	Construction Materials	173.808
9	Ghodbunder	Anu Industries (paper & ink manufacturing)	3590.272
10	Chene	Cement, Concrete Footpath Interlocking Tile	6389.636
11	Chene	Concrete Pavers Manufacturing	7136.52
12	Versave	Suryadipta Projects Pvt. Ltd. manufacturing boat propeller and agitators	12990.261
13	Versave	Shree Buddheshwar private limited estate	9528.907
14	Versave	Metal Parts Manufacturer	1607.724
15	Kashi	Dyeing Factory	2606.697
16	Mire	Manufacturing construction material	31456.33
17	Kashi	Card Board Factory	1467.224

Source: Consultant Analysis

Figure 6-4 Industrial Activity Conflicts within ESZ, MBMC Area, 2024

1 and 2. RMC Plant

3.RMC Plant

4.J Kumar Casting Yard

5.Construction Materials

6.Construction Materials

7.Construction Materials

8. Construction Materials

9. ANU Industries (paper & ink manufacturing)

10.Cement, Concrete Footpath Interlocking Tile

11.Concrete Pavers Manufacturing

12.Suryadipta Projects Pvt. Ltd.

13.Shree Buddheshwar Private Limited Estate

14.Metal Parts Manufacturer

15.Dyeing Factory

16.Manufacturing construction material

17.Card Board Factory

Source: Consultant Analysis

Table 6-9 Industrial Activity Conflicts within ESZ, VVCMC Area, 2024

Sr.No	Location	Type of Conflict	Estimated Area (sqm)
1	Sasunavghar	Petron F Global	856.330
2	Sasunavghar	Ice Factory	1239.361
3	Sasunavghar	Bone and Tallow Industry	5730.820
4	Sasunavghar	RMC Plant	312.598
5	Sasunavghar	Skymix Concrete RMC Plant	1499.210

Source: Consultant Analysis

Figure 6-5 Industrial Activity Conflicts within ESZ, VVCMC Area, 2024

1.Petron F Global

2.Ice Factory

3.Bone and Tallow Industry

4.RMC Plant

5.Skymix Concrete RMC Plant

Source: Consultant Analysis

Table 6-10 Industrial Activity Conflicts within ESZ, Vasai Taluka Area, 2024

Sr. No	Location	Type of Conflict	Estimated Area (Sq.m)
1	Mori	Saree printing industry	3167.111
2	Mori	Saree printing industry	3795.921
3	Mori	Mixcrete India (construction chemicals, coatings, and waterproofing products)	502.277
4	Mori	Shree Powerex (Industrial Brushes)	530.406
5	Mori	Pioneer Power International	743.508
6	Mori	Amar Textiles	2648.035
7	Mori	Saree printing industry	5097.607
8	Mori	VTech Offshore Service Pvt. Ltd.	957.397
9	Mori	Card Board Manufacturing	2354.850
10	Mori	Yess Industry (Polishing Products)	325.046
11	Mori	SS Galvanizers	334.491
12	Mori	Mamta Insulations	392.781
13	Mori	Spaciyo Enterprises Pvt Ltd (Manufacturer of modular furniture)	2441.764
14	Mori	Amrit Prints (Saree Printing)	4397.543
15	Poman	Sarvadnya Udyog Pvt Ltd (Manufacturing of electrical machinery)	2586.438

16	Poman	Pentagon Tapes (manufacturing pressure-sensitive adhesive tapes)	910.440
17	Poman	Apollo Ropes and Alloys pvt ltd (manufacture in high-quality wire ropes)	1625.349
18	Poman	Sky Global Chemicals	377.390
19	Poman	Thermacol manufacturing industry	1101.138
20	Poman	Ikon Lamicoats (PVC Coated Polyster fabric)	1495.748
21	Poman	Mariyam PET Blow	300.206
22	Poman	Heavy metal springs manufacturing	889.242
23	Poman	Rubber industry	210.246
24	Poman	R K Techniques (PVC-Coated Polyester Fabric Manufacturing)	1342.117
25	Poman	Card Board Manufacturing	
26	Poman	Magnet Adhesive Solutions	946.540
27	Poman	Chem Sells	1123.555
28	Poman	UHPC India Pvt Ltd (UHPC dry premix, wet-mix, and precast long-span girders)	613.749
29	Poman	Steelfab Industries	1207.390
30	Poman	Sauradip Chemicals Pvt Ltd	1350.487
31	Poman	Industrial Vessel Manufacturing	583.240
32	Poman	Spaciyo Enterprises Pvt Ltd (Manufacturer of modular furniture)	2441.764
33	Poman	Amrit Prints (Saree Printing)	4397.543
34	Poman	Plywood Factory	767.019
35	Poman	Duo Exam Board Manufacturing	656.554
36	Poman	Alphabet Imaging Technologies Pvt Ltd	1024.826
37	Poman	Industrial Vessel Manufacturing	575.869
38	Poman	V5 Interiors (Wood Based industry)	560.167
39	Poman	Nilkanth Plasto Pack	512.324
40	Poman	Plastic bottle manufacturing industry	542.915
41	Poman	Royal Industries (Extruded Rubber Profiles Manufacturing)	970.172
42	Poman	Mutual Engineering Pvt Ltd (precision tooling and mould manufacturing)	2276.344
43	Poman	Selver Conveyors Pvt Ltd	2642.339
44	Poman	Helli Moulds Pvt Ltd (precision injection mould manufacturing and CNC machining)	1668.298
45	Poman	Hitech Moulds Pvt Ltd (precision injection mould manufacturing)	2003.434
46	Poman	Dhaval Products (Manufactures and supplies various liquid cleaning products)	797.568
47	Poman	Rubber industry	2339.608
48	Poman	Brio industries (brass components and metal forgings)	550.797
49	Poman	Plywood dealer	551.381
50	Poman	Ananta Infrachem LLP (Manufacturer of metals and chemicals)	398.739
51	Poman	Street light manufacturing industry	2418.361
52	Poman	E-Luna (E-Bike Manufacturing)	938.916
53	Poman	Jumbo Quality Metal Prints and Pack	779.000
54	Poman	Krishna Shivam Digitex	2208.660
55	Poman	M S Petro Chemical	1127.621
56	Shilottar	Petron F Global	345.940

Source: Consultant Analysis

Figure 6-6 Industrial Activity Conflicts within ESZ, Vasai Taluka Area, 2024

1. Saree Printing Industry

2. Saree Printing Industry

3. Mixcrete India (construction chemicals, coatings, and waterproofing products)

4. Shree Powerex (Industrial Brushes)

5. Pioneer Power International

6. Amar Textiles

7. Saree Printing Industry

8. VTech Offshore Service Pvt. Ltd.

9. Card Board Manufacturing

10. Yess Industry Polishing Products

11. SS Galvanizers

12. Mamta Insulations

13. Spaciyo Enterprises Pvt Ltd (Manufacturer of modular furniture)

14. Amrit Prints (Saree Printing)

15. Sarvadnya Udyog Pvt Ltd (Manufacturing of electrical machinery)

16. Pentagon Tapes (manufacturing pressure-sensitive adhesive tapes)

17. Apollo Ropes and Alloys pvt ltd (manufacture in high-quality wire ropes)

18. Sky Global Chemicals

19. Thermacol manufacturing industry

20. Ikon Lamicoats (PVC Coated Polyster fabric)

21. Mariyam PET Blow

22. Heavy metal springs manufacturing

23. Rubber industry

24. R K Techniques (PVC-Coated Polyester Fabric Manufacturing)

25. Card Board Manufacturing

26. Magnet Adhesive Solutions

27. Chem Sells

28. UHPC India Pvt Ltd (UHPC dry premix, wet-mix, and precast long-span girders)

29. Steelfab Industries

30. Sauradip Chemicals Pvt Ltd

31. Industrial Vessel Manufacturing

32. Spaciyo Enterprises Pvt Ltd (Manufacturer of modular furniture)

33. Amrit Prints (Saree Printing)

34. Plywood Factory

35. Duo Exam Board Manufacturing

36. Alphabet Imaging Technologies Pvt Ltd

37. Industrial Vessel Manufacturing

38. V5 Interiors (Wood Based industry)

39. Nilkanth Plasto Pack

40. Plastic bottle manufacturing industry

41. Royal Industries (Extruded Rubber Profiles Manufacturing)

42. Mutual Engineering Pvt Ltd (precision tooling and mould manufacturing)

43. Selvel Conveyors Pvt Ltd

44. Helli Moulds Pvt Ltd (precision injection mould manufacturing and CNC machining)

45. Hitech Moulds Pvt Ltd (precision injection mould manufacturing)

46. Dhaval Products (Manufactures and supplies various liquid cleaning products)

47. Rubber industry

48. Brio industries (brass components and metal forgings)

49. Plywood dealer

50. Ananta Infrachem LLP (Manufacturer of metals and chemicals)

51. Street light manufacturing industry

52. E-Luna (E-Bike Manufacturing)

53. Jumbo Quality Metal Prints and Pack

54. Krishna Shivam DIgitex

55. M S Petro Chemical

56. Petron F Global

Source: Consultant Analysis

Table 6-11 Industrial Activity Conflicts within ESZ, TMC Area, 2024

Sr.No	Location	Type of Conflict	Estimated Area (sqm)
1	Chitalsar manpada	Application Systems	248.77
2	Pachpakhadi	Associated Engineers	992.36
3	Chitalsar manpada	Construction materials	3602.20
4	Kavesar	Dalal Engineering Pvt Ltd (stainless steel process equipment)	3511.35
5	Majiwade	Dhiman Rubber Machinery Manufacturer	250.05
6	Pachpakhadi	Elvee Industries	42.37
7	Pachpakhadi	International Industrial Springs	929.83
8	Bhaindar pada	J Kumar Infraprojects Pvt Ltd (Pier and Girders for Metro)	15920.44
9	Pachpakhadi	Lance Auto Parts	1150.33
10	Boriwade	Megha Engineering & Infrastructures Ltd (MEIL)	80274.60
11	Chitalsar manpada	Mikron Teknik Pvt. Ltd	625.04
12	Majiwade	Mukesh Heavy Industries	300.76
13	Majiwade	Laxmi Traders	165.86
14	Chitalsar manpada	Plywood and woodworks	654.97
15	Chitalsar manpada	Plywood and woodworks	474.47
16	Chitalsar manpada	Plywood and woodworks	395.26
17	Chitalsar manpada	Plywood and woodworks	395.51
18	Chitalsar manpada	Ramco Ancillary (Plastic Packaging)	643.55
19	Pachpakhadi	Rao Engineering Pvt. Ltd.	670.33
20	Chitalsar manpada	Revansh foods LLP	212.45
21	Pachpakhadi	Rubicon Research Pvt. ltd.	332.14
22	Majiwade	S. K . Engineering Works	131.73
23	Pachpakhadi	S.S. Enterprises	53.14
24	Majiwade	Dabir Mechanical works	371.08
25	Pachpakhadi	Super Electricals	996.09
26	Chitalsar manpada	Shree Balaji Wood Works	88.39
27	Chitalsar manpada	Gotey Automation	359.33
28	Majiwade	Tathastu Engineering (Fabrications)	135.00
29	Pachpakhadi	Tower Engineering Pvt. Ltd.	1320.06
30	Majiwade	Uni Abex Alloy Products Ltd. (Centrifugal and Static Castings)	18138.49
31	Majiwade	Uni Deritend Limited (Investment casting)	10719.79
32	Chitalsar manpada	Unity Enterprises (Industrial Fabricated items, supplier of electrical switchgear items)	398.69
33	Chitalsar manpada	Furniture Factory	1318.14
34	Majiwade	Vijay Fabricators	147.88
35	Majiwade	Vignahar Engineering Works	270.45

36	Bhaindar pada	Vinayaga Marine Petro Ltd (Maritime and Offshore Infrastructure)	37401.49
37	Majiwade	Mumbai Wood works/ Daya Packers	132.87
38	Pachpakhadi	Kiron Textile Industries	2157.76
39	Majiwade	Ratan Springs	127.41
40	Majiwade	J.S Industries	543.87
41	Majiwade	Enerjet Engineering Services (metal fabrication, machining, and assembly)	229.48
42	Majiwade	Alfatech Engineering Private Limited / UNIVERSAL MEP Projects and Engineering Services Limited	332.61
43	Majiwade	Jeetswara enterprises	286.99
44	Majiwade	Shivanand Machine Tools	172.69
45	Majiwade	Mayfair Machinekraft Pvt. Ltd.	295.45
46	Majiwade	Gemini Tool Engineers	125.23
47	Chitalsar manpada	Navkar Furniture	263.48
48	Chitalsar manpada	Maestrotech Enterprises LLP	289.50
49	Majiwade	Navin Engineers (precision parts, jigs and fixtures	286.99
50	Majiwade	Smita Engineering Works	56.77
51	Chitalsar manpada	Alpha Beltech & Systems	243.22
52	Chitalsar manpada	Eurospin Dry Cleaners Higin Cleaning Systems	212.15
53	Chitalsar manpada	Saw Mill	222.24
54	Majiwade	Megha Pattern Works (Metal and Wooden Pattern)	108.67
56	Majiwade	Reyansh Engineering Works (Metalworking & fabrication)	277.93
57	Pachpakhadi	Metals and Allied products	1119.86
58	Chitalsar manpada	Star Perfumery Works	326.65
59	Pachpakhadi	Electroteknics (Manufacturer of electrical equipment)	679.81
60	Chitalsar manpada	Wood I Land Interiors	676.88
61	Chitalsar manpada	UNITOP Multitech (I) Pvt. Ltd.	277.48

Source: Consultant Analysis

Figure 6-7 Industrial Activity Conflicts within ESZ, TMC Area, 2024

1. **Application Systems**

2. **Associated Engineers**

3. **Construction materials**

4. **Dalal Engineering Pvt Ltd (stainless steel process equipment)**

5. **Dhiman Rubber Machinery Manufacturer**

6. **Elvee Industries**

7. **International Industrial Springs**

8. **J Kumar Infraprojects Pvt Ltd (Pier and Girders for Metro)**

9. **Lance Auto Parts**

10. **Megha Engineering & Infrastructures Ltd (MEIL)**

11. **Mikron Teknik Pvt. Ltd**

12. **Mukesh Heavy Industries**

13. **Laxmi Traders**

14. **Plywood and woodworks**

15. **Plywood and woodworks**

16. **Plywood and woodworks**

17. **Plywood and woodworks**

18. **Ramco Ancillary (Plastic Packaging)**

19. **Rao Engineering Pvt. Ltd.**

20. **Revansh foods LLP**

21. **Rubicon Research Pvt. ltd.**

22. **S. K . Engineering Works**

23. S.S. Enterprises

24. Dabir Mechanical works

25. **Super Electricals**

26. **Shree Balaji Wood Works**

27. **Gotey Automation**

28. **Tathastu Engineering (Fabrications)**

29. **Tower Engineering Pvt. Ltd.**

30. **Uni Abex Alloy Products Ltd. (Centrifugal and Static Castings)**

31. **Uni Deritend Limited (Investment casting)**

32. **Unity Enterprises (Industrial Fabricated items, supplier of electrical switchgear items)**

33. **Furniture Factory**

34. **Vijay Fabricators**

35. **Vignahar Engineering Works**

36. **Vinayaga Marine Petro Ltd (Maritime and Offshore Infrastructure)**

37. **Mumbai Wood works/ Daya Packers**

38. **Kiron Textile Industries**

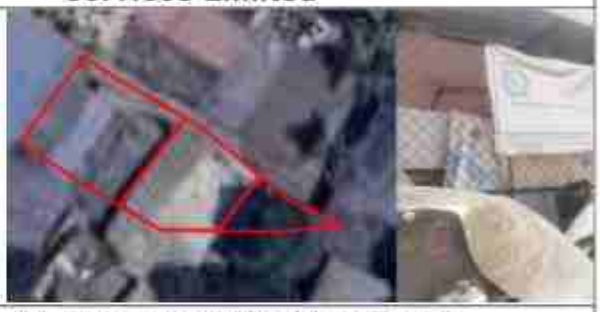
39. **Ratan Springs**

40. **J.S Industries**

41. Enerjet Engineering Services (metal fabrication, machining, and assembly)

42. Alfatech Engineering Private Limited / UNIVERSAL MEP Projects and Engineering Services Limited

43. Jeetswara enterprises



44. Shivanand Machine Tools

45. Mayfair Machinekraft Pvt. Ltd.

46. Gemini Tool Engineers

47. Navkar Furniture

48. Maestrotech Enterprises LLP

49. Navin Engineers (precision parts, jigs and fixtures

50. Smita Engineering Works

51. Alpha Beltech & Systems

52. Eurospin Dry Cleaners

53. Saw Mill

54. Megha Pattern Works (Metal and Wooden Pattern)

55. Super fibre glass FRP products

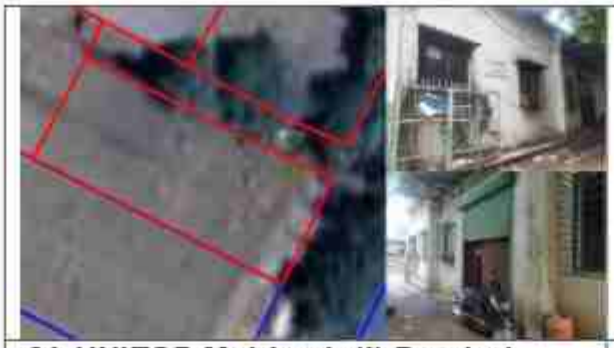
56. Reyansh Engineering Works (Metalworking & fabrication)

57. Metals and Allied products

58. Star Perfumery Works

59. Electroteknics (Manufacturer of electrical equipment)

60. Wood I Land Interiors



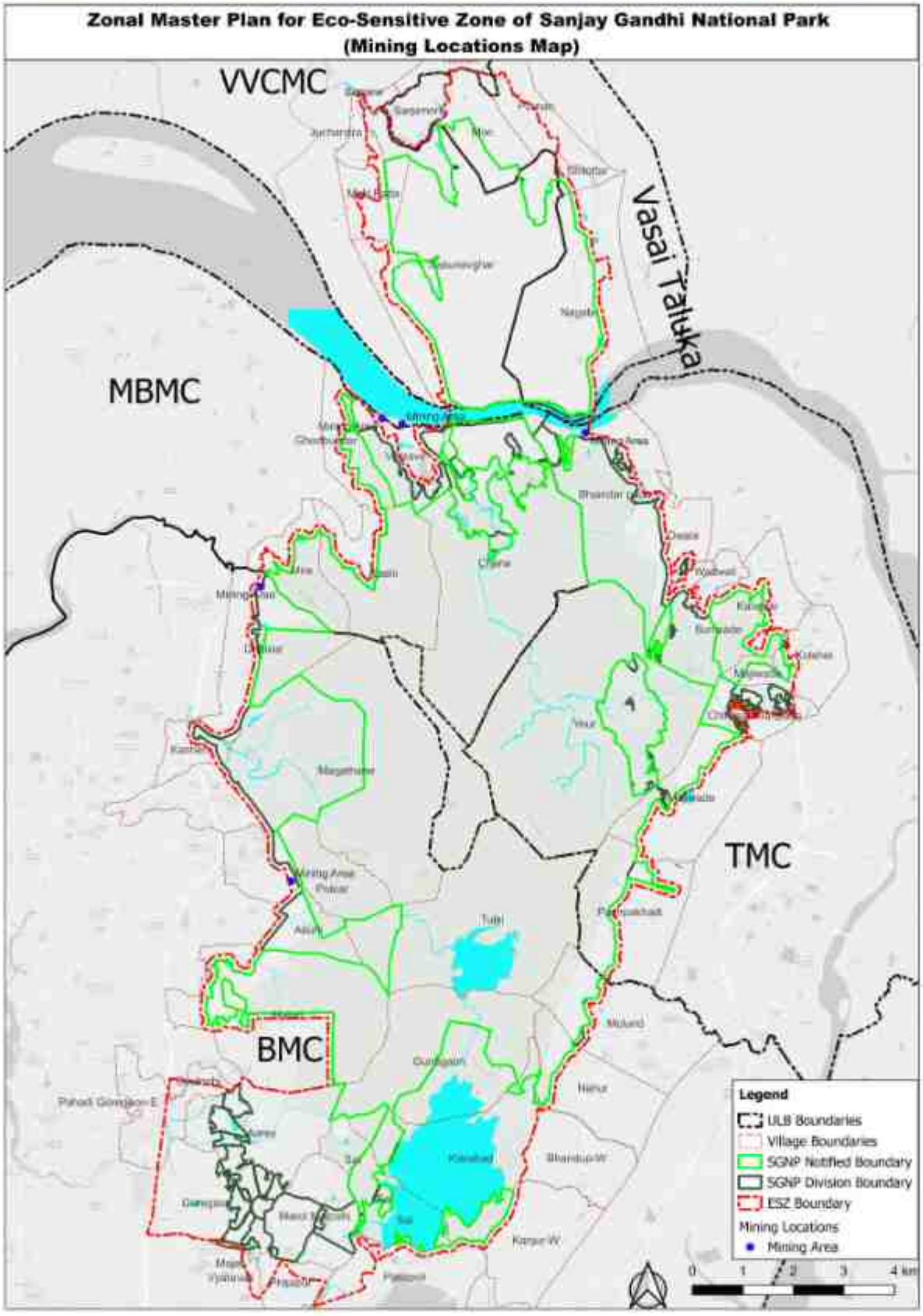
61. UNITOP Multitech (I) Pvt. Ltd.	

Source: Consultant Analysis

6.3.2 Mining Areas

Mining activities in the ESG zone of SGNP pose severe threats to the environment, biodiversity, and natural resources. The extraction of minerals and stone quarrying within the park has led to deforestation, soil erosion, groundwater depletion, and loss of wildlife habitat. Two specific mining sites have been identified where such activities must be immediately prohibited to prevent further degradation of the ESZ and the national park's environment.

Figure 6-8: Mining/Quarrying Area locations within ESZ of SGNP, BMC, 2024



Source: Consultant Analysis

Table 6-12: Mining/Quarrying Activity Conflicts within ESZ, BMC Area, 2024

Sr. No.	Ward	Name of Location	Approximate Area (Sq.M)
1	R/North	Ketki Pada, Dahisar	6,01,975.98
2	R/South	Poisar, Kandivali East	1,54,221.89

Source: Consultant Analysis

The mining/quarrying sites are not actively being used however the land under the sites is denuded and degraded and needs suitable action for environmental mitigation. These closed mining sites falls on the SGNP Division Forest area.

Figure 6-9: Pictures showing Mining/Quarrying Locations in ESZ of SGNP, BMC, 2024

Ketki Pada, Dahisar, R/North | Poisar, Kandivali East, R/South

Source: Consultant Analysis

Figure 6-10 Pictures showing Mining/Quarrying Locations just outside ESZ of SGNP, MBMC, 2024

Source: Consultant Analysis

This area is denuded of the mangroves previously present and require afforestation efforts to restore back to its original environment in the MBMC area beside Ulhas Creek.

Table 6-13 Mining/Quarrying Activity Conflicts within ESZ, TMC Area, 2024

Sr. No.	Village	Name of Location	Approximate Area (Sq.M)
1	Bhaindar pada	Gaimukh, Along Ghodbunder Road	11,970.00

Source: Consultant Analysis

Figure 6-11 Pictures showing Mining/Quarrying Locations in ESZ of SGNP, TMC, 2024

Gaimukh, Bhaindar pada, Thane

Source: Consultant Analysis

This is a Sand depot in Gaimukh which has led to severe land degradation, air pollution, potential water pollution which needs afforestation techniques to maintain the diversity within the Eco Sensitive Zone.

6.4 Slums & Encroachments in ESZ

It is observed that several slum settlements exist within the ESZ of Sanjay Gandhi National Park (SGNP). These unauthorized settlements have led to deforestation, habitat destruction, and increased environmental impacts including encroachments at times extending into SGNP. The presence of these slums contributes to waste disposal issues, illegal water extraction, and increased human-wildlife conflict, further endangering the biodiversity of SGNP. It is imperative to rehabilitate these settlements on a priority to maintain the ecological balance. As per the ESZ notification, new encroachments and their regularization is prohibited within ESZ.

There are 63 Slum pockets across the ESZ of SGNP in the BMC jurisdiction covering a total area of about 142.968 Hectares, as below there are 13 slums who touches the SGNP Notified boundary as well and are further encroaching in them.

Table 6-14: List of Slums falling within ESZ of SGNP, BMC

Sr. No.	Ward	Name of Slum	Slum Area in ESZ (SqM) (A)	Total Area of Slum including outside ESZ (SqM)
1	R/North	Ketki Pada, Dahisar	6138.28	0.00
2		Bahadur Singh Chawl	3909.760	0.00
3		Baulpal Chawl	2,696.64	29254.6
4		Hanuman Nagar	4174.89	3763.261
5		Vaishali Nagar	19386.44	2955.933
6	R/North	Konkani Pada, Dahisar	6505.621	46442.20
7		Dnyeneshawar Nagar	3349.125	99115.003
8		Wagadebi Nagar	14922.192	1061.241
9	R/Central	Sukarwadi, Kanheri	1543.812	35108.922
10	R/Central	Babu Rao Kolpate Chawl	987.58	961.40
11	R/Central	Devi Pade, Magathane	8792.069	60905.40
12		Trimurti Nagar	26185.701	14176.90
13	R/Central	Siddhart Nagar, Magathane	272.226	11481.77
14	R/Central	Janupada, Magathane	752.95	0.00
15	R/South	Janupada, Poisar	13,053.26	23.60
16	R/South	Damu Nagar, Akurli	2581.387	2658.30
17	R/South	Gautam Nagar, Akurli	15,776.56	0.00
18	R/South	Kranti Nagar	33503.626	61704.33
19	P/North	Bheem Nagar	10661.493	171544.00
20		Durga Mata Cooperative	3,071.90	5542.079
21		Maharani Sai Baba Nagar	3891.23	5049.926
22		Ramgad Nagar	66552.121	45621.3
23		Tanaji Nagar	16,083.07	33191.4
24	P/North	Ananadwadi	1846.31	57874.00
25		Ramgad Nagar	27721.389	72101.50
26	P/North	Krishna Bharat Chawl	11,141.70	5362.30
27	P/North	Pimpripada, Malad East Azad Nagar	5848.210	0.00
28		Indira Nagar	17776.158	0.00
29		Jai Ambe Chawl Sanjay Nagar	7196.687	0.00
30		Meera Nagar	1710.4	29163.01
31		Mira Nagar	46354.6	8347.467
32		Ramgad Nagar	35115.229	0.00
33	P/North	Aarey	32814.782	0.00
34		Shivdarshani Nagar	7056.77	203293.7
35		Shree Krishna Nagar	595.802	6642.321
36	P/South	Aarey	86,530.53	474,992.86 0.00
37		Aarey Colony	103,321.14	0.00
38		Aarey Milk Colony	90108.041	0.00
39		Adarsh Nagar	5,324.89	0.00

40		Anand Nagar	9,689.96	0.00
41		Durga Nagar	19,140.99	0.00
42		Ekta Nagar	52,089.20	0.00
43		Ekta Nagar Rahivasi Seva Sangh	1,988.81	0.00
44		Gautam Nagar, Aarey	2,622.71	0.00
45		Goregaon	49,459.36	0.00
46		Moracha Pada	54332.20	0.00
47		Navjivan Nagar	13,420.91	0.00
48		Ram Nagar JJC	51,050.32	20550.60
49	P/South	Unit 22	70,079.56 37,258.96	0.00
50	P/South	Sakivihar	5470.62	0.00
51	K/East	PRAJAPUR	3693.617	0.00
52		Aarey Colony	19620.866	0.00
53		Ganesh Nagar	21,210.51	0.00
54		Rup Nagar	26010.28	0.00
55	S	Banshila	2925.81	0.00
56		Pathanwadi	57266.00	0.00
57		Jai Bhim Nagar	49617.19	0.00
58	S	Hanuman Nagar, Kanjur-W	13721.08	99678.92
59	S	Ramabhai Nagar	40251.279	22646.043
60		Uttakarsha Nagar	963.38	186479.76
61	T	Gaibi Nagar	36719.804	41661.80
62	T	Tagore Nagar	87788.779	61657.56
63	T	Siddharth Nagar-2	2859.225	11026.77

Source: SRA, Mumbai and Consultant Analysis

There are 8 Slum pockets across the ESZ of SGNP in the MBMC jurisdiction covering a total area of about 9.672 Hectares, as below. It has to be noted that there are 4 slums who touches the SGNP Notified boundary as well and are having risk of potential encroachments in the park.

Table 6-15: List of Slums falling within ESZ of SGNP, MBMC

Sr. No.	Village	Name of Slum	Area in ESZ (SqM) (A)	Total Area of Slum including outside ESZ (SqM)
1	Ghodbunder	Dachkul Pada	31217.30	132106.51
2	Ghodbunder	Kashimira	2170.54	2170.55
3	Mire	Mahajan Wadi	16240.76	46,413.76
4	Kashi	Mandvipada	17441.28	17441.28
5	Kashi	Mashachapada	22868.60	22508.91
6	Mire	MIDC Mira Road East	1092.92	1092.93
7	Versave	Retibunder	11639.90	13918.31

Source: Consultant Analysis

There are 13 Slum pockets across the ESZ of SGNP in the TMC jurisdiction covering a total area of about 26.09 Hectares, as below. It has to be noted that there are 10 slums who touches the SGNP Notified boundary as well and are further encroaching in them.

Table 6-16 List of Slums falling within ESZ of SGNP, TMC

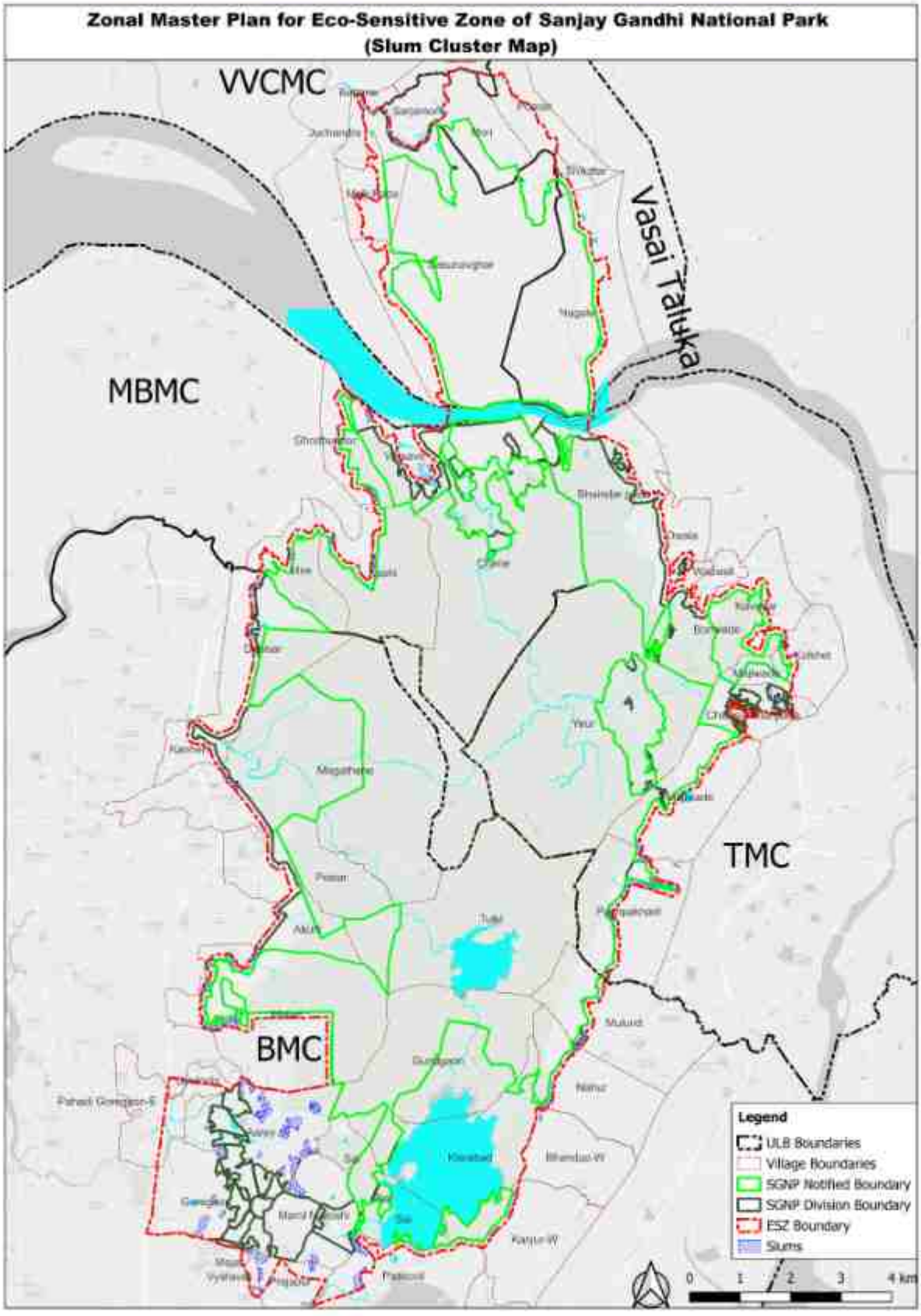
Sr. No.	Village	Name of Slum	Area in ESZ (SqM) (A)	Total Area of Slum including outside ESZ (SqM)
1	Pachpakhadi	Shree Nagar	19,429.71	38,781.82
2	Pachpakhadi	Kailash Nagar	2715.48	2,708.73
3	Pachpakhadi	Juna Gaon	7767.35	7,767.35
4	Pachpakhadi	Hanuman Nagar	72161.54	300,252.53
5	Pachpakhadi	Ramnagar	25611.40	25,635.37
6	Pachpakhadi	Karvalo Nagar	29984.60	81,969.93
7	Pachpakhadi	Gangadhar Nagar	4043.46	4043.46
8	Kolshet	Patlipada	7472.88	220275.45
9	Chitalsar manpada	Krishna Nagar Manpada	12,715.94	12,715.94
10	Majiwade	Lokmanya Nagar	49955.85	292,550.95
11	Pachpakhadi	Lokmanya Nagar	6716.59	
12	Majiwade	Konkanipada	17306.47	18,436.60
13	Chitalsar Manpada	Konkanipada	1130.13	

Source: Consultant Analysis

Many of these slums share their boundaries with SGNP Notified Boundary as well. These slums increase the pressure of encroachments within the boundary of SGNP. Slums are also location within the cautious zone of Human Animal Conflict. Their Rehabilitation needs to be a Priority.

Since many of the padas have been encroached by slum dwellers over the years, the area of the slums mentioned above includes areas of the padas as well. The same shall be updated as and when demarcation for the padas will be made available from the competent authority.

Figure 6-12: Slum/Encroachment within ESZ of SGNP, BMC 2024



Source: Consultant Analysis

6.5 Human Animal Conflict

Human-Animal conflict refers to the clashes between humans and wildlife, often resulting from habitat loss, urban expansion, and resource competition. As human population grows and encroach upon natural habitats, animals like leopards, monkeys, snakes are forced into closer contact with people, leading to attacks, property damage, and retaliatory killings. These conflicts pose serious threats to both human safety and wildlife conservation.

6.5.1 Human Animal Conflict

The issue of Human-Animal conflicts within the BMC (Brihanmumbai Municipal Corporation) area, specifically involving leopards, has become a critical concern. A total of 22 conflict points has been identified, based on Forest department records, where these encounters have occurred, each representing a significant risk to human safety and wildlife preservation. These incidents have had devastating consequences, with a total of 17 fatalities resulting from leopard attacks. Additionally, 5 other incidents have led to injuries, further highlighting the serious implications of these conflicts for the local population.

Human-animal conflicts within the Mira-Bhayandar Municipal Corporation (MBMC) area-particularly involving leopards, panthers, and monkeys-have emerged as a major concern. According to records from the Forest Department, 26 conflict hotspots have been identified: 26 involving leopards. Each of these locations poses a significant threat to both public safety and wildlife conservation. These encounters have led to serious consequences, including injuries and even fatalities, underscoring the urgent need to address the risks these conflicts present to the local community.

In TMC (Thane Municipal Corporation) area, specially involving leopards, crocodile and monkeys has been a critical concern. A total of 19 (17 Leopards and 2 Crocodile) has been identified, based on Forest department records, where these encounters have occurred, each representing a significant risk to human safety and wildlife preservation. These incidents have had devastating consequences, with a fatalities risk to injuries, further highlighting the serious implications of these conflicts for the local population. However, Monkeys are present all over the ESZ area.

6.5.2 Trends and Patterns

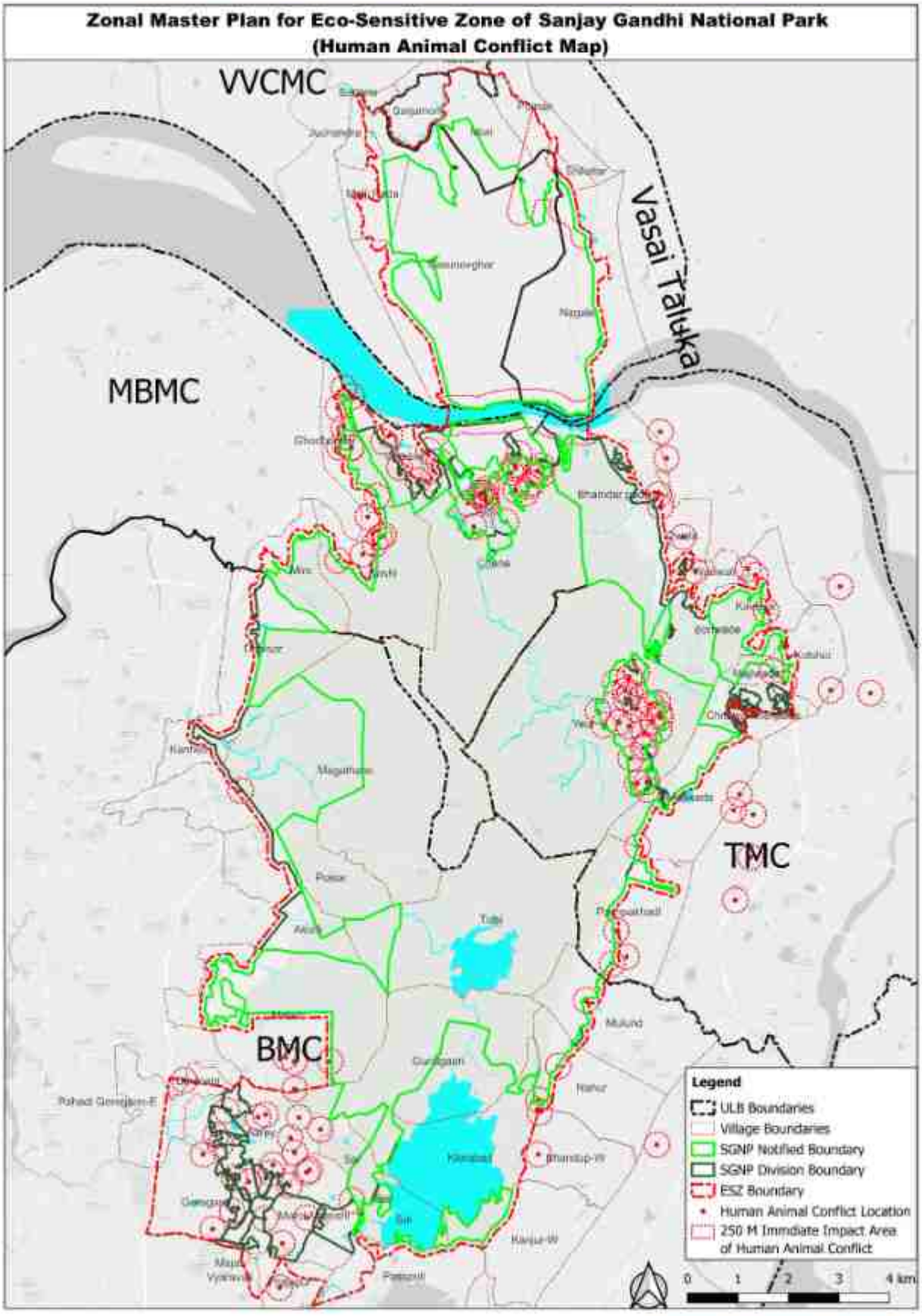
Analysis of these incidents suggests a concerning trend. The frequency of leopard attacks has increased over the past decade, with the highest number of conflicts occurring in areas adjacent to forested zones such as Aarey Colony, Sanjay Gandhi National Park (SGNP), and other green corridors. The pattern of these attacks indicates that the leopard's natural habitat is increasingly encroaching upon human settlements, leading to more frequent encounters

Analysis of these incidents suggests a concerning trend. The frequency of leopard attacks has increased over the past decade, with the highest number of conflicts occurring in areas within Eco Sensitive Zone such as Chene, Sanjay Gandhi National Park (SGNP), and other green corridors. The pattern of these attacks indicates that the leopard's natural habitat is increasingly encroaching upon by the human settlements, leading to more frequent encounters.

Several factors have contributed to this escalating crisis:

- Urban Expansion: Rapid urbanization has led to deforestation, reducing the natural habitat available for leopards and pushing their habitat due to human interventions
- Food as Easy Prey: Depletion of natural prey due to habitat destruction has forced leopards to seek alternative food sources, sometimes leading them into villages and urban areas in search of easy prey as food.
- Human Activities: Increased human movement into forested zones for activities such as illegal construction, garbage dumping, and deforestation has heightened the likelihood of encounters.
- Leopard Adaptability: Leopards are highly adaptable and have learned to survive in semi-urban environments, increasing the probability of conflict.

Figure 6-13: Human Animal Conflict in or near ESZ of SGNP



Source: Consultant Analysis

6.5.3 Identified Conflict Zones

The 20 conflict points identified within the BMC area are primarily concentrated in the following locations:

- Aarey Colony
- Sanjay Gandhi National Park (SGNP) perimeter
- Film City, Goregaon
- Powai and Vikhroli forest fringes

The 29 conflict points identified within the MBMC area are primarily concentrated in the following locations:

- Chene area
- Versave area
- Kashi area
- Ghodbunder Road (connecting SGNP to Vasai-Virar green zones)

The 23 conflict points identified within the TMC area are primarily concentrated in the following locations:

- Yeoor
- Panchpakhadi

6.6 Vulnerability analysis using MCDM

Vulnerability analysis plays a critical role in environmental management, particularly in the conservation of ecologically sensitive zones such as the SGNP Eco-sensitive Zone. As urbanization, climate change, and human activities continue to put pressure on these fragile ecosystems, it is vital to assess and identify areas that are most vulnerable. Vulnerability analysis enables decision-makers to prioritize conservation efforts, allocate resources efficiently, and develop strategies to protect biodiversity and ecosystem services. Without a clear understanding of the vulnerability of different areas, conservation efforts could be ineffective or misdirected, leaving critical ecosystems at risk. By performing a vulnerability analysis, areas under threat due to habitat loss, pollution, overexploitation, or human encroachment can be identified, allowing for targeted interventions that can help mitigate these risks and preserve the integrity of the ecosystem.

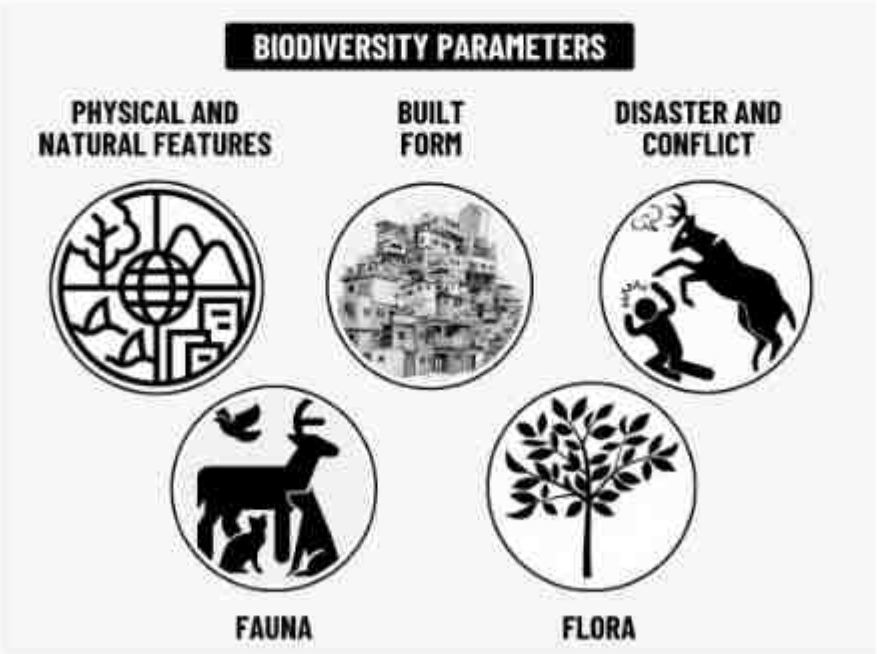
To assess the vulnerability of lands within the SGNP Eco-sensitive Zone, a Multi-Criteria Decision Making (MCDM) approach is employed. MCDM is a decision-making framework that allows the evaluation of multiple criteria, which may be conflicting, to arrive at an optimal solution. In the context of environmental management, this method is particularly useful as it enables the integration of various environmental, ecological, and socio-economic factors into a single, coherent decision-making process. These factors include habitat quality, human population density, proximity to urban areas, and more. MCDM helps to structure and quantify complex problems, making it easier to compare the vulnerability of different regions based on their unique characteristics.

Among various MCDM techniques, the Analytic Hierarchy Process (AHP) is selected to evaluate the vulnerability of lands in the SGNP Eco-sensitive Zone. AHP is a structured method that breaks down complex decision-making problems into a hierarchy of criteria and sub-criteria. It allows experts to conduct pairwise comparisons to determine the relative importance of each criterion, making it possible to quantify subjective judgments and prioritize the factors that most significantly contribute to vulnerability.

The AHP process begins by identifying and defining the criteria that affect vulnerability, such as habitat quality and human impact. These criteria are then structured into a hierarchical framework. The next step involves performing pairwise comparisons to assess the relative importance of each criterion. This is typically done by assigning numerical values to indicate how much more important one criterion is compared to another. Once the pairwise comparisons are completed, the results are used to calculate the weight of each criterion. These weights reflect the relative importance of each factor in contributing to vulnerability. After determining the weights, each area in the SGNP Eco-sensitive Zone is evaluated against the established criteria. The areas are scored based on how well they align with each criterion, and these scores are then combined according to the criteria weights to produce an overall vulnerability score for each area.

6.7 Criteria Selected for MCDM

A comprehensive approach is needed to capture the complex interplay of environmental, ecological, developmental and socio-economic factors. The goal is to identify the most significant contributors to land vulnerability, encompassing both natural and anthropogenic influences. After thorough consideration, five main criteria were selected



i. Natural and Physical Features: The Natural and Physical Features criterion was deemed essential as these aspects, including terrain, soil properties, water bodies, and tree cover, directly impact ecosystem stability, water

retention, erosion susceptibility, and biodiversity. These features are foundational for maintaining ecological balance, making them crucial to assess land vulnerability.

ii. Built Form: The Built Form criterion was also prioritized, given the significant human influence around SGNP, where urbanization and infrastructure development contribute to habitat fragmentation and increased pressure on the environment

iii. Disasters & Conflicts: Disasters & Conflicts emerged as another critical factor, as natural disasters such as floods, combined with human-wildlife conflicts, can severely disrupt ecosystems and accelerate land degradation

iv. Fauna: The Fauna and Flora criteria were identified as vital indicators of overall ecosystem health, as the well-being of animal and plant populations directly reflects the resilience and stability of the environment.

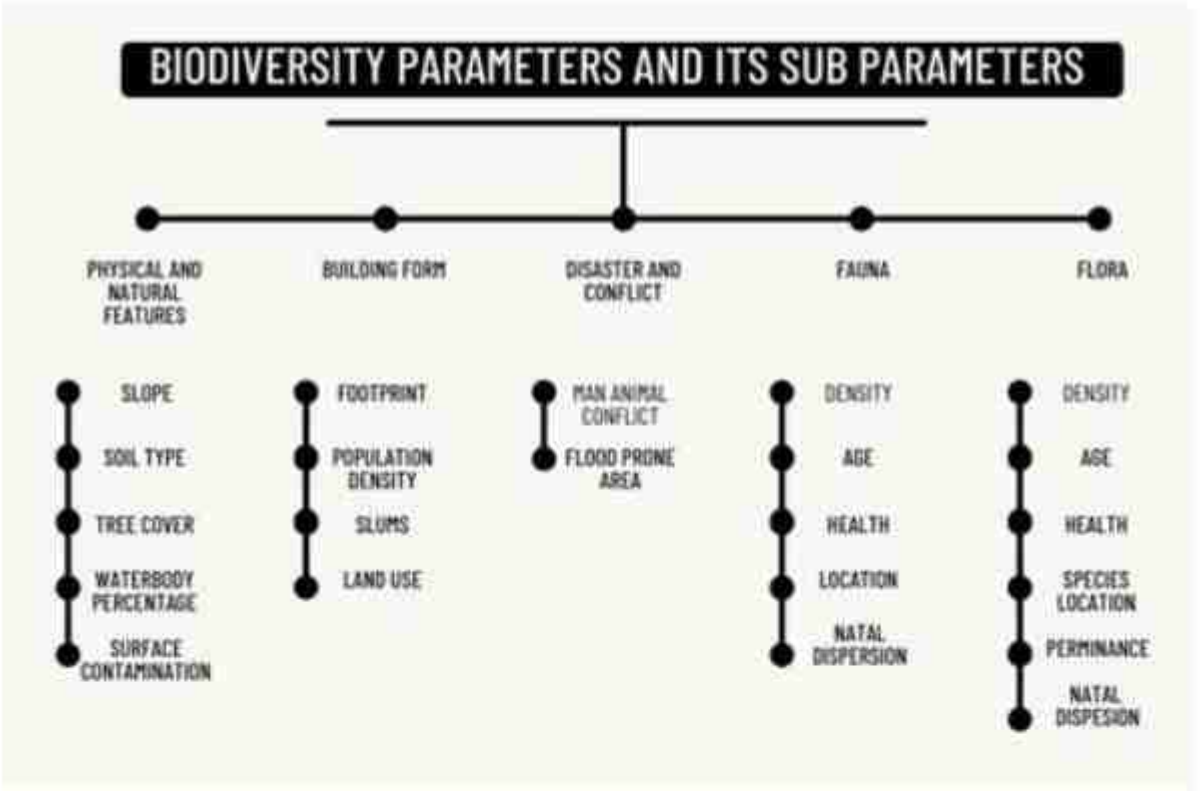
v. Flora: Flora supports the ecosystem by providing essential services like soil stabilization, while fauna is integral for biodiversity and ecosystem functions.

By combining these key areas, the analysis provides a more holistic understanding of the factors contributing to land vulnerability, guiding the development of targeted and effective conservation strategies.

6.8 Sub Criteria Structuring and Scoring

Once the criteria are identified, the next step involves structuring the sub-criteria into a hierarchical framework at subsequent levels. Each land area within the SGNP Eco-sensitive Zone is then assessed against these criteria to determine its vulnerability. To conduct a detailed vulnerability assessment, a grid-based approach has been employed, dividing the study area into 100m × 100m grids. This micro-level framework enables a fine-grained analysis of ecological stressors, habitat quality, and land-use changes. Each grid functions as an individual unit, allowing for a comprehensive evaluation of environmental variables, ensuring a precise and systematic understanding of the study area's ecological conditions. In case of parameters of Biodiversity - Flora and fauna, the survey grid is larger, as per the area characteristics and the data captured has been transferred to the smaller grids as adopted for the MCDM analysis.

Since each criterion will be measured on a different scale, it becomes necessary to normalize the data to ensure that all variables can be compared on the same scale. This normalization process converts the diverse data points into a common scale, ranging from 1 to 5, 5 represents the least vulnerable, indicating the most environmentally rich areas and 1 represents developed zone or areas which have lower environmental values. By standardizing the data in this manner, the analysis allows for a consistent and meaningful comparison of the land's ecological health and vulnerability.



The following section outlines the sub-criteria and their respective normalized score factors used in this analysis.

6.8.1 Physical & Natural Features

6.8.1.1 Slope

The slope of an area plays a crucial role in determining environmental vulnerability and richness. Steep slopes are more prone to erosion and landslides, making them less stable for vegetation and human settlements. They also influence water drainage patterns, affecting soil moisture and groundwater recharge. Gentle slopes, on the other hand, support better soil retention and plant growth, contributing to ecological richness. In areas with steep terrain, afforestation and erosion control measures are essential to maintain environmental stability.

Slope was calculated using Digital Terrain Model which was then categorized into 5 class for easy of classification according to the scale

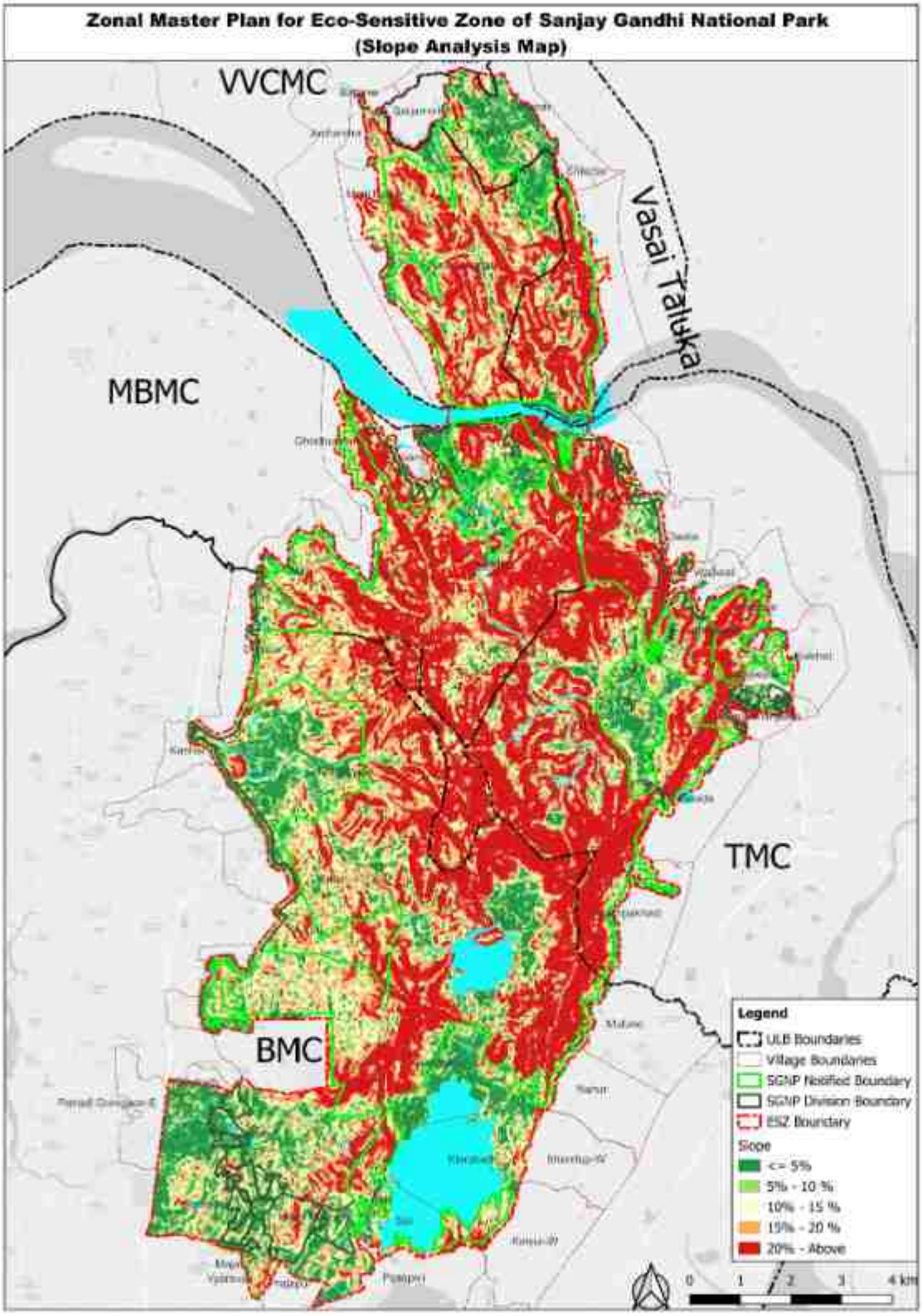
Slope	0-5 %	5-10 %	10-15 %	15-20 %	More than 20 %
Scoring	5	4	3	2	1

Source: Consultant Analysis

The scoring system reflects the suitability of land for development, agriculture, and accessibility. 0-5% slopes receive the highest score (5) as they are easiest to use with minimal erosion risk. 5-10% slopes (4) remain manageable but may require slight modifications. 10-15% slopes (3) pose moderate challenges, impacting construction and drainage. 15-20% slopes (2) have increased erosion risks and require engineering solutions. Slopes above 20% score lowest (1) due to significant stability

concerns, limited usability, and high development costs. This system ensures an objective assessment of land feasibility based on slope constraints.

Figure 6-14 Slope Map for ESZ of SGNP



Source: Consultant Analysis

6.8.1.2 Soil type

Soil type determines land fertility, water-holding capacity, and vegetation support. Sandy soils drain quickly but may lead to desertification, while clayey soils retain water but can cause waterlogging. Loamy soils, rich in organic matter, are the most suitable for plant growth and biodiversity. Soil type also influences erosion rates, agricultural productivity, and the ability to support diverse ecosystems. Understanding soil composition helps in land management strategies and conservation planning. The soil map was sourced from the Geological Survey of India, and the soils within the eco-sensitive area were ranked based on their environmental contributions.

Soil Type	Quaternary Alluvium, Hydrosol, Eutric Nitosols	Laterite and Oxisol	Bed Rock Soil, Bog Aggregate, and Agglomerate Tuff	Calc Tuffa, Trachyte, and Cretaceous Soil	Gabbro, Basalt Flow
Scoring	5	4	3	2	1

Source: Consultant Analysis

Quaternary Alluvium, Hydrosol, and Eutric Nitosols score 5 due to their high fertility, water retention, and support for diverse ecosystems, including wetlands and sustainable agriculture. Laterite and Oxisol, scoring 4, are vital for biodiversity, especially in tropical regions, but are prone to degradation if mismanaged. Bed Rock Soil, Bog Aggregate, and Agglomerate Tuff receive a score of 3 as they provide geological stability and support some vegetation, though their ecological benefits are moderate. Calc Tuffa, Trachyte, and Cretaceous Soil, scoring 2, have limited fertility and contribute less to ecosystem support. Lastly, Gabbro and Basalt Flow, with a score of 1, are the least beneficial as they primarily consist of hard, igneous rock with minimal vegetation support and low ecological sensitivity. This scoring ensures that soils are ranked according to their ability to sustain life, regulate water, and support biodiversity.

6.8.1.3 Tree Cover

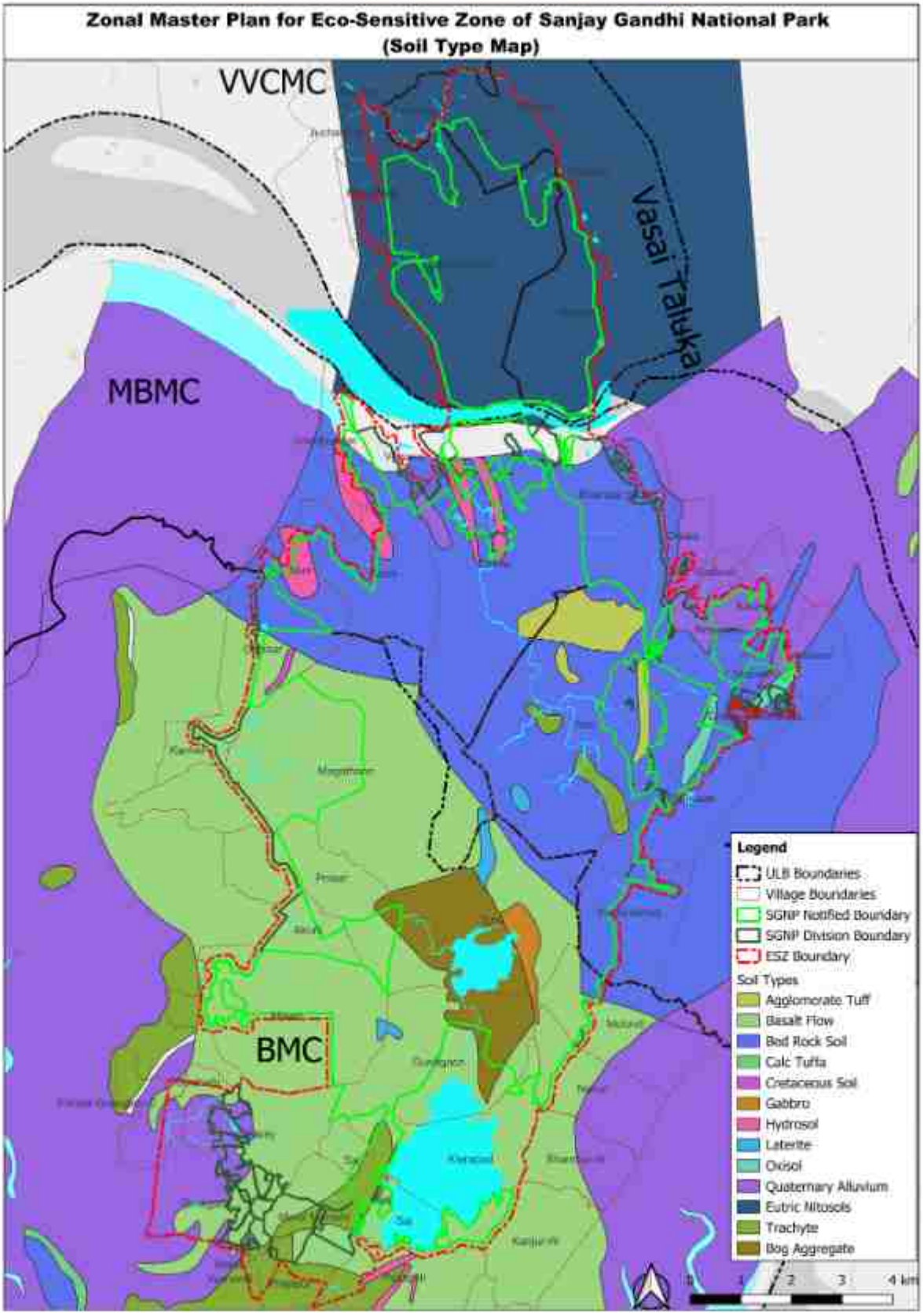
Tree cover is a primary indicator of environmental richness, as it supports biodiversity, prevents soil erosion, and regulates climate. Areas with dense tree cover act as carbon sinks, absorbing greenhouse gases and providing habitat for wildlife. Deforestation leads to habitat loss, increased temperatures, and reduced soil fertility. Maintaining tree cover is crucial for ecological balance, preventing desertification, and ensuring sustainable land use.

Tree Cover Percentage	0-20%	20-40%	40-60%	60-80%	Above 80%
Scoring	1	2	3	4	5

Source: Consultant Analysis

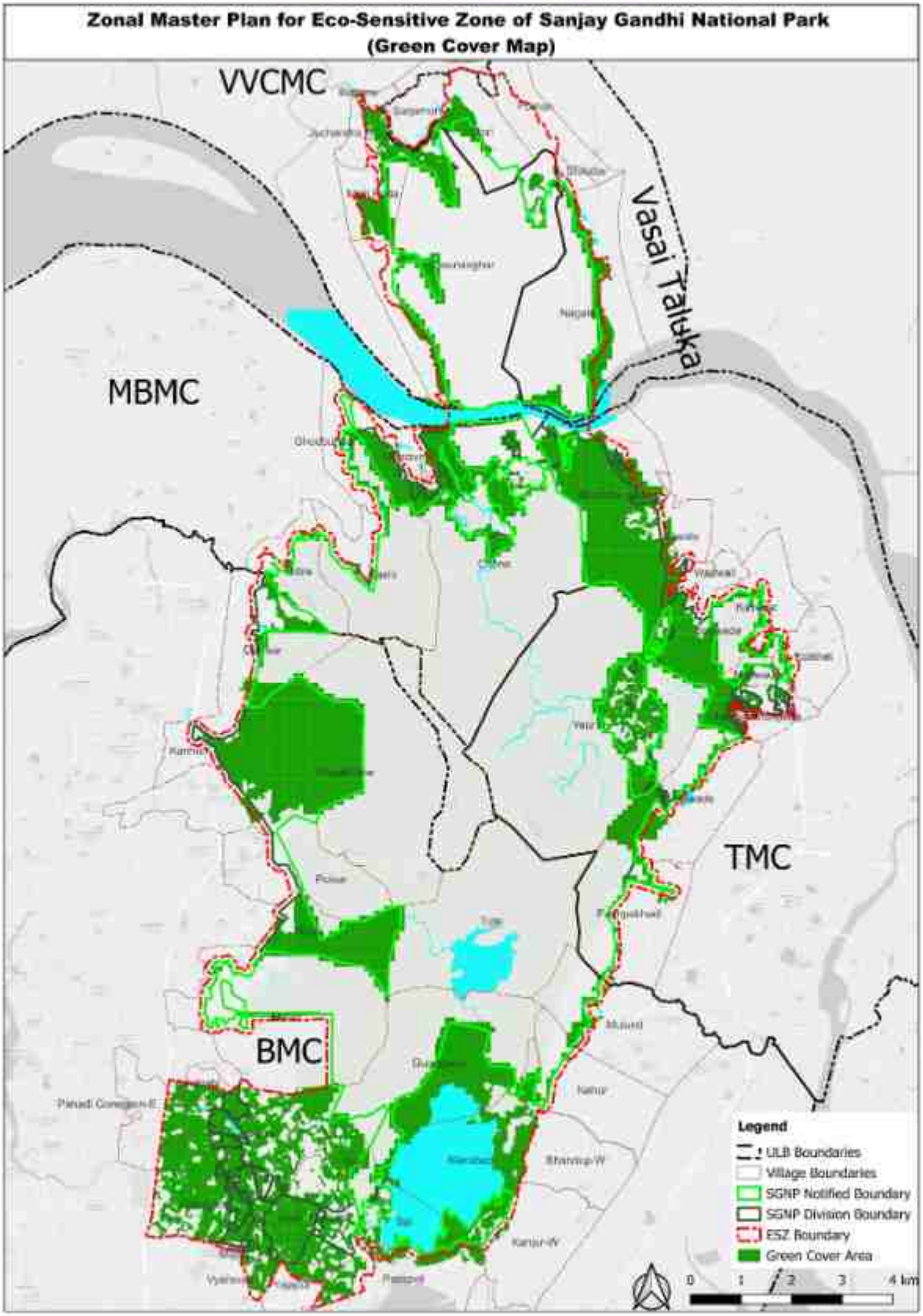
The scoring was based on the percentage of green cover, which was identified and analysed using drone imagery. A higher percentage of green cover indicated greater environmental benefits.

Figure 6-15 Soil Type Map of ESZ of SGNP



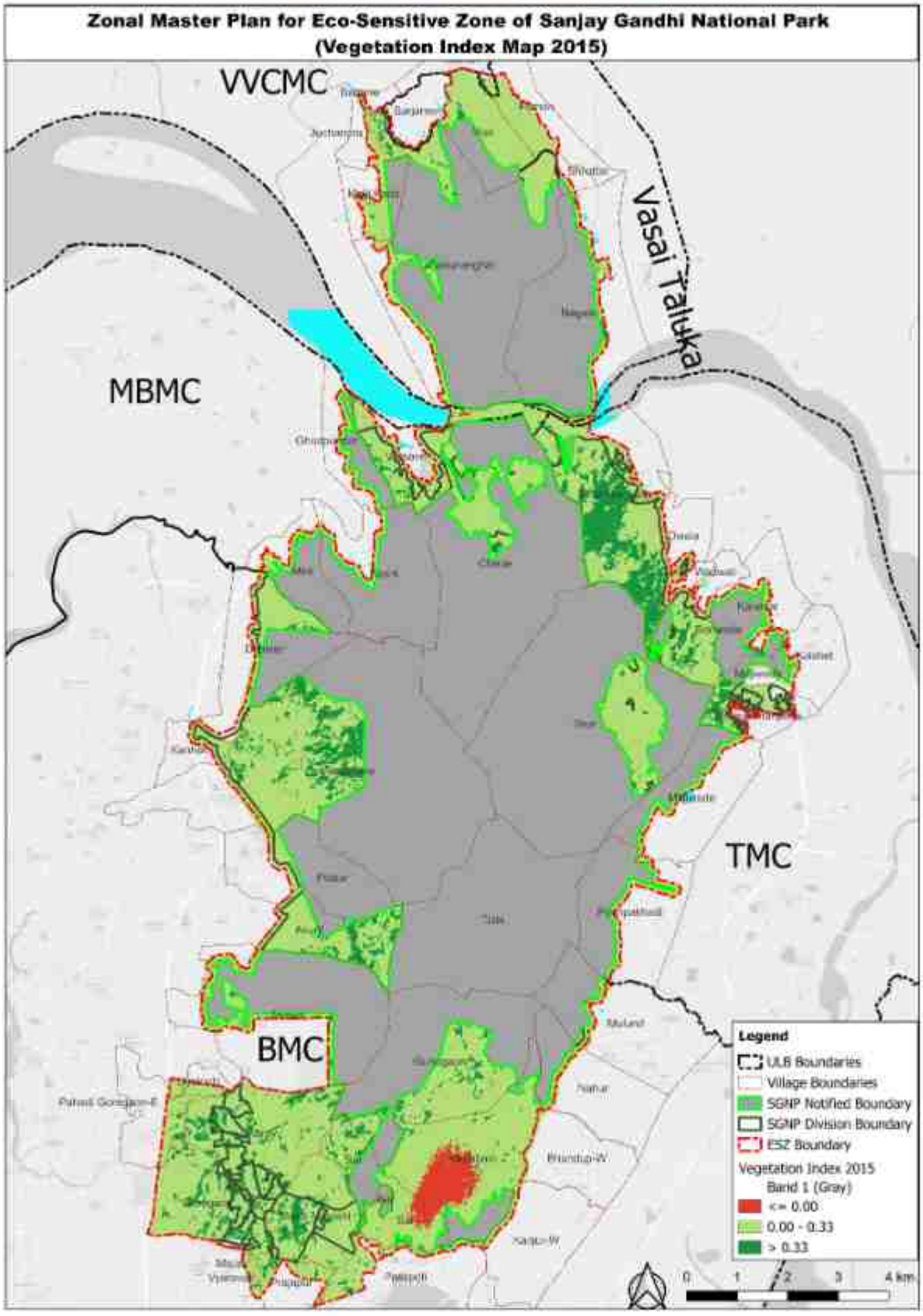
Source: Geological Survey of India

Figure 6-16 Tree Cover Map in ESZ



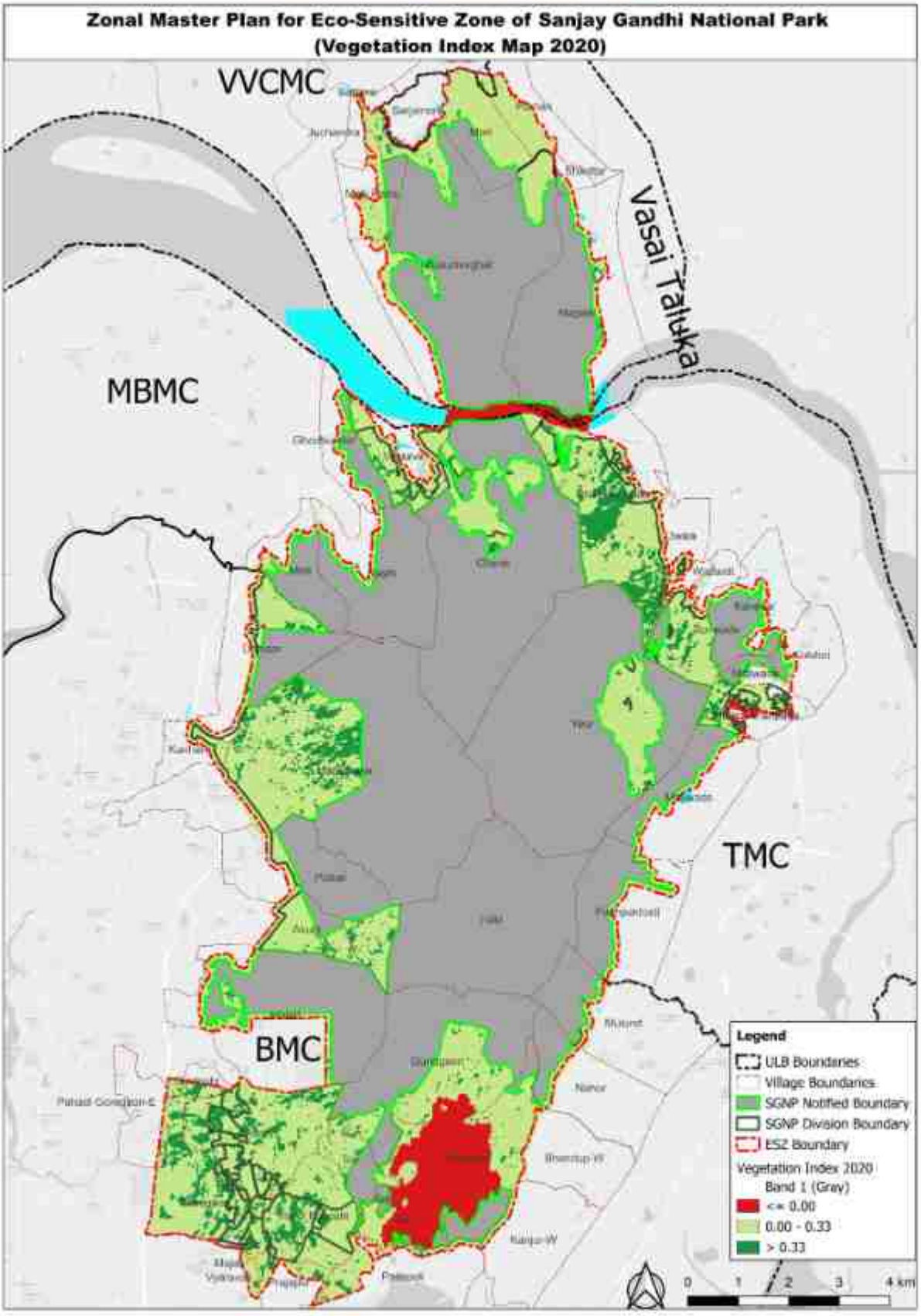
Source: Consultant Analysis

Figure 6-17 Vegetation Index 2015



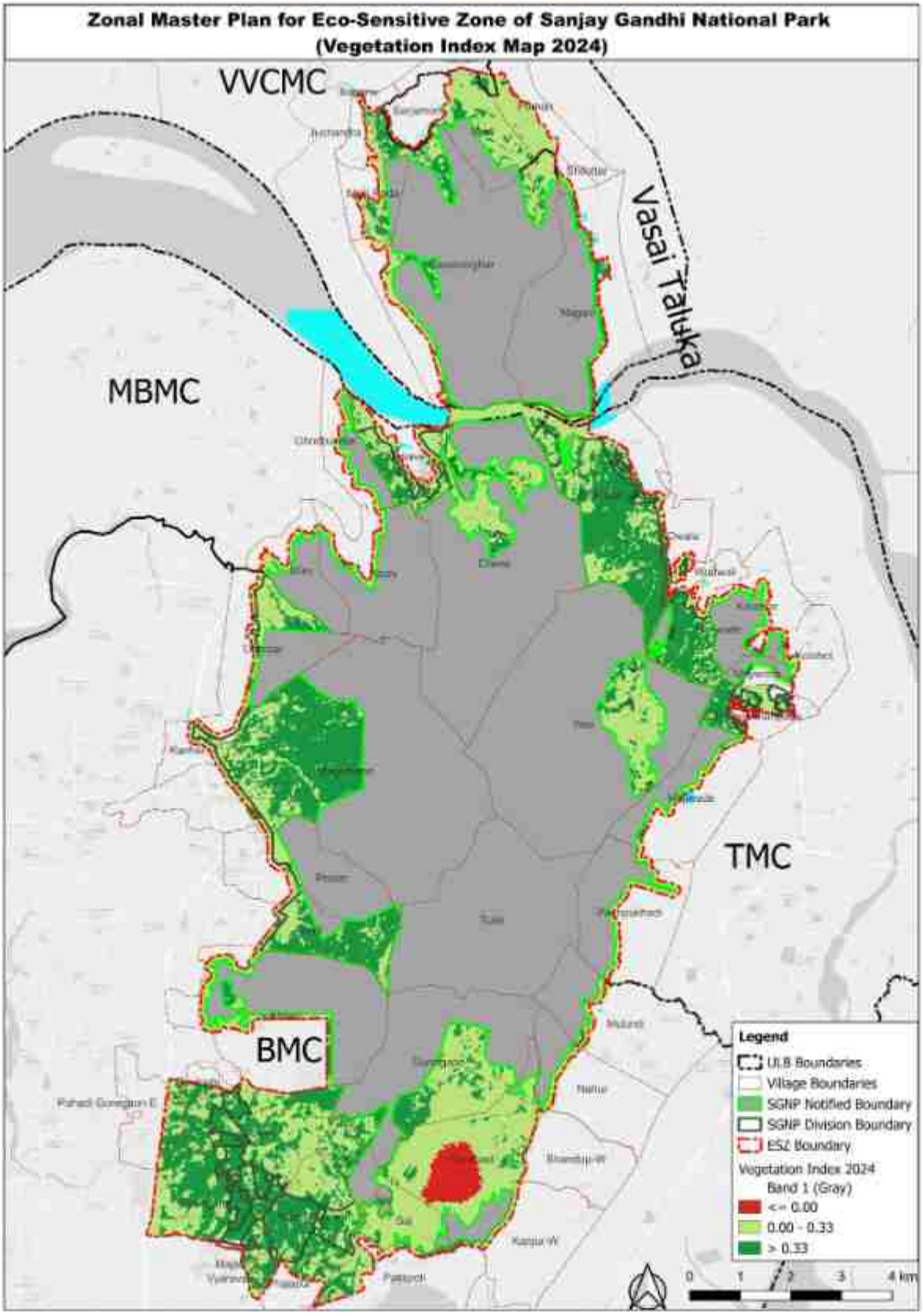
Source: Consultant Analysis

Figure 6-18 Vegetation Index 2020



Source: Consultant Analysis

Figure 6-19 Vegetation Index 2024



Source: Consultant Analysis

6.8.1.4 Water Body Presence

The presence of water bodies such as lakes, rivers, and wetlands enhance biodiversity and provides essential resources for flora and fauna. These areas act as natural cooling systems, regulate local climate, and support aquatic ecosystems. Protecting water resources ensures ecological stability and long-term environmental sustainability.

Water Body Percentage	0-20%	20-40%	40-60%	60-80%	Above 80%
Scoring	1	2	3	4	5

Source: Consultant Analysis

The scoring was determined by the percentage of water bodies present, identified and analysed through drone imagery. A higher water body percentage signified a more ecologically rich area.

6.8.1.5 Surface Contamination

Surface contamination, including pollutants such as chemicals, heavy metals, and industrial waste, degrades soil and water quality. Contaminated land affects plant growth, harms wildlife, and poses health risks to humans are critical to understand the surface degradation and preventing further environmental degradation.

Number of Surface Contamination Points	0	1	2	3	4 or more
Score	5	4	3	2	1

Source: Consultant Analysis

Surface Contamination points were identified by primary survey. Surveyor's team identified the points where there was Garbage dumping, Discoloration of soil, Oil or chemical spillage, Presence of dead fauna, Unnatural soil texture (sticky, greasy, powdery, Corroded pipelines or storage tanks etc. The grids were scored as per number and extent of the contamination.

6.8.2 Built Form

6.8.2.1 Building Footprints

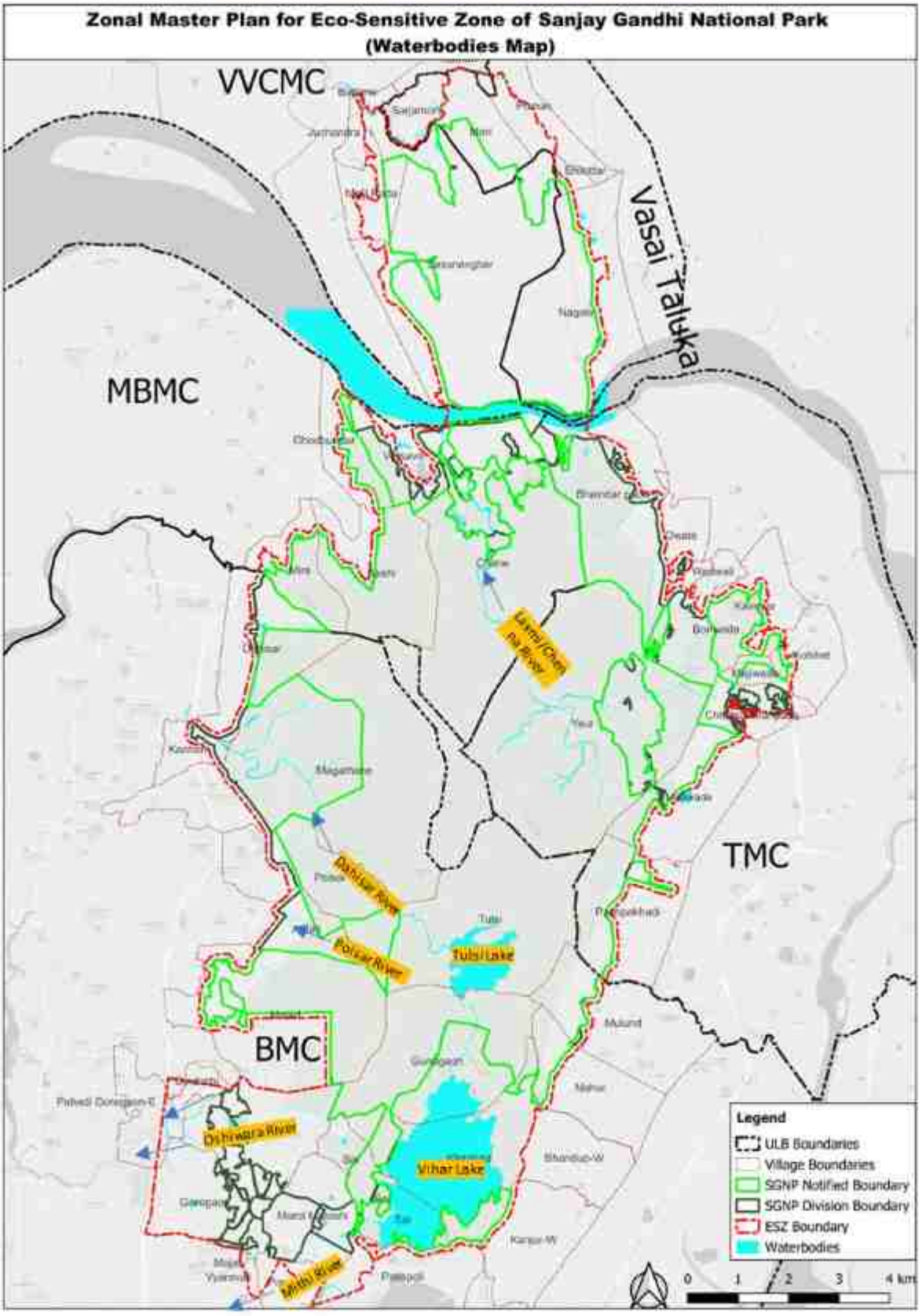
Human footprints, settlements, and infrastructure, indicate the extent of human intervention in natural landscapes. High human activity often leads to habitat destruction, deforestation, and pollution. Assessing footprints helps in understand the extent of penetration

Footprint cover Percentage	0-10%	10-25%	25-40%	40-60%	Above 60%
Scoring	5	4	3	2	1

Source: Consultant Analysis

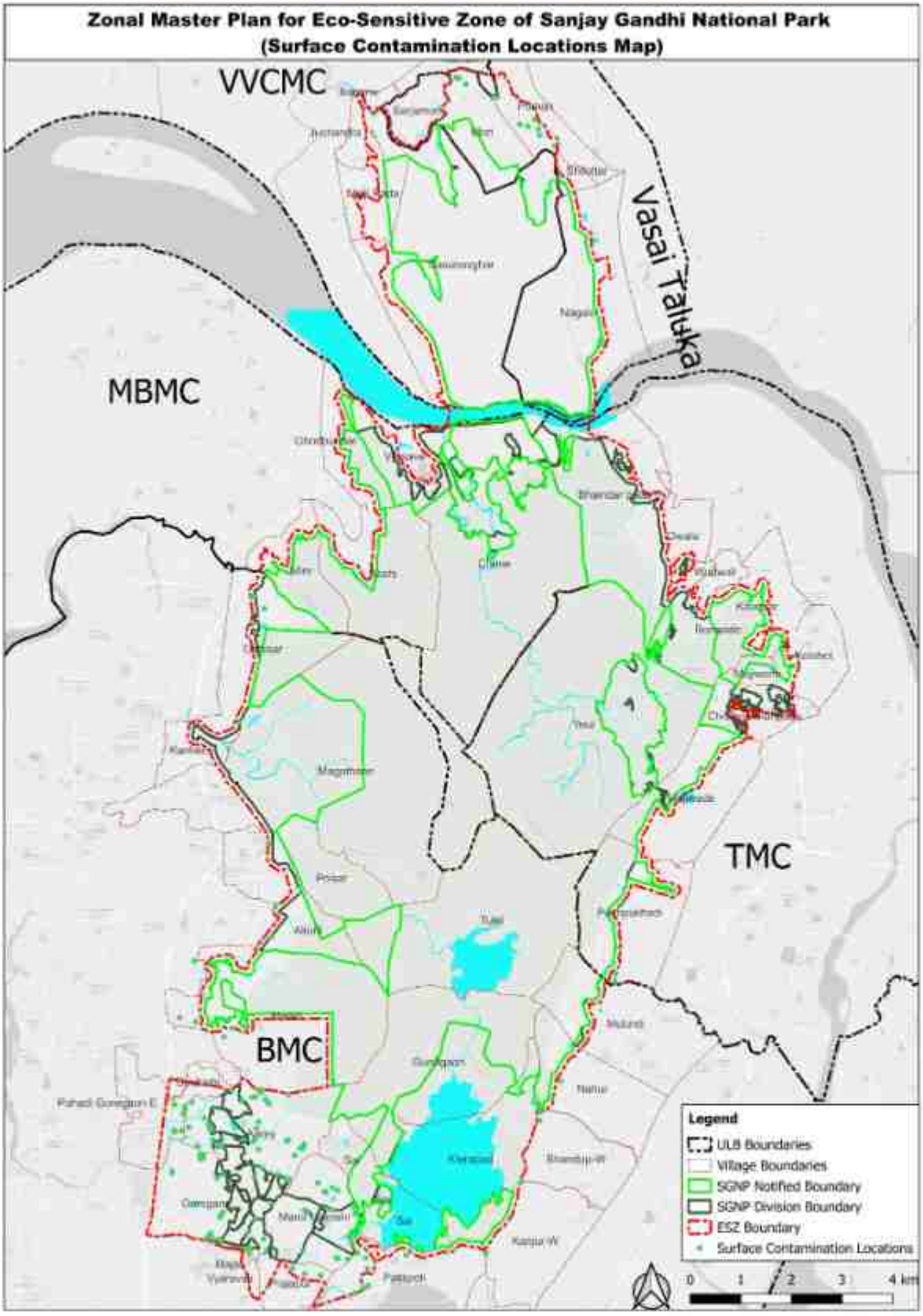
Footprints were identified on drone imagery and analysed for their percentage coverage per grid. A higher footprint coverage resulted in a lower score, as it indicated environmental degradation.

Figure 6-20 Waterbodies Map of ESZ of SGNP



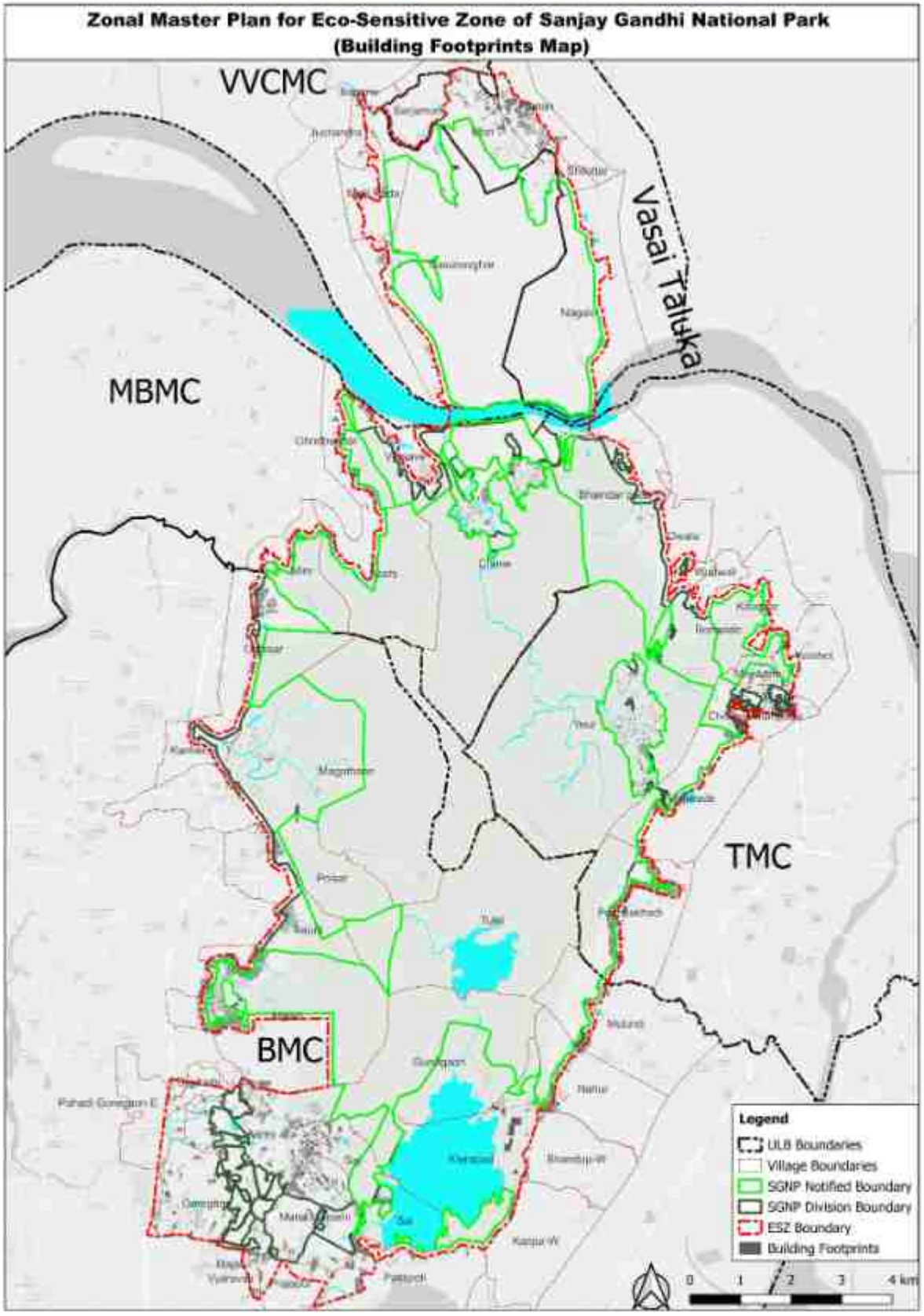
Source: Consultant Analysis

Figure 6-21 Surface Contamination map of ESZ of SGNP



Source: Consultant Analysis

Figure 6-22 Building Footprints Map of ESZ of SGNP



Source: Consultant Analysis

6.8.2.2 Existing Land Use

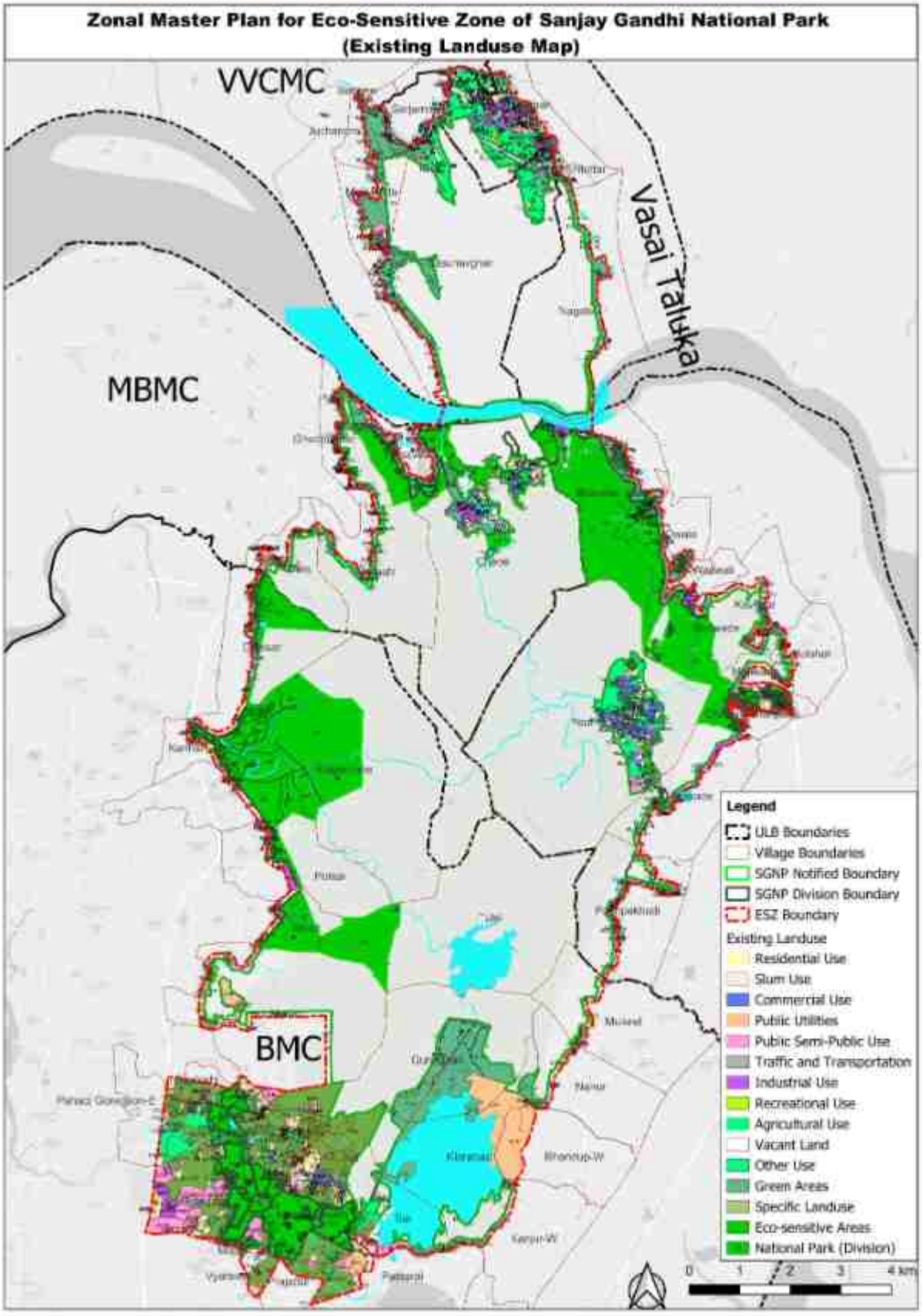
Land use patterns, are important aspect to study the environmental richness and vulnerability. Primary survey was conducted to study the Existing land use and GIS Based map was Generated. Different land use of area under each grid was calculated and was multiplied by the individual scoring to normalize the score of multiple land uses in one grid

5	4	3	2	1
Most Beneficial	Beneficial	Least Harmful	Harmful	Most Harmful
Green Area	Agriculture	Public and Semi-public buildings	Residential	Industrial
Wetlands	Recreational	Health	Commercial	Slum
Eco sensitive Zones	Cowsheds	Education	Mixed	Traffic and Transportation
	Vacant lands	Religious		

Source: Consultant Analysis

Existing land use was categorized based on its environmental impact, with rankings reflecting the extent of built-up areas, pollution levels, and ecological disruption. The most harmful zones include industrial areas, slums, transportation hubs, traffic-related infrastructure, and wastelands, as they contribute to severe environmental degradation through high pollution, resource consumption, and habitat destruction. High harmful impact areas, such as residential and commercial zones, mixed-use areas, roads, government properties, and vacant lands, involve significant built-up structures but may still allow for some environmental management. Moderate harmful impact areas include public utilities, recreational spaces, healthcare facilities, and religious sites, which, while developed, can incorporate sustainable practices and green spaces. Low harmful impact zones, such as agricultural land, communication infrastructure, and specific planned zones, retain a balance between built-up structures and open spaces, mitigating their ecological footprint. Finally, the least harmful areas, including eco-sensitive zones, green spaces, wetlands, offer major ecological benefits by preserving biodiversity, improving air and water quality, and supporting sustainable land use.

Figure 6-23 Existing Land use and Activity Map of ESZ of SGNP



Source: Consultant Analysis

6.8.2.3 Slums/Encroachments

Unplanned settlements and encroachments lead to deforestation, loss of green spaces, and pollution. These areas often lack proper waste management, contributing to soil and water contamination. High population density in slum areas exerts pressure on natural resources, leading to environmental degradation.

Slum Cover Percentage	0-20%	20-40%	40-60%	60-80%	Above 80%
Scoring	5	4	3	2	1

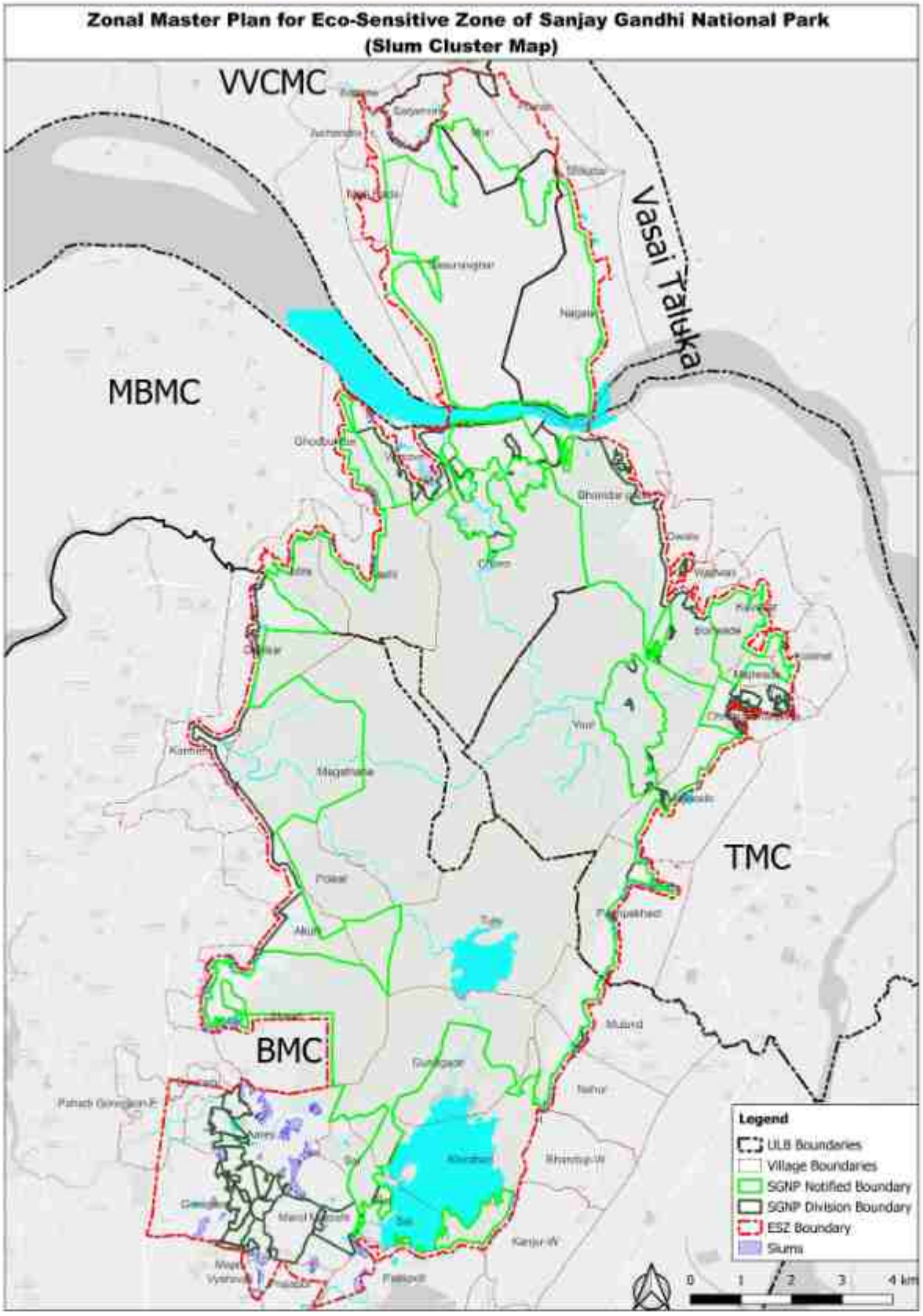
Source: Consultant Analysis

Notified Slum Boundaries were obtained from slum rehabilitation authorities and non-notified slums were identified from the building features and primary survey. The percentage score was obtained in each grid and score was calculated accordingly.

6.8.2.4 Population Density

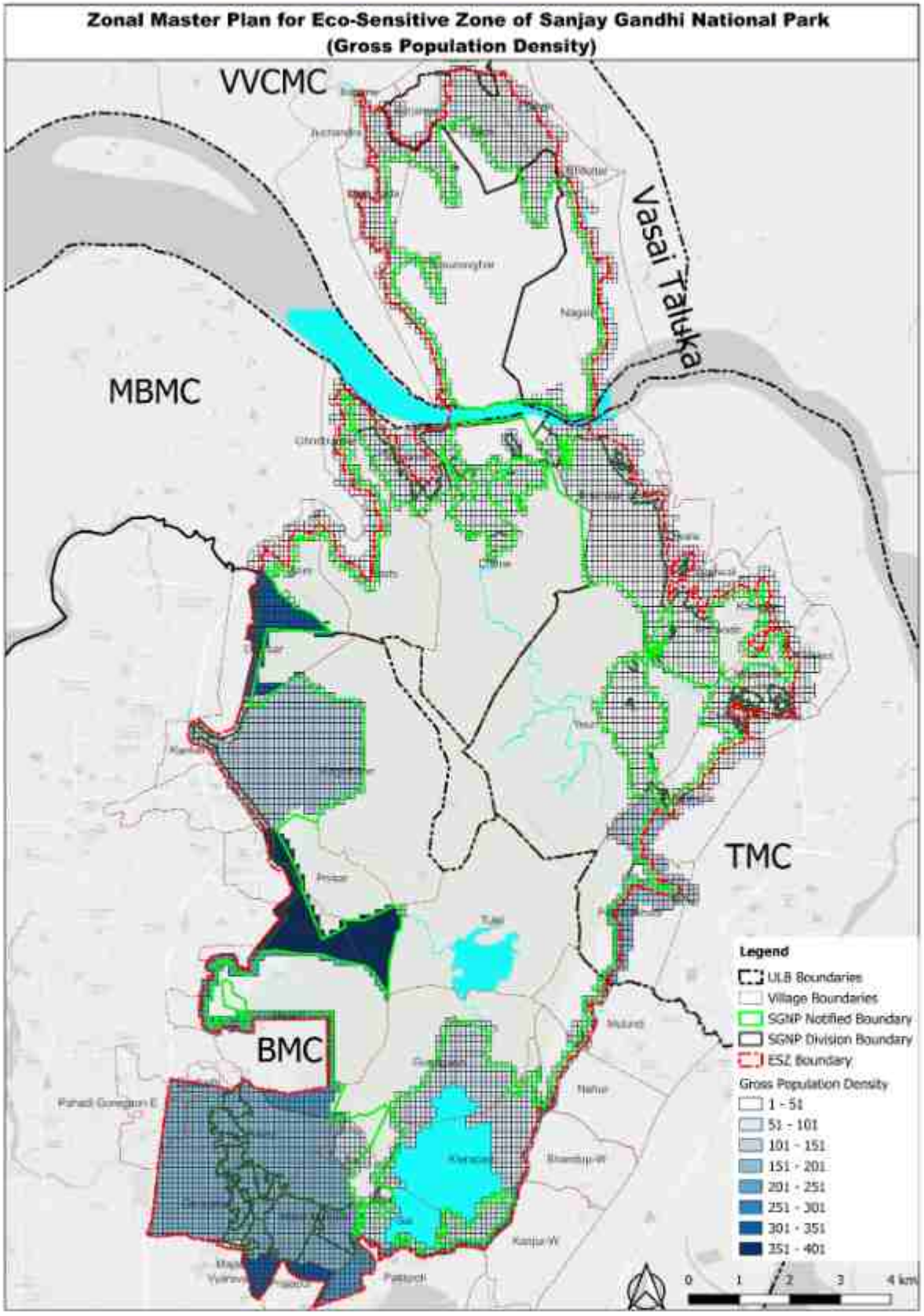
High population density increases resource consumption, waste generation, and pollution. Urban expansion reduces forest cover and disrupts natural ecosystems. Overcrowded areas experience poor air quality, water scarcity, and increased vulnerability to environmental hazards. This factor is essential to study the depletion of the resources. Scoring is done as higher the Densities lesser the score. It is done by identifying the highest and lowest densities present in the area.

Figure 6-24 Slum Clusters in ESZ of SGNP



Source: Consultant Analysis

Figure 6-25 Population Density of wards in ESZ



Source: Consultant Analysis

6.8.3 Disasters and Conflicts

6.8.3.1 Human Animal Conflict

Human-wildlife conflicts arise when natural habitats shrink due to deforestation and urbanization. Wildlife venturing into human settlements can lead to loss of biodiversity and pose risks to both animals and people. As per a technical report published on Human-Animal Wildlife Conflict in Uttarakhand, a buffer of 500m was taken around previously observed conflict locations. However, SGNP being surrounded by urban areas on all the sides, cautious zone of 250m has been taken in order to identify the overlay for human-animal conflict across ESZ. (Assessment of socio psychological perspectives and actual threat from Leopard in Motichur Range, Dec 2019)

Zone	Conflict points	Immediate danger zone	Cautious Zone	Buffer zone	Safe Zone
Distance	0	100m	250m	500m	Rest of the area
Score	1	2	3	4	5

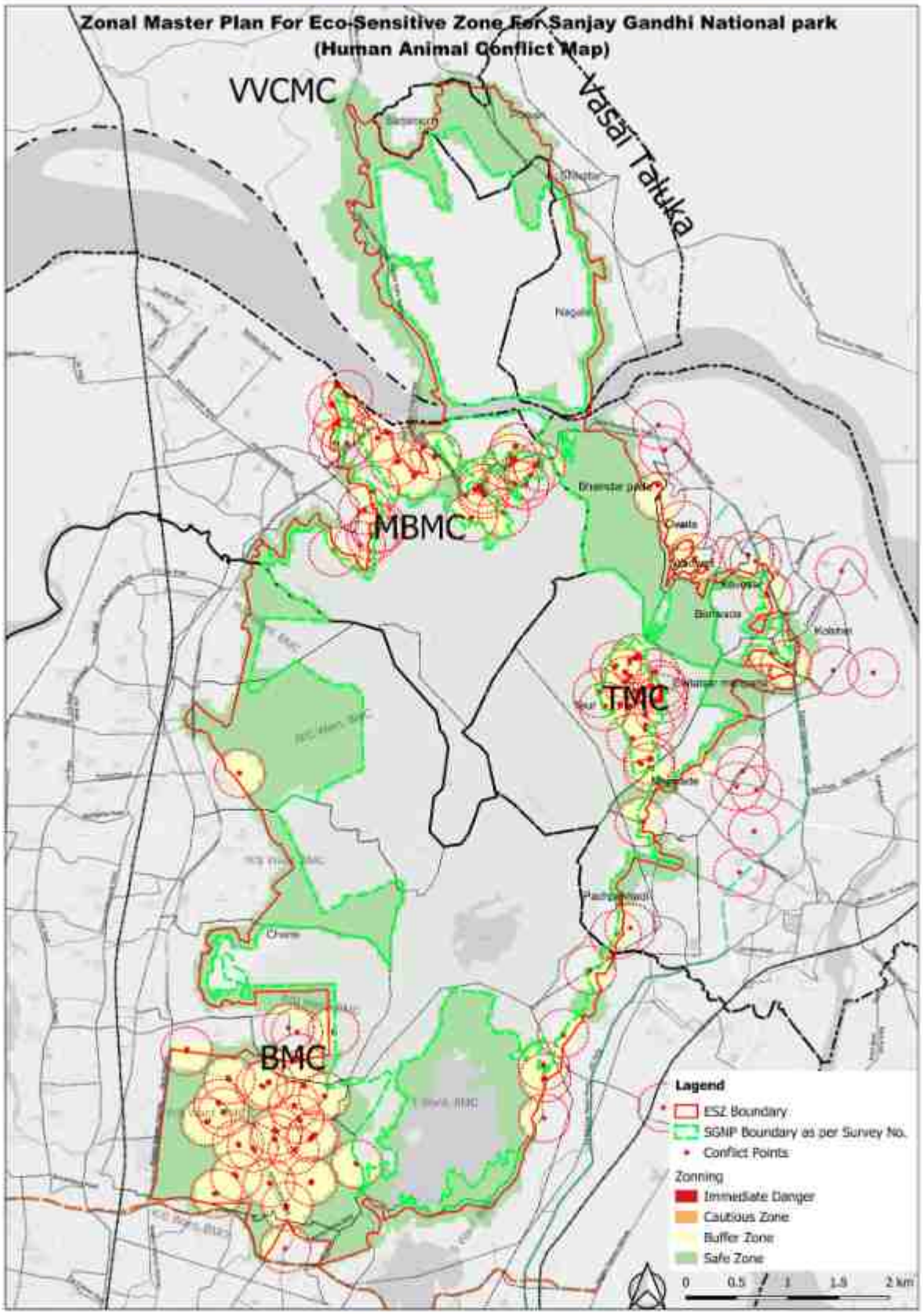
Source: Consultant Analysis

Human animal conflict points were obtained from the Forest Department, and buffer maps were created based on policies and frameworks relevant to the Indian context. Different distances were classified into conflict zones, immediate danger zones, cautious zones, and buffer zones. Scores were assigned to each grid accordingly, while the remaining grids were designated as safe zones.

6.8.3.2 Flood Prone Area

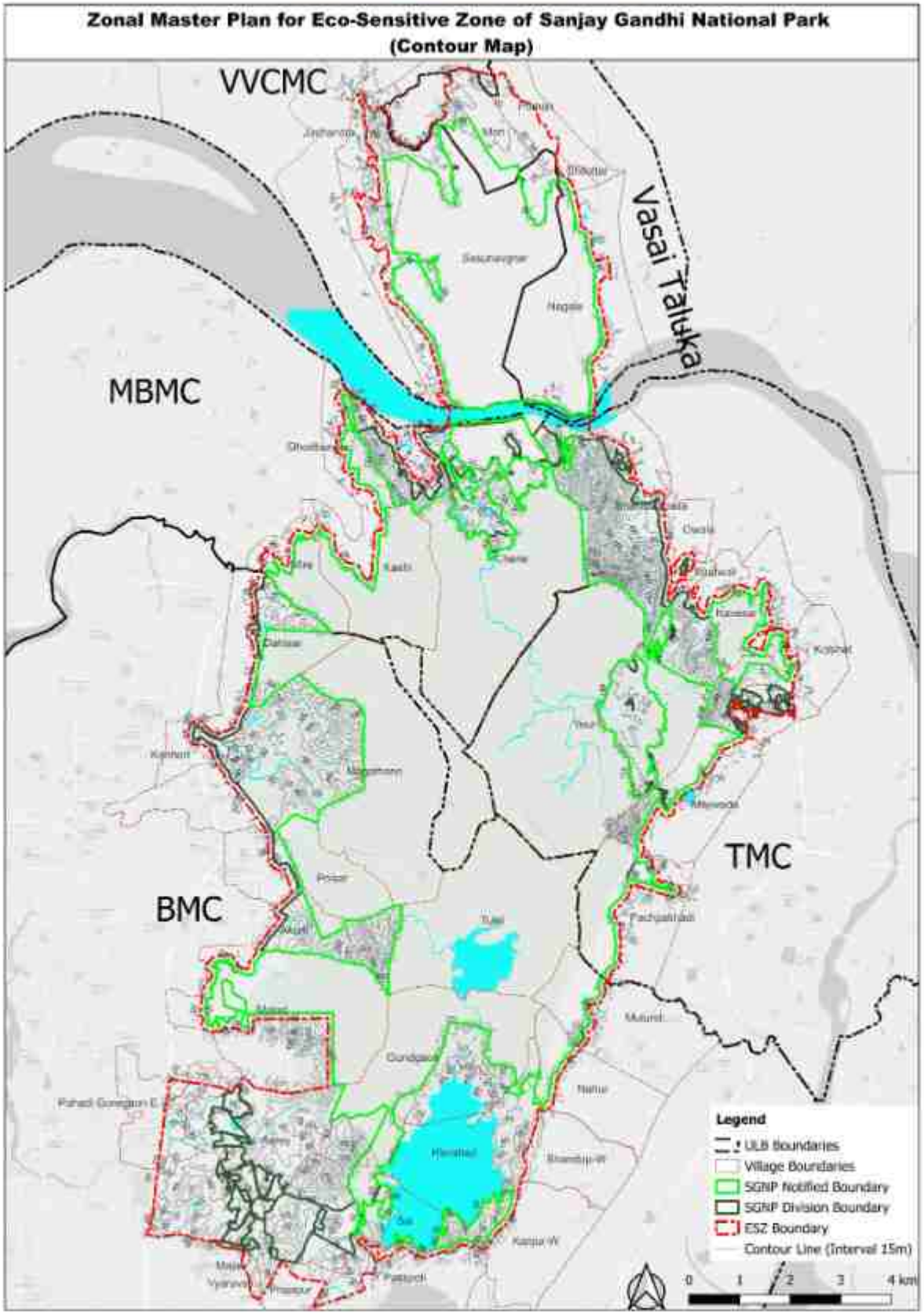
Flood-prone areas refer to regions within and around SGNP that experience waterlogging, flash floods, or seasonal inundation due to heavy monsoon rains and poor drainage. To study this Contour maps were generated and highest and lowest points were identified. Elevation above 100m were given highest score and lowest values were divided into scale and were scored accordingly.

Figure 6-26 Human Animal Conflict Map of ESZ of SGNP



Source: Consultant Analysis

Figure 6-27 Contour Map of ESZ



Source: Consultant Analysis

6.8.4 Fauna

The parameter for scoring was done from the data obtained from biodiversity survey. The data was normalized according to count of species and its recurring percentage value of the species.

6.8.4.1 Fauna Density

Fauna density indicates the number of animal species in a given area, reflecting habitat quality and ecosystem stability. High fauna density suggests a thriving environment with sufficient resources, while low density may indicate habitat degradation or resource scarcity. A decline in fauna density often signals environmental stress due to deforestation, climate change, or human activities. Overcrowding, on the other hand, can lead to competition for resources, affecting species survival. Monitoring fauna density helps in assessing biodiversity health and guiding conservation efforts.

The count was obtained from biodiversity survey the highest and lowest density values were obtained and were scored by categorising it into scale of 5.

6.8.4.2 Fauna Age

Fauna age distribution provides insights into population stability, reproductive success, and species survival. A balanced age structure ensures healthy population dynamics, while an aging or juvenile-skewed population may indicate ecological stress. Factors such as habitat loss, hunting, and food shortages can disrupt age distribution, affecting long-term species sustainability. Monitoring fauna age helps detect changes in breeding patterns and environmental pressures.

Age	Old/Matured	Adult	Juvenile
Score	5	3	1

Source: Consultant Analysis

6.8.4.3 Fauna Health

Fauna health is a key indicator of environmental conditions, reflecting habitat quality, pollution levels, and disease prevalence. Poor fauna health often signals pollution, food scarcity, or climate-induced stress. Disease outbreaks in wildlife can also impact ecosystems and even pose risks to human health. Monitoring fauna health helps detect environmental imbalances and guides conservation interventions.

Health	Healthy	Unhealthy	Irrecoverable
Score	5	3	1

Source: Consultant Analysis

6.8.4.4 Fauna Location

Animal distribution refers to the spatial presence of domesticated, stray, and wild animals in an ecosystem. Changes in distribution patterns often indicate habitat disturbances, urban expansion, or resource availability shifts. Stray animals, often a result of human neglect, can disrupt local wildlife and spread diseases. Wild animals facing habitat loss may enter human settlements, leading to conflicts. Understanding animal distribution helps in wildlife management, urban planning, and conservation efforts.

Distribution	Wild	Stray	Domesticated
Score	5	3	1

Source: Consultant Analysis

6.8.4.5 Fauna Natal Dispersion

Fauna natal dispersal plays a crucial role in genetic diversity and population connectivity. Limited dispersal due to habitat fragmentation can lead to isolated populations and reduced adaptability to environmental changes. Human-made barriers such as roads and urban expansion often restrict dispersal, increasing extinction risks. Creating wildlife corridors helps maintain natural movement and species survival. Ensuring safe dispersal pathways supports biodiversity and ecosystem balance. This was done by studying research papers and scoring them accordingly.

6.8.5 Flora

The parameter for scoring was done from the data obtained from biodiversity survey. The data was normalized according to count of species and its recurring percentage value of the species

6.8.5.1 Flora Density

Flora density refers to the number of plant species within a specific area, indicating vegetation cover and ecosystem productivity. High flora density supports biodiversity by providing food, shelter, and oxygen for various organisms. Low flora density may result from deforestation, overgrazing, or soil degradation, leading to habitat loss and increased vulnerability to erosion. Dense vegetation helps in carbon sequestration, improving air quality and climate resilience. Monitoring flora density is crucial for assessing habitat quality and implementing conservation strategies.

The count was obtained from biodiversity survey the highest and lowest density values were obtained and were scored by categorising it into scale of 5

6.8.5.2 Flora Age

Flora age indicates the maturity and life cycle stage of plant species within an ecosystem. A diverse age structure, with a mix of young and mature plants, ensures natural regeneration and ecological stability. A lack of young plants may signal deforestation, soil degradation, or poor seed dispersal. Older vegetation plays a crucial role in carbon sequestration and providing habitats for wildlife. Monitoring flora age helps assess forest sustainability and the long-term health of an ecosystem.

Age	Heritage	Mature	Juvenile
Score	5	3	1

Source: Consultant Analysis

6.8.5.3 Flora Health

Flora health reflects the overall condition of vegetation, influenced by factors such as soil quality, pollution, and climate conditions. Unhealthy plants may exhibit signs of disease, nutrient deficiencies, or physical damage from human activities. Declining flora health can indicate environmental degradation, affecting biodiversity and ecosystem services. Healthy flora supports wildlife, improves air quality, and enhances climate resilience.

Health	Healthy	Diseased	Irrecoverable
Score	5	3	1

Source: Consultant Analysis

6.8.5.4 Flora Location

Flora location refers to the spatial distribution of plant species across different ecosystems. Changes in flora location can result from deforestation, urbanization, or shifting climate conditions. Certain plant species serve as bioindicators, reflecting soil fertility and water availability. Mapping flora locations helps identify critical habitats that require protection and restoration.

Location	Wild	Developed area	Road Side
Score	5	3	1

Source: Consultant Analysis

6.8.5.5 Flora Permeance

Flora permanence refers to the longevity and stability of plant species in a given area, categorized into seasonal, annual, and perennial vegetation. Seasonal plants grow and die within a short period, responding to specific climatic conditions, making them the least stable. Annual plants complete their life cycle within a year, requiring continuous regeneration, which can make ecosystems more vulnerable to environmental stress. Perennial plants, which live for multiple years, provide long-term ecological benefits such as soil stabilization, carbon storage, and sustained habitats for wildlife, making them the most environmentally valuable. Ecosystems with a higher presence of perennial plants tend to be more resilient, whereas areas dominated by seasonal or annual flora are more susceptible to degradation and habitat loss

Permeance	Perennial	Seasonal	Annual
Score	5	3	1

Source: Consultant Analysis

6.8.5.6 Flora Natal Dispersion

Flora natal dispersion refers to the spread of seeds and young plants from parent vegetation to new areas. Effective dispersion promotes plant diversity, ecosystem regeneration, and habitat expansion. Factors like wind, water, and animals aid natural dispersion, while habitat fragmentation can limit seed spread. Poor dispersal can lead to reduced plant populations and lower biodiversity. Conservation strategies, such as habitat connectivity and reforestation, enhance flora natal dispersion for ecosystem sustainability. This was done by literature review for the subject and scoring them accordingly.

6.8.6 AHP - Pairwise Comparisons

Experts or stakeholders are asked to perform pairwise comparisons between the criteria and sub criteria to establish their relative importance. Each criterion was compared based on relative scale and its reverse.

Table 6-17: Comparative Scoring of Importance for pairwise comparisons in AHP for vulnerability Analysis

Level of criticalness	Definition	Explanation
1	Equal Importance	Both elements have equal contribution in the objective
3	Moderate importance	Moderate advantage of one element compared to other
5	Strong Importance	Strong favoring of one element compared to other
7	Very Strong Importance	one element is strongly favored and has domination in practice, compared to the other element
9	Extreme Importance	one element is favored in comparison with the other, based on strong proved evidences and facts

Source: Consultant Analysis

The values 1/3, 1/5, 1/7, and 1/9 were used for inverse comparisons. These values were then input into spreadsheet to construct a matrix. This process was repeated for all pairs of sub-criteria, resulting in the creation of a comprehensive matrix of comparisons. For better understanding and clarity, the table of main criteria is provided below, and the remaining tables of sub-criteria matrices are attached in the Annexure VII.

Table 6-18: Pairwise comparison matrix for Criteria for AHP – Vulnerability Analysis

Criteria	Soil & Surface (C1)	Built Form (C2)	Disasters & Conflicts (C3)	Fauna (C4)	Flora (C5)
Soil & Surface (C1)	1	1	7	5	5
Built Form (C2)	1	1	7	5	5
Disasters & Conflicts (C3)	0.142857	0.142857	1	0.333333	0.3333333
Fauna (C4)	0.2	0.2	3	1	1
Flora (C5)	0.2	0.2	3	1	1
SUM	2.542857	2.542857	21	12.33333	12.333333

Source: Consultant Analysis

6.8.7 Weight Calculation

Using the pairwise comparison matrix, AHP calculates the relative weights of each criterion. These weights reflect how much influence each criterion should have in the final vulnerability assessment. The calculation process ensures that the subjective judgments of experts are quantified and consistently applied across all criteria.

Its first step is normalising the data to calculate the weight of each criterion, the matrix must be normalized. Normalization involves dividing each element in the matrix by the sum of the column it is in. This ensures that each column adds up to 1.

For Soil and Surface criteria the sum of column is 2.542857 Normalize each element:

- Soil & Surface (C1) = 1/2.542857 = 0.3933
- Built Form (C2) = 1/2.542857 = 0.3933

- Disasters & Conflicts (C3) = 0.142857/2.542857 = 0.0562
- Fauna (C4) = 0.2/ 2.542857 = 0.0787
- Flora (C5) = 0.2/ 2.542857 = 0.0787

This normalization process is done for all columns. After normalizing the matrix, the next step is to calculate the average of each row. This gives the relative weight of each criterion. Each weight represents the importance of a criterion in relation to the others.

Criteria	C1	C2	C3	C4	C5	Total	Criteria weights (Avg)
C1	0.3933	0.3933	0.3333	0.4054	0.4054	1.9307	0.3861
C2	0.3933	0.3933	0.3333	0.4054	0.4054	1.9307	0.3861
C3	0.0562	0.0562	0.0476	0.0270	0.0270	0.2140	0.0428
C4	0.0787	0.0787	0.1429	0.0811	0.0811	0.4623	0.0925
C5	0.0787	0.0787	0.1429	0.0811	0.0811	0.4623	0.0925

Source: Consultant Analysis

A key aspect of AHP is checking the consistency of the judgments made during the pairwise comparisons. A consistency ratio (CR) is calculated to ensure that the comparisons are logically consistent. A CR less than 0.1 is typically considered acceptable. If the CR is too high, it indicates that the judgments may be inconsistent and need to be revised.

The consistency ratio CR is calculated by:

Dividing the consistency index (CI) by the random index (RI), which is based on the size of the matrix.

The formula for consistency index (CI) is: CI = (λmax - n) / (n - 1) Where: λmax is the largest eigenvalue of the pairwise comparison matrix which is obtained by summation of solving the initial matrix and multiplying it but the corresponding weight. and n is the number of criteria. Random index (RI) depends upon the number of criteria

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

For this criteria matrix the number of criteria were 5 hence the random index (RI) is 1.12

Criteria weights (Average)	Comparison Matrix (By solving the initial scoring matrix
0.3861	5.170653
0.3861	5.170653
0.0428	5.017296
0.0925	5.059254
0.0925	5.059254

- λmax (Largest Eigenvalue): λmax = 5.095422
- Consistency Index (CI): CI = (λmax - n) / (n - 1)
- = (5.095422 - 5) / (5 - 1) = 0.023855

Consistency Ratio (CR): CR = CI / RI = 0.023855 / 1.12 = 0.021299 which is less than 0.1 hence this is acceptable. In similar way the rest of the Sub criteria are calculated, the calculation tables are attached in the Annexure-VII.

6.9 Final Vulnerability Score Calculation

The weighted scores for each criterion are combined to calculate an overall vulnerability score for each grid. This score represents the relative vulnerability of each grid within the eco-sensitive zone, with higher scores indicating grids with greater environmental value. The areas are then ranked based on their scores, providing a clear indication of regional context. This is done by multiplying criteria weight to the sub criteria weight. Ranking is then established based on this.

Table 6-19: Global Weight Calculation for Vulnerability Analysis - AHP

Criteria	Criteria code	Criteria Weights	Sub-Criteria	Sub-Criteria Code	Sub-Criteria Weights	Global weights
Soil & Surface	C1	0.386132	Slope	C1.1	0.09125628	0.03524
			Soil type	C1.2	0.11230891	0.04337
			Tree Cover	C1.3	0.56761598	0.21917
			Water body presence	C1.4	0.18254076	0.07048
			Surface Contamination (Presence of Foreign substances)	C1.5	0.04627808	0.01787
Built Form	C2	0.386132	Footprints	C2.1	0.08318381	0.03212
			Existing Landuse	C2.2	0.35720694	0.13793
			Slums/ encroachments	C2.3	0.3988736	0.15402
			Population Density	C2.4	0.16073565	0.06207
Disasters & Conflicts	C3	0.042807	Human Animal Conflicts	C3.1	0.125	0.00535
			Flood Prone areas	C3.2	0.875	0.03746
Fauna	C4	0.092465	Fauna Density	C4.1	0.50345161	0.04655
			Fauna Natal Dispersal Distance	C4.2	0.03288697	0.00304
			Fauna Age	C4.3	0.14340065	0.01326
			Fauna Health	C4.4	0.2641804	0.02443
			Fauna Location	C4.5	0.05608036	0.00519
Flora	C5	0.092465	Flora Density	C5.1	0.33728034	0.03119
			Flora Natal Dispersal Distance	C5.2	0.02623473	0.00243
			Flora Age	C5.3	0.08627213	0.00798

			Flora Health	C5.4	0.31554121	0.02918
			Flora Location	C5.5	0.1681724	0.01555
			Flora Permanence	C5.6	0.0664992	0.00615

Source: Consultant Analysis

The most critical factor in understanding environmental vulnerability and richness is Tree Cover (Rank 1), as it plays a fundamental role in maintaining biodiversity, enhancing carbon sequestration, regulating temperature, and stabilizing the ecosystem. It prevents soil erosion, mitigates the urban heat island effect, and provides habitat for numerous species, making it the primary indicator of environmental health. Slums/Encroachments (Rank 2) and Existing Land Use (Rank 3) highlight the impact of human settlements and activities on the environment. Unplanned urban expansion, deforestation, and industrial growth contribute to habitat destruction, pollution, and resource depletion. Water Body Presence (Rank 4) is crucial for biodiversity, serving as a life source for flora and fauna, influencing microclimate, and reducing temperature variations. Population Density (Rank 5) directly affects land consumption, waste production, and pollution levels. Areas with high population density often experience environmental degradation due to overexploitation of natural resources, loss of vegetation, and increased carbon emissions. Fauna Density (Rank 6) is an essential indicator of ecosystem health, showing the richness of wildlife populations in an area. A high fauna density suggests a thriving habitat, while a decline indicates ecological stress. Soil Type (Rank 7) determines land fertility, water retention, and erosion resistance. The nature of the soil impacts vegetation growth, agricultural productivity, and the ability to withstand environmental changes. Flood-Prone Areas (Rank 8) and Slope (Rank 9) play key roles in land stability, disaster risk, and erosion control. Steep slopes are prone to landslides, while low-lying areas are susceptible to flooding, affecting both human settlements and natural ecosystems. Footprints (Rank 10) measure direct human presence in an area, including urbanization, deforestation, and resource extraction. High human activity leads to soil degradation, loss of wildlife habitat, and pollution.

Flora Density (Rank 11) and Flora Health (Rank 12) indicate the richness and quality of vegetation cover. Healthy flora supports carbon absorption, biodiversity, and climate resilience. Fauna Health (Rank 13) and Surface Contamination (Rank 14) reflect environmental degradation. Polluted land and water sources negatively impact both flora and fauna, disrupting ecosystems and posing health risks to human populations. Flora Location (Rank 15) and Fauna Age (Rank 16) influence species movement and habitat stability. Fragmented vegetation affects connectivity between ecosystems, while an imbalanced age distribution in wildlife suggests reproductive and survival challenges. Flora Age (Rank 17) and Flora Permanence (Rank 18) determine long-term ecological sustainability. Young forests absorb more carbon, while older forests provide stable ecosystems. Areas with permanent vegetation are more resilient to environmental stress compared to those with seasonal plant cover. Human animal Conflicts (Rank 19) arise when wildlife habitats shrink due to human encroachment, leading to risks for both animals and people. Fauna Location (Rank 20) plays a key role in conservation, as fragmented habitats make species more vulnerable to extinction. Fauna Natal Dispersal Distance (Rank 21) and Flora Natal

Dispersal Distance (Rank 22) determine species' ability to regenerate and adapt. If dispersal distances are limited, habitat fragmentation increases, making ecosystems more vulnerable.

Thus, the higher-ranked factors, particularly Tree Cover, Land Use, and Water Body Presence, have the most immediate impact on assessing environmental vulnerability and richness. Human activities, ecosystem health, and disaster risks play major roles in shaping environmental conditions.

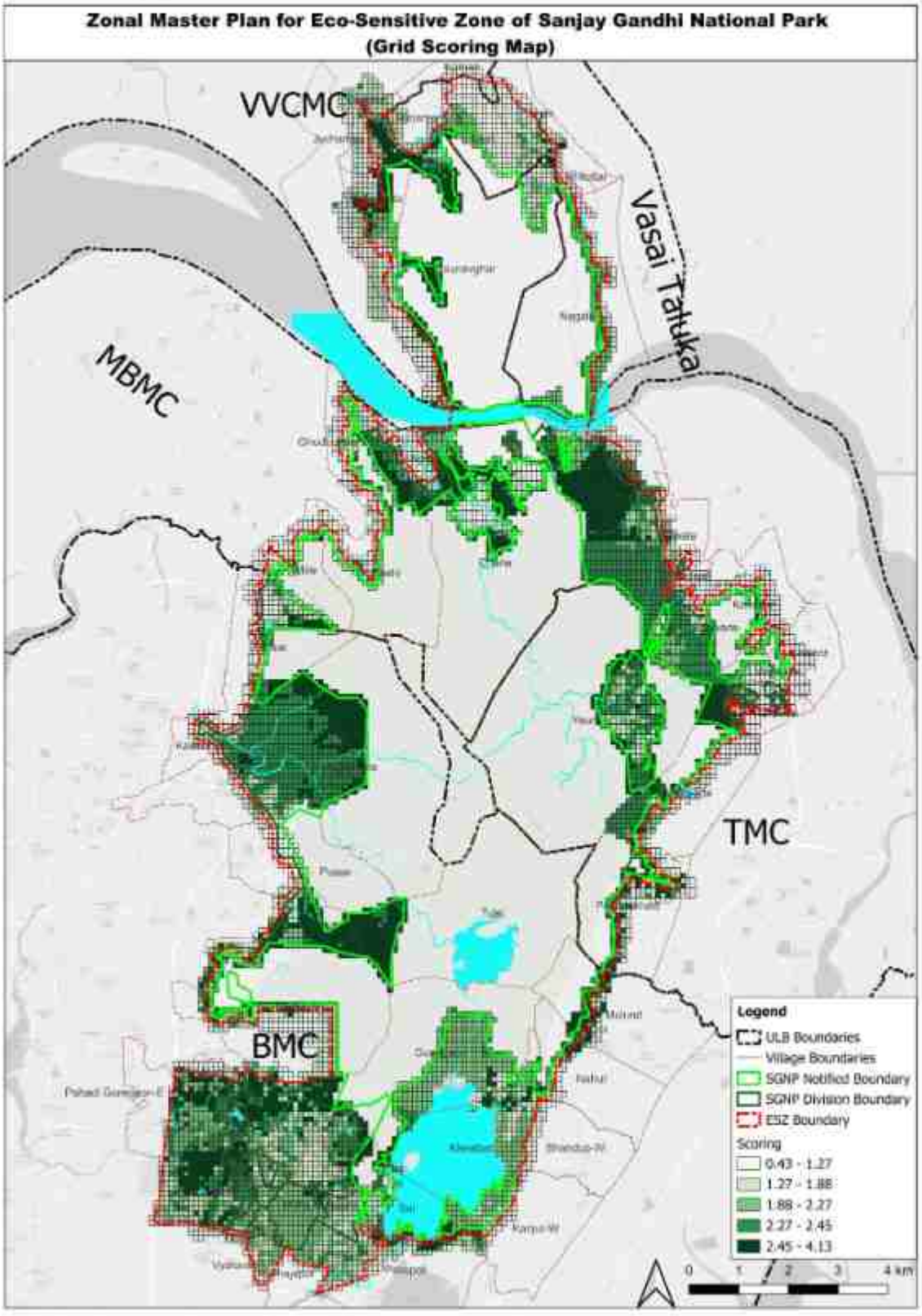
6.9.1 Ranking of Grids

The individual scoring of each grid is multiplied by its corresponding global weight to determine the final score. This ensures that each factor is evaluated based on its relative significance in assessing environmental vulnerability and richness. The final scores are then normalized on a scale ranging from 1 to 5, aligning with the selected standard. Consequently, the final scoring for each grid falls within the range of 0 to 5, where higher scores indicate greater environmental value. A higher score signifies a more ecologically rich and significant area, emphasizing its importance in conservation and sustainable planning.

6.9.2 Vulnerability Index Map

The Grid wise map showing the Vulnerability Index is given below

Figure 6-28: Grid wise Vulnerability Index for ESZ of SGNP



Source: Consultant Analysis

6.9.3 Inference from the Vulnerability Analysis

As per the analysis carried out for Eco-Sensitive Zone of Sanjay Gandhi National Park based on Multi Criteria Decision Making method, the higher values implies that those areas are environmentally rich and its ecology has to be preserved. These areas are immediate extension of the forest area with similar characteristics. And lower values implies that those areas are with high concentration of developments and best suited for it.

7 TOURISM MASTER PLAN

SGNP is inhabited by a staggering variety of plant and animal life, such as leopards, spotted deer, bonnet macaques, and birds. The fact that these species inhabit the park underlines the park's significance in urban wildlife conservation. SGNP also contains ancient historical monuments like the Kanheri Caves, a series of rock-cut Buddhist caves dating from the 1st century BCE, which are a rich source of information regarding India's cultural and religious past. Other significant heritage sites, including the Gandhi Tekdi, also contribute to the park's historical importance.

This Tourism Master Plan is designed to establish a strategic framework for balancing conservation and sustainable tourism development. The strategy focuses on sustainable tourism practices that reduce ecological disruptions and improve visitor experience through well-planned infrastructure, educational activities, and environmentally friendly initiatives.

Through efficient visitor management, green infrastructure development, and community engagement, this plan aims to maintain SGNP's natural and cultural resources and ensure that tourism is positively affecting conservation. Overall, the vision is to establish SGNP and its ESZ as a model for urban conservation of biodiversity and eco-tourism and to demonstrate how natural and historic heritage can be integrated into a modern city without diluting ecological integrity.

7.1 Vision & Objectives

7.1.1 Vision:

The vision for SGNP is to establish it as a benchmark for sustainable tourism, harmonizing conservation, cultural heritage preservation, and responsible visitor engagement. The aim is to create a rich experience for tourists, scientists, and local communities, where both the natural and historical assets are enjoyed and actively preserved.

7.1.2 Objectives of the Tourism Master Plan:

a. Conservation of Biodiversity: The core objective is to safeguard and restore SGNP's diverse flora and fauna. Efforts will focus on preventing habitat degradation, curbing encroachments, and enhancing reforestation initiatives. Establishing wildlife corridors and buffer zones will ensure ecological balance and provide safe movement for animals. Collaboration with research institutions and environmental organizations will ensure continuous biodiversity monitoring.
b. Sustainable Tourism Development: Promoting eco-friendly tourism is a key objective, with an emphasis on infrastructure and practices that minimize human impact while enriching the visitor experience. This includes the development of nature trails, observation decks, eco-lodges, and initiatives for carbon-free tourism. Waste management systems and sustainable transportation options, such as electric shuttle buses and bicycle rentals, will also be prioritized to reduce environmental harm.
c. Integration of Environmental Protection and Tourism Infrastructure: The master plan aims to integrate environmental protection with tourism

infrastructure, ensuring that development initiatives align with conservation goals. Special attention will be given to eco-sensitive infrastructure, such as waste management systems, recycling, and composting. This approach will support sustainable tourism while preserving the park's ecological integrity.

d. Cultural and Heritage Conservation: Efforts will be made to protect and preserve SGNP's historical sites, including the Kanheri Caves, Shilonda Trail, and Gandhi Tekdi, through specialized conservation projects. Interactive digital interpretation centers and guided tours will be established to enhance visitor engagement with the park's rich cultural heritage.
e. Sustainable Community Development and Stakeholder Engagement: Community participation is vital to the long-term success of the plan. Local populations will be involved in eco-guiding, handicraft production, and other sustainable livelihood activities. These community-driven initiatives will generate economic benefits while preserving local traditions and knowledge. Additionally, targeted programs for environmental education, such as workshops, nature trails, and interactive learning centers, will foster a deep, long-term appreciation for nature and wildlife, particularly among children and young adults.
f. Monitoring and Enforcement: To ensure the continued success of conservation and tourism efforts, regular environmental impact assessments will be conducted, along with adaptive management strategies to address emerging challenges. These measures will ensure that SGNP's ecosystem remains protected while tourism develops in a sustainable manner.

The vision and objectives of this Master Plan aim to position SGNP as a leading example of eco-tourism, balancing biodiversity conservation, cultural heritage preservation, and community engagement in an urban-protected area.

7.2 Existing Tourist Attractions in SGNP - ESZ

Sanjay Gandhi National Park (SGNP) in Mumbai is one of the most accessible urban national parks in the world, offering a unique blend of natural beauty, wildlife, and historical significance. The park's Eco-Sensitive Zone (ESZ) is home to several popular tourist attractions that play a vital role in promoting both tourism and conservation. However, these attractions face a range of challenges due to the growing number of visitors and the need to balance tourism with environmental protection. This chapter highlights the key tourist attractions within SGNP, their associated problems, and proposes mitigation measures to ensure their sustainability.

The following are the existing Tourist locations and activities that are available within ESZ of SGNP.

1. Film City
2. Chhota Kashmir
3. Upvan Lake

7.2.1 Vihar Lake

The Vihar Lakes within ESZ of Sanjay Gandhi National Park (SGNP) are essential water bodies for Mumbai and Thane, serving as crucial reservoirs. The surrounding forests provide excellent birdwatching opportunities, with a variety of species such as kingfishers, herons, and migratory waterfowl regularly spotted around the lakes. To protect water quality, boating is prohibited, but visitors can still enjoy the serene environment by engaging in activities like picnicking, photography, and nature walks along the lakeshores. These lakes offer a peaceful retreat for nature enthusiasts while contributing significantly to the region's water resources. Details regarding migratory birds within ESZ is attached as Annexure XII.

7.2.2 Film City

A Film City is a dedicated complex designed for filmmaking, television production, and media-related activities, offering facilities such as sound stages, outdoor sets, editing studios, and production offices. These hubs serve as one-stop destinations for filmmakers, providing all necessary resources for shooting, post-production, and distribution. Notable film cities around the world include Mumbai Film City and Ramoji Film City in India, Pinewood Studios in the UK, and Universal Studios in the USA. These locations have played a crucial role in shaping the global entertainment industry by supporting large-scale productions and fostering creativity in cinema and television.

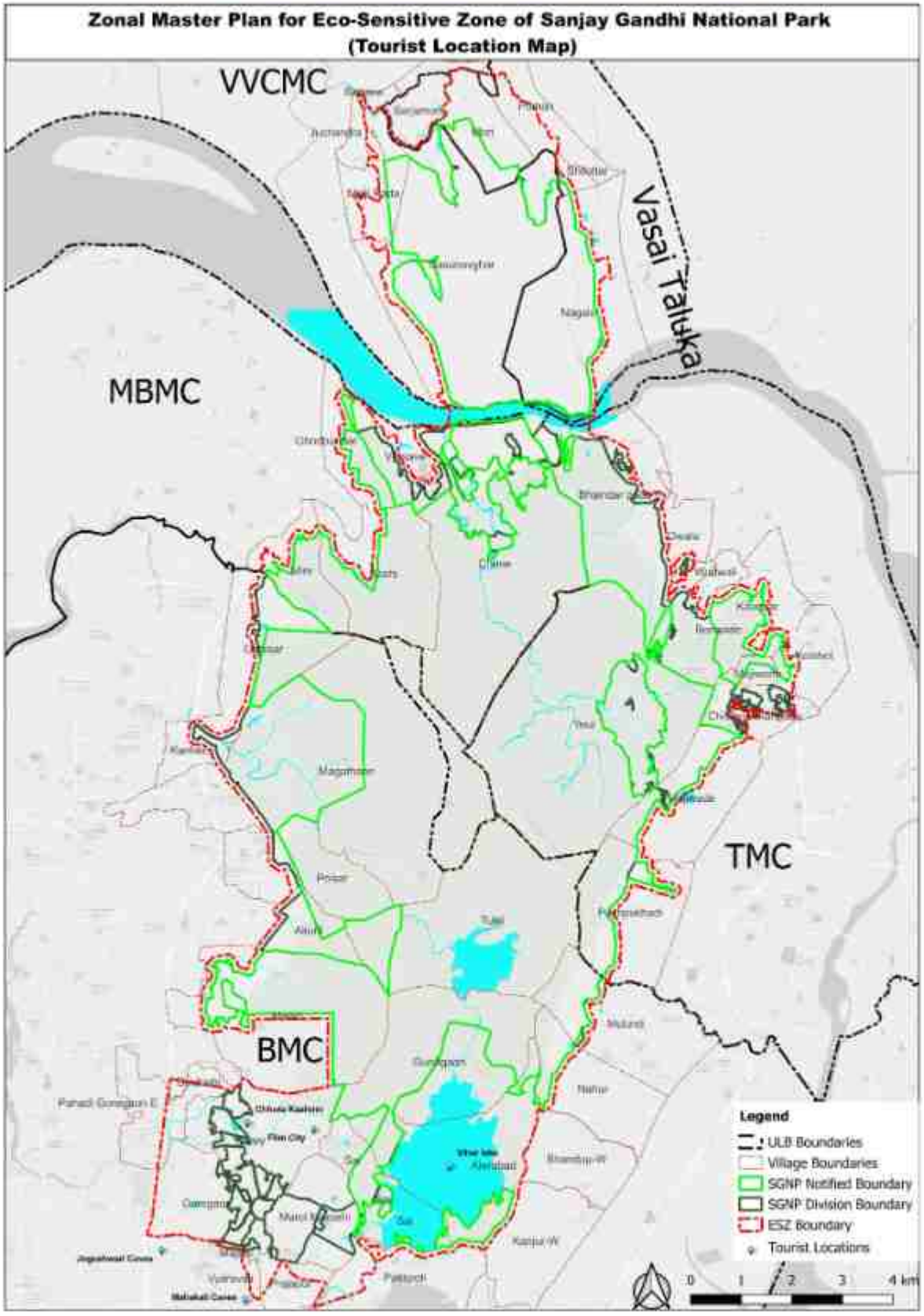
7.2.3 Chhota Kashmir Boat Club

Chhota Kashmir in Aarey Colony, Mumbai, is a serene and picturesque spot known for its lush greenery, scenic lake, and tranquil atmosphere. Often referred to as a mini version of Kashmir due to its peaceful surroundings, it serves as a popular getaway for nature lovers, photographers, and couples seeking a quiet escape from the city's hustle. The area features a beautiful garden with vibrant flowers and a boating facility on the lake, making it a favourite picnic spot. Located within the expansive Aarey Milk Colony, Chhota Kashmir is a refreshing retreat that offers a glimpse of nature amidst the urban landscape of Mumbai.

7.2.4 Upvan Lake

Upvan Lake supports modest biodiversity due to its proximity to Yeoor Hills and Sanjay Gandhi National Park. The surrounding area hosts various bird species like egrets, herons, and kingfishers, especially during migratory seasons. Aquatic life includes small fish and amphibians, while nearby vegetation attracts insects and butterflies, contributing to the lake's ecological value within the urban setting.

Figure 7-1 Existing Tourist Locations within ESZ of SGNP



Source: Consultant Analysis

7.3 Tourism in ESZ in SGNP: Recommendations & Mitigation Measures

The following are the General Recommendations are applicable for eco-tourism promotion within ESZ of SGNP.

i. Respect wildlife: Maintain a safe distance from wildlife and do not feed them. Avoid loud noises or sudden actions that might startle animals.
ii. Stay on designated trails: Remain on designated paths to protect fragile habitats. Prevent harm to plants and animals by avoiding off-trail walking or entering restricted zones.
iii. Leave no trace: Take all your trash with you and dispose of it responsibly. Do not litter, and help keep the area clean by picking up any litter you find and placing it in proper bins.
iv. Reduce noise to preserve the park's peace and protect wildlife. Refrain from playing loud music or using disruptive equipment.
v. Respect Cultural and Historical Site: Honour cultural and historical places such as the Kanheri Caves by adhering to guidelines. Avoid touching or damaging artifacts and monuments.
vi. Follow fire safety rules: Do not light fires or smoke in prohibited areas. Properly discard flammable materials to avoid accidental fires.
vii. Opt for environmentally friendly travel methods such as public transport and cycling to cut carbon emissions. Honour local communities, their cultures, traditions, and ownership rights.
viii. Designated Tourism Areas: Specific zones will be designated for tourists to avoid confusion, ensuring visitors stay within designated tourist areas.
ix. Plastic Use Reduction: Exhibits will be placed at key locations to raise awareness about the harmful impact of plastics on wildlife. A continued "No Plastic" campaign will be implemented, with support from NGOs and chaukidars to remove plastics from the ESZ area.
x. Vehicle Monitoring: Vehicle registration numbers will be noted upon entry. Walkie-talkies will be provided to guards to report offences, enabling real-time identification and fines for violators.
xi. Upgradation of Existing Infrastructure: All the existing facilities and infrastructure to be upgraded with the state-of-the-art equipment's to cater the demand of increasing visitors.

7.4 Specific Issues & recommendations specific to Tourist Locations in ESZ of SGNP

7.4.1 Film City Area

7.4.1.1 Overview

Mumbai's Film City, officially called **Dadasaheb Phalke Chitranagari**, is among India's largest and most renowned film studios. Situated in **Goregaon**, it covers approximately **520 acres** and serves as a major center for Bollywood, television productions, and commercial shoots.

7.4.1.2 Issues

- Overcrowding & Management Issues: High Tourist Influx: Film City experiences a surge in visitors, particularly during peak seasons. Tourism vs. Filmmaking Conflict: The presence of tourists may interfere with ongoing film and TV productions.
- Infrastructure & Maintenance Challenges: Aging Facilities: Several sets and studios require renovation and modern upgrades. Traffic & Accessibility Issues: Situated in Goregaon, access to Film City is often hindered by Mumbai's heavy traffic.
- Environmental Concerns: Threat to Aarey Forest: Proximity to Aarey Colony makes the green cover vulnerable to tourism and development pressures. Waste Management Issues: Increased visitor and production activities contribute to waste generation, necessitating stricter disposal regulations.

7.4.1.3 Mitigation Measures

- Regulated & Structured Public Access: Designated Tourist Areas: Establish specific zones where visitors can explore film sets without interfering with productions. Pre-Scheduled Guided Tours: Introduce an online reservation system to control visitor flow and prevent overcrowding.
- Enhancing Infrastructure & Traffic Control: Eco-Friendly Shuttle Services: Deploy electric shuttle buses from nearby metro stations to ease traffic congestion. Improved Signage & Amenities: Install clear directional boards, rest areas, and essential visitor facilities for a better experience.
- Environmental Sustainability Measures: Sustainable Tourism Initiatives: Enforce strict waste management policies with designated disposal bins. Preserving Green Buffer Zones: Maintain dense tree cover to protect Aarey Forest from ecological degradation.

7.4.2 Chhota Kashmir Boat Club

7.4.2.1 Overview

Chhota Kashmir Boat Club, nestled in Aarey Colony, Goregaon, Mumbai, is a charming lakeside retreat often dubbed "**Little Kashmir**." Spread across roughly 4 acres, it features a tranquil water body offering paddle and rowing boat rides—complete with whimsical swan-shaped boats—set amid lush gardens, palm trees, and flowering lawns.

7.4.2.2 Issues

- Water Pollution and Waste Accumulation: Boating activity and visitor littering have led to pollution in the lake, including plastic waste, food wrappers, and decaying organic matter, affecting aquatic health.
- Disturbance to Biodiversity: Increased human footfall, noise from boating, and limited habitat space disrupt local bird species and butterflies, reducing the area's ecological richness.
- Encroachment and Urban Pressure: Being located within Aarey Colony-a region under constant urban development pressure-the surrounding green cover and lake ecosystem face risks from unauthorized constructions and infrastructure expansion.

7.4.2.3 Mitigation Measures

- Pollution Control: Install waste bins and signage around the lake to encourage proper disposal. Conduct regular clean-up drives and enforce strict no-littering rules. Introduce eco-friendly boats to minimize oil and fuel leakage.
- Biodiversity Conservation: Designate certain areas as no-entry zones to protect bird nesting and butterfly habitats. Limit boating hours and reduce noise levels to minimize disturbance to wildlife.
- Regulation of Urban Impact: Enforce strict land-use zoning around the lake to prevent encroachment. Promote sustainable tourism practices and involve local stakeholders in conservation efforts to maintain ecological balance.

7.4.3 Upvan Lake

7.4.3.1 Overview

Upvan Lake is a prominent and scenic freshwater lake located at the foothills of Yeoor Hills in Thane, Maharashtra. Originally built in the 1880s by Thane Municipal Corporation for water supply, it now serves as a recreational and cultural hub. Surrounded by lush greenery and the Sanjay Gandhi National Park on one side, the lake offers a tranquil setting and supports local biodiversity, including migratory birds and aquatic species.

7.4.3.2 Issues

- Pollution and Waste Dumping: Discharge of untreated sewage, plastic waste, and religious offerings into the lake degrades water quality and harms aquatic life.
- Eutrophication: Excessive nutrient inflow from nearby residential areas leads to algal blooms, reducing oxygen levels and impacting biodiversity.
- Encroachment and Urban Pressure: Urban development around the lake has reduced green buffers and increased human activity, affecting the lake's natural ecology and its capacity for recharge.

7.4.3.3 Mitigation measures

- Environmental mitigation measures: Sustainable resource management, waste reduction and pollution control, eco-friendly infrastructure, carbon footprint reduction and controlled tourism activities are few mitigation measures to combat environmental issues.
- Community involvement and benefit sharing, cultural preservation and responsible tourism, fair wages and job security, regulated development and government policies and balance pricing and cost control are few mitigation measures for socio economic issues.

7.5 Summary and Conclusion

Sanjay Gandhi National Park and its Eco Sensitive Zone offers an array of unique and significant attractions, each drawing thousands of visitors annually. However, with increasing footfall, these attractions face a variety of challenges, from environmental degradation to overcrowding. Through careful tourism planning, sustainable practices, and effective visitor management, it is possible to mitigate these issues and ensure that SGNP's attractions remain accessible and ecologically

sustainable for future generations. Implementing measures such as controlled visitor flows, eco-friendly infrastructure, and improved visitor education will help preserve the park's natural and cultural heritage while enhancing the tourism experience.

8 ZONAL MASTER PLAN FOR ESZ

A Zonal Master Plan (ZMP) for an Eco-Sensitive Zone (ESZ) is a strategic document that guides sustainable development while ensuring ecological protection. It balances conservation, livelihood opportunities, and controlled development in areas surrounding protected ecosystems, such as national parks, wildlife sanctuaries, and biodiversity hotspots.

The Zonal Masterplan consists of zones which have been created along with a set of stipulations, regulations, measures and mitigation strategies that have to be followed while undertaking any development within the Eco Sensitive Zone.

8.1 Objectives of Zonal Master Plan

The objectives of the Zonal Masterplan are as follows

- To protect the ecological integrity of the eco sensitive zone area.
- To regulate land use & development to minimize the adverse impact on the environment.
- To promote eco-friendly livelihood opportunities for local communities.
- To prevent proliferation of polluting industries and harmful activities in ESZ.
- To ensure compliance with environmental laws & guidelines.
- To identify, manage and conserve natural and manmade heritage in the ESZ
- To regulate mitigate impact of existing development plan on ESZ.
- To identify zones of ESZ based on biodiversity, carrying capacity, vulnerability and sustainability.

8.2 Challenges and Limitations in Zonal Master Plan

The Eco Sensitive Zonal masterplan for SGNP presents multiple challenges in zoning being a part of a bustling Metropolis, the financial capital of India, where the population & Development pressure is very high. Nevertheless, in order to protect the Sanjay Gandhi National Park, it is necessary to achieve a balance between environment, ecology and development. The challenges in the zoning are

a) Large scale development with varying intensity has already taken place in the Eco Sensitive Zone.
b) ESZ falls within the jurisdiction of multiple Urban local bodies, each facing development pressure to accommodate its human population.
c) Development Plans under the MRTP Act 1966 for the Urban local bodies already exists, which also cover the area of ESZ.
d) The ESZ also caters to important inter-regional Road and Railway Links like the Ghodbunder Road, National Highways, Virar Alibag Multi Modal Corridor, Mumbai Ahmedabad High Speed Rail, Dedicated Freight Corridor.
e) The ESZ also houses important and critical Water Reservoirs and Treatment Plants, Trunk Pipeline Network which treat and distribute potable water supply across ULB's.

f) The ESZ also forms an important link between the two fragmented blocks of SGNP for wildlife movement across the blocks. The wildlife movement corridor further connects to the Tungareshwar National Park.

8.3 Zoning System

As the ESZ falls within areas where Development Plans have been published and sanctioned under the MRTP Act 1966, the need to create another similar zoning system is not desirable. All land falling within ESZ is developed as per the Development Plans and Regional Plans sanctioned and published for each ULB and revised from time to time, subject to any conflict with the activities prohibited as per the ESZ Notification. The Zoning system intends to mitigate the impact of development based on the existing vulnerabilities while defining the activities and mitigation measures under the ESZ Zones.A broad zoning system has been adopted which is based on the following factors

- Unique characteristic of the Eco Sensitive Zone
- Human Animal Conflict Zone
- Existing Developmental Pattern in light of Vulnerability
- Avoidance of any zoning nomenclature that is used in the Development Plan or Development Control & Promotion Regulation for land falling within ESZ

The Zonal Masterplan is delineated into primary two zones – ESZ-1 and ESZ-2 along with overlays of Immediate Impact Area of Human Animal Conflict and Immediate Impact Area of Animal Movement Corridor

The ESZ Zones and its regulations, stipulations and measures shall apply to the area falling between SGNP Notified (1996) Boundary and ESZ Boundary area but excluding the SGNP Division Boundary area that lies in between. SGNP Division Boundary area which is the SGNP forest is a part of Sanjay Gandhi National Park itself.

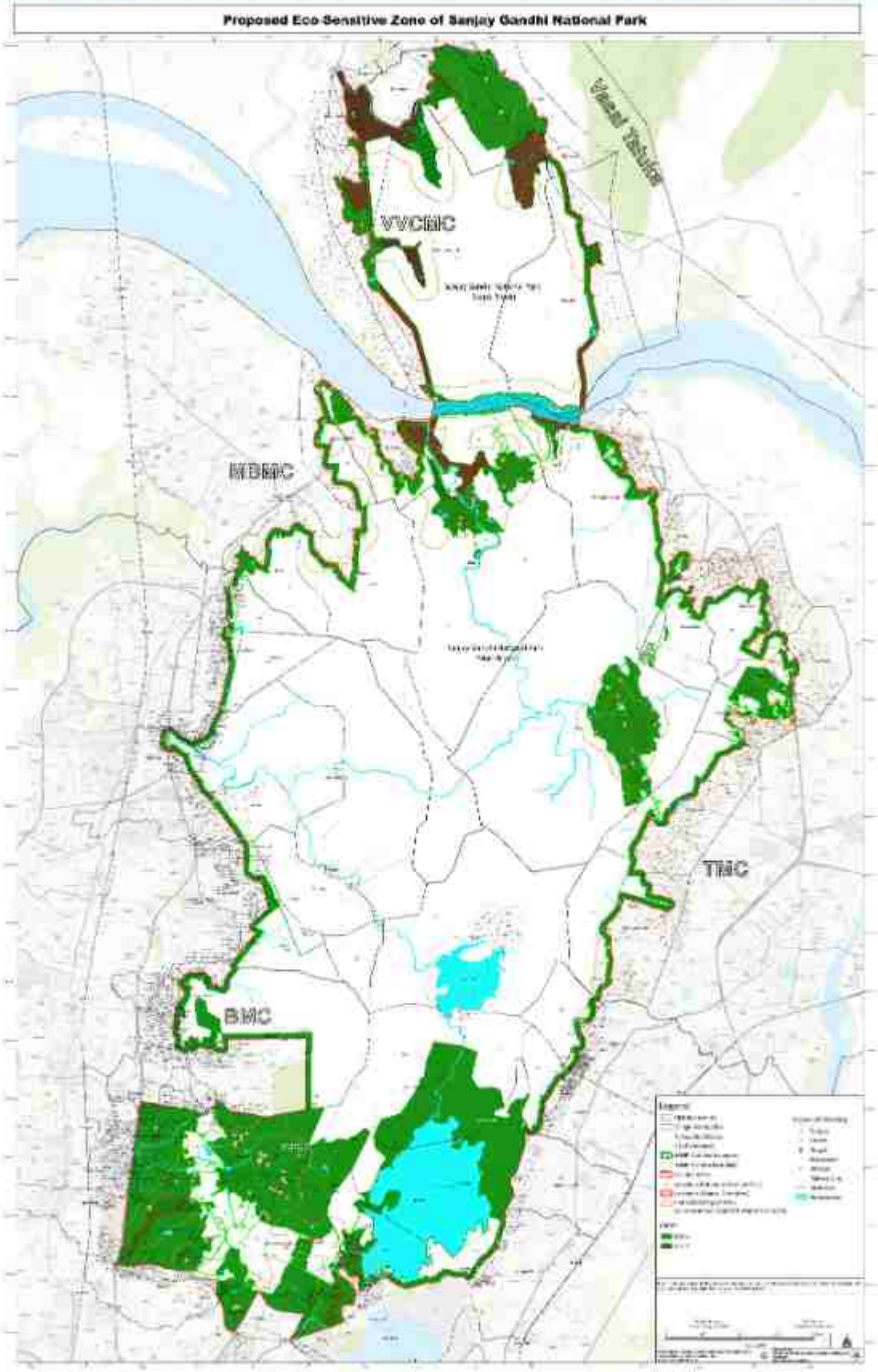
ULB-wise area distribution within various zones;

ULB	ESZ-1 (Ha)	ESZ-2 (Ha)	Waterbodies (Ha)	SGNP Division Forest (Ha)
BMC	1788.968	0.000	507.308	1235.278
MBMC	277.066	62.613	18.168	126.781
TMC	519.657	6.241	26.585	685.634
VVCMC	117.020	204.122	9.981	0.174
VT	289.740	16.719	29.416	0.000

Source: Consultant Analysis

Please refer Annexure IX for the same.

Figure 8-1 Proposed Zoning for Eco-Sensitive Zone of Sanjay Gandhi National Park



Source: Consultant Analysis

8.4 Activities prohibited, regulated and promoted in various zones.

The sections below list the activities allowed the respective zones, conditions (if any) for undertaking development within the respective zone.

8.4.1 Eco Sensitive Zone-1 (ESZ-1)

All activities permitted in the respective Development Plan zones as per the respective Development Control Regulations of the ULBs falling under ESZ -1, shall be allowed subject to the regulations of Eco Sensitive Zonal Master Plan of SGNP.

Activities and projects which have been permitted by the ESZ monitoring committee and have been given environmental consent, till the date of publication, of the Zonal Master Plan shall be permitted.

8.4.1.1 Activities Prohibited within ESZ-1

1. Commercial Mining, stone quarrying and crushing units: New and existing mining (minor and major minerals), stone quarrying and crushing units shall be prohibited except for the domestic needs of bona fide local residents with reference to digging of earth for construction or repair of houses and for manufacture of country tiles or bricks for housing for personal use. The license/lease of existing mines and stone crushers shall not be extended. If license violates the existing rules under different Acts, the license will be terminated. The mining operations shall strictly be in accordance with the interim order of the Hon'ble Supreme Court dated 04.08.2006 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No. 202 of 1995 and order of the Hon'ble Supreme Court dated 21.04.2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No. 435 of 2012.
2. Setting up of saw mills: No new or expansion of any existing saw mills shall be permitted within the Eco-sensitive Zone.
3. Setting up of Industries causing water or air or soil or noise pollution: No new or expansion of polluting Industries in the Eco-sensitive Zone shall be permitted.
4. Establishment of hydroelectric projects and thermal power plants: Prohibited (except as otherwise provided) as per applicable laws.
5. Use or production of any hazardous substances: Prohibited (except as otherwise provided) as per applicable laws.
6. Discharge of untreated effluents and solid waste in natural water bodies or land area: Prohibited (except as otherwise provided) as per applicable laws.
7. New wood-based industry: Establishment of new wood-based industry shall not be permitted within the limits of Eco-sensitive Zone: Provided the existing wood-based industry may continue unless prohibited under any law for the time being force.
8. New encroachments and their regularization: Encroachments of all kinds shall be prohibited.
9. Lease out of submergence areas by irrigation department: Total ban on lease for farming, fishing or any other activity in the submergence area, not related

to the stated purpose (water supply & ancillary works thereto) of the lakes and tanks.

8.4.1.2 Activities Regulated within ESZ-1

1. Establishment of hotels and resorts: No new commercial hotels and resorts shall be permitted, within one kilometer of the boundary of the Protected Area or the extent of Eco-sensitive Zone whichever is nearer, except related to eco-friendly tourism activities: Provided that beyond one km. from the boundary of the Sanjay Gandhi National Park area and upto the extent of the Eco-sensitive Zone, all new eco-tourism activities or expansion of existing activities shall be in conformity with the Zonal Master Plan..
2. Construction activities: Construction shall be permitted within the Eco-sensitive Zone as per the provisions of the approved Development Plan and other applicable rules and regulation under the Maharashtra Regional and Town Planning Act: Provided that the under construction/renovation of commercial buildings including group housing societies, offices, and services such as Information Technology/Information Technology Enabled Services, Parks, Roads, Power Transmission lines and cables, Telecommunication Towers and cables, Sewage lines, civic amenities, etc., and new construction projects such as Mumbai Metro Rail Shed, and creation of new civic amenities such as water supply related infrastructure and facilities and Operation & Maintenance of infrastructure, facilities of civic amenities sanctioned by concerned Local Self Government under approved Development Plan under the Maharashtra Regional and Town Planning Act, may be permitted within ESZ subject to applicable rules and regulations. Provided further that commercial redevelopment, reconstruction, repairs of existing structures which includes group housing societies, sanctioned by concerned Local Self Government under approved Development Plan under the Maharashtra Regional and Town Planning Act, may be allowed within Eco sensitive Zone subject to applicable rules and regulations. The construction activity related to small scale industries not causing pollution shall be permitted as per applicable rules and regulations, if any, with the prior permission from the competent authority. The Approved Development Plan shall be in conformity with the Zonal Master Plan taking into consideration the conservation aspects of the Eco sensitive Zone.
3. Felling of trees. There shall be no felling of trees on the forest or Government or revenue or private lands without prior permission of the competent authority in the State Government. The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made thereunder.
4. Commercial water resources including ground water harvesting: The extraction of surface water and ground water shall be permitted only for bona fide agricultural use and domestic consumption of the occupier of the land. Extraction of surface water and ground water for industrial or commercial use including the amount that can be extracted, shall require prior written permission from the concerned regulatory authority: The construction activities of water supply infrastructure facilities of Municipal Corporation/Council

related to maintenance, rehabilitation and augmentation are permitted. No extraction of surface water or ground water shall be permitted; however, sale of bottled water, water in containers and tankers for the requirement as applicable shall be permitted. Steps shall be taken to prevent contamination or pollution of water from any source including agriculture.

5. Erection of electrical cables and telecommunication towers: Regulated as per applicable laws. Construction/Augmentation and renovation of Power Transmission lines and cables, Telecommunication Towers and cables is permitted. New underground cabling is promoted.
6. Fencing of existing premises of hotels and lodges: Regulated as per applicable laws. A tall fence shall be erected over the existing boundary wall of the Sanjay Gandhi National Park.
7. Widening and strengthening of existing roads, bridges, infrastructure and construction of new roads, public utility or community buildings: Shall be done as per applicable laws to these activities without adverse impact within the Eco-sensitive Zone.
8. Movement of vehicular traffic at night: Regulated for commercial purpose under applicable laws.
9. Introduction of exotic species; Regulated as per applicable laws.
10. Protection of hill slopes and river banks: Regulated as per applicable laws.
11. Discharge of treated effluents in natural water bodies or land area: Recycling of treated effluent shall be encouraged and for disposal of sludge or solid wastes shall be in accordance with the applicable regulations
12. Commercial Sign boards and hoardings: Regulated as per applicable laws.
13. Small scale industries not causing pollution: Non-polluting, non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agrobased industry producing products from indigenous goods from the Eco-Sensitive Zone, and which do not cause any adverse impact on environment shall be permitted.
14. Collection of Forest produce or Non- Timber Forest Produce (NTFP): No collection centre shall be permitted within hundred metres from the boundary of Wild Life Sanctuary or National Park
15. Air and vehicular pollution: Regulated as per applicable laws.
16. Use of polythene bags by shopkeepers: Regulated as per applicable laws.
17. Drastic Change of Agriculture systems: Regulated as per applicable laws.
18. Commercial use of firewood: Regulated (except as otherwise provided) as per applicable laws.
19. Undertaking activities related to tourism such as over-flying the National Park Area by aircraft, hot-air balloons, drones, etc.: Regulated (except as otherwise provided) as per applicable laws.
20. Solid Waste Management: Regulated (except as otherwise provided) as per applicable laws.
21. Eco-Tourism: Regulated (except as otherwise provided) as per applicable laws.