



TAYAR NEPAL PROGRAM

DEVELOPING RISK SENSITIVE LAND USE PLANNING FOR GODAWARI MUNICIPALITY

Annex Volume: Final RSLUP of Godawari Municipality
April 2022

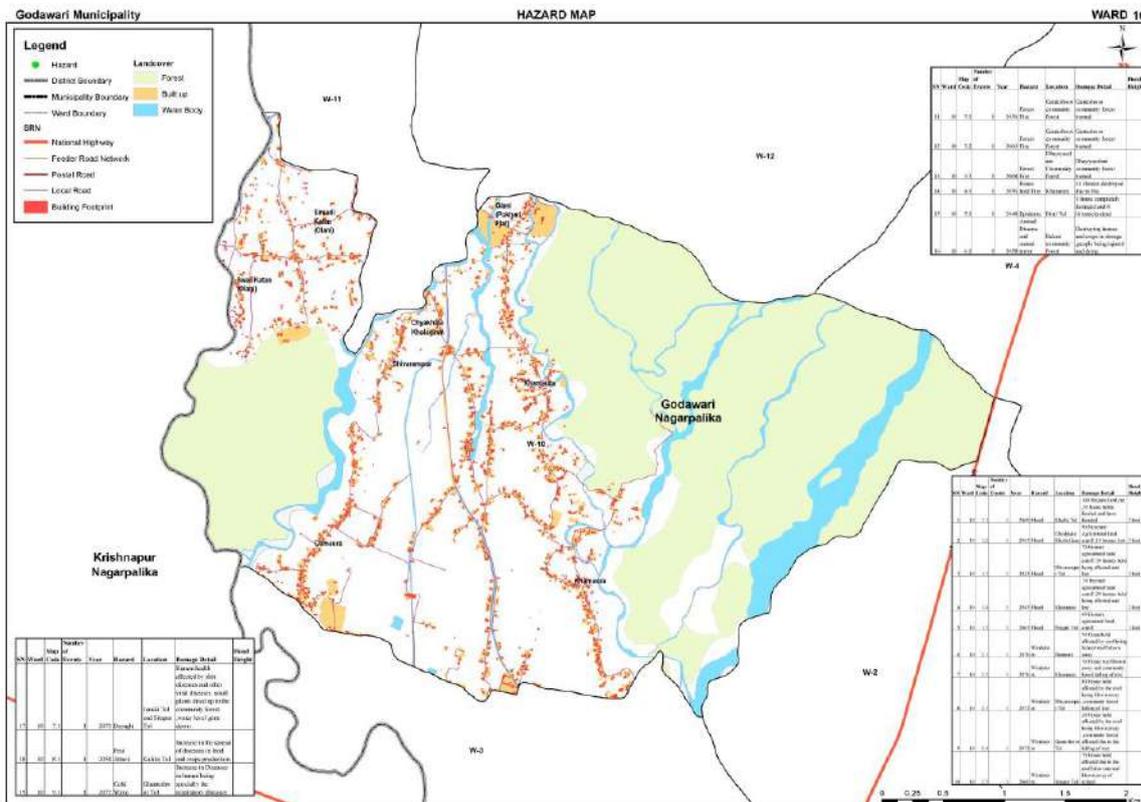
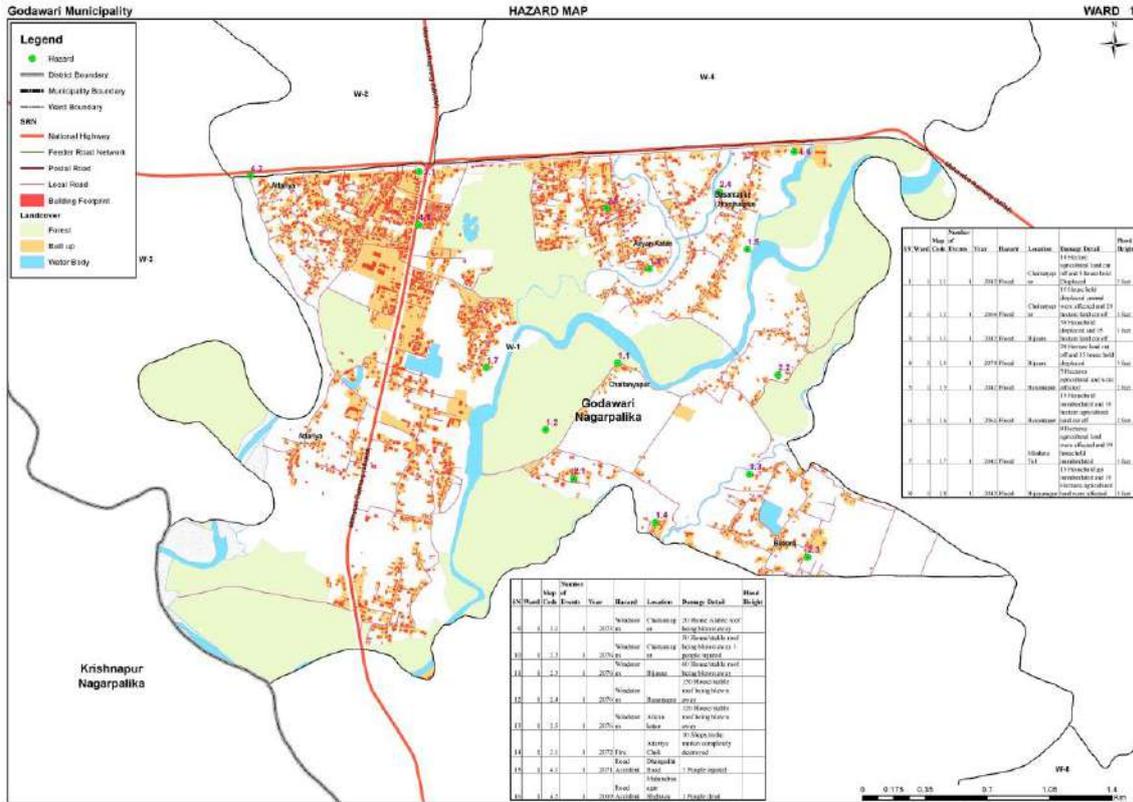
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PROGRAM TITLE: USAID TAYAR NEPAL PROGRAM
SUB CONTRACT NUMBER: SUBK-1003907-S21-0001
SPONSORING USAID OFFICE: USAID/NEPAL
IDIQ NUMBER: XX
TASK ORDER NUMBER: XX
CONTRACTOR: DAI GLOBAL LLC
DATE OF PUBLICATION: [APRIL 17, 2022]
AUTHOR: [RAJDEVI ENGINEERING CONSULTANT (P) LTD.]

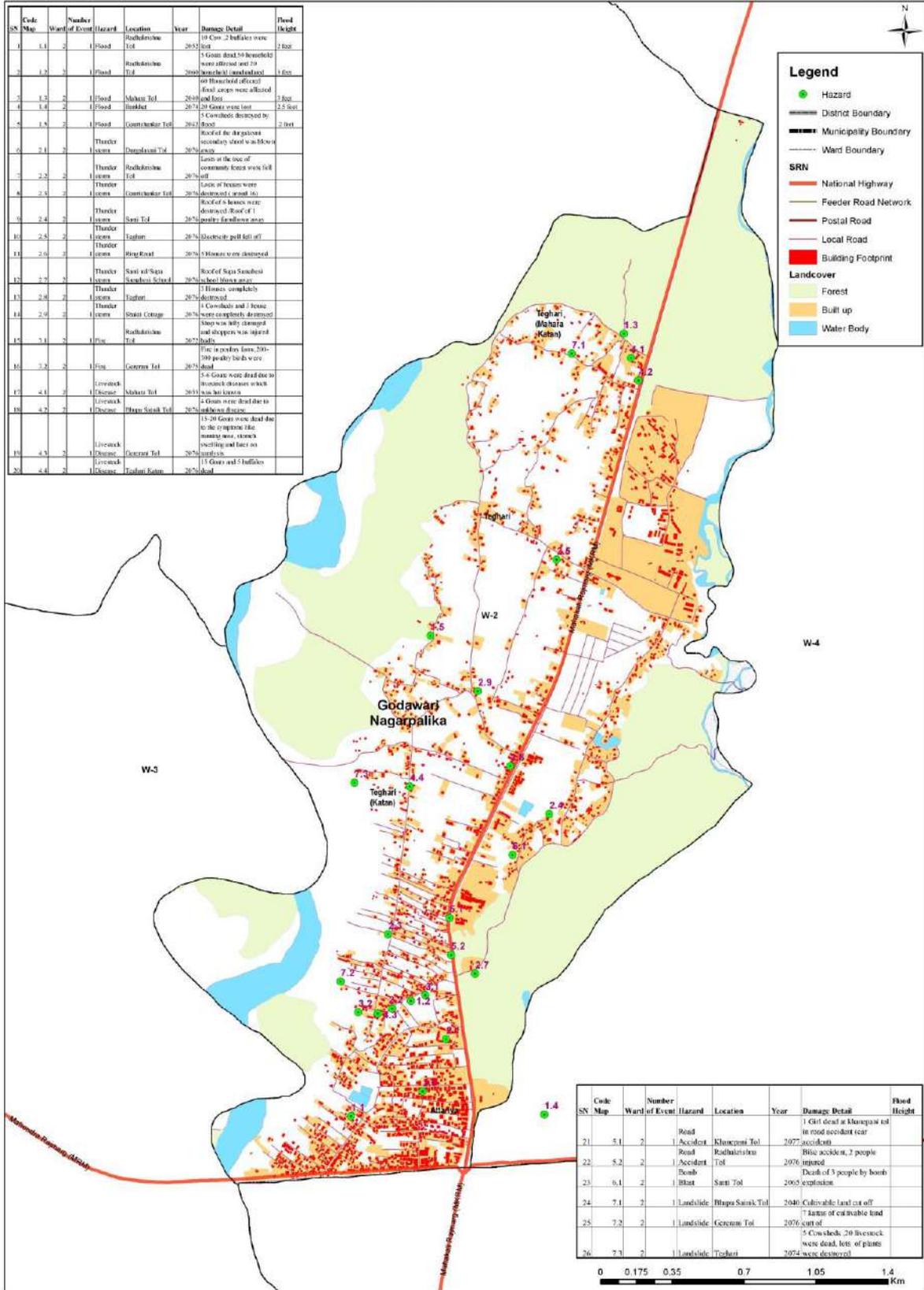
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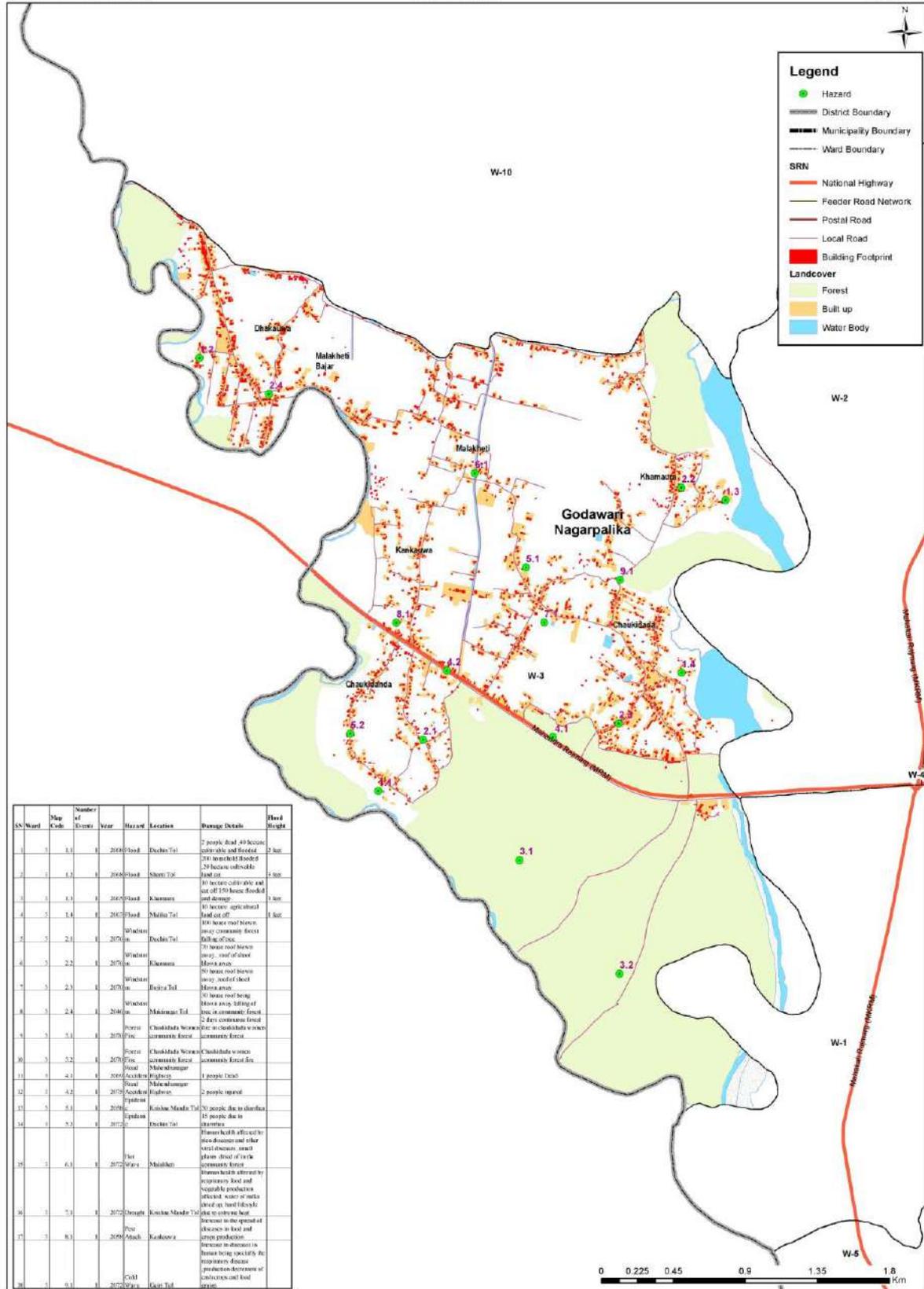
ANNEX I: DIGITIZED HAZARD ZONATION MAPS OF WARDS OF GODAWARI FROM THE FIELD CONSULTATION

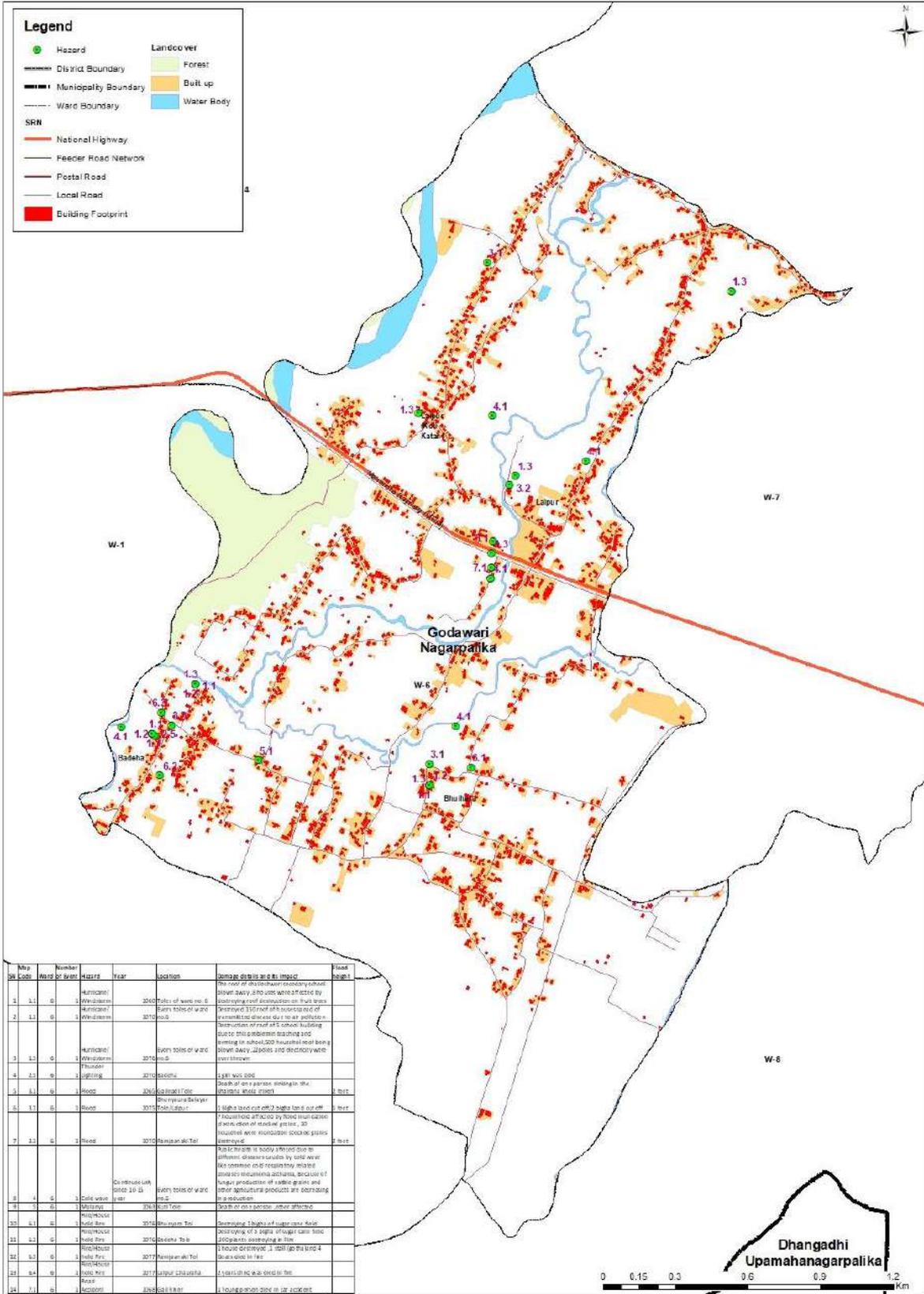


| Code SN | Map | Ward | Number of Event | Hazard | Location | Year | Damage Detail | Flood Height |
|---------|-----|------|-----------------|-------------------|-------------------------|------|---|--------------|
| 1 | 1.1 | 2 | 1 | Flood | Rudhakeshwar Tol | 2052 | 10 Cows, 2 buffaloes were lost | 2 feet |
| 2 | 1.2 | 2 | 1 | Flood | Rudhakeshwar Tol | 2050 | 9 Goats dead, 50 households were affected and 20 were killed (unpublished) | 1.5 feet |
| 3 | 1.2 | 2 | 1 | Flood | Mahara Tol | 2039 | and loss | 2 feet |
| 4 | 1.4 | 2 | 1 | Flood | Bankhat | 2074 | 20 Cows were lost | 1.5 feet |
| 5 | 1.8 | 2 | 1 | Flood | Chandrasekar Tol | 2022 | 5 Cows/heads destroyed by flood | 2 feet |
| 6 | 2.1 | 2 | 1 | Thunder lightning | Dandakant Tol | 2070 | Roof of the 4th person secondary school was blown away | |
| 7 | 2.2 | 2 | 1 | Thunder lightning | Rudhakeshwar Tol | 2076 | Lanes at the top of some houses were full with water | |
| 8 | 2.3 | 2 | 1 | Thunder lightning | Chandrasekar Tol | 2076 | Lane of houses were destroyed, roof of 1 house destroyed | |
| 9 | 2.4 | 2 | 1 | Thunder lightning | Sant Tol | 2076 | Roof of 6 houses were destroyed, Roof of 1 house destroyed | |
| 10 | 2.5 | 2 | 1 | Thunder lightning | Tajpur | 2076 | Electricity pole fell off | |
| 11 | 2.6 | 2 | 1 | Thunder lightning | Shyambad | 2076 | 1 House was destroyed | |
| 12 | 2.7 | 2 | 1 | Thunder lightning | Sant Tol, Sanyal School | 2076 | Roof of Sanyal School was destroyed | |
| 13 | 2.8 | 2 | 1 | Thunder lightning | Tajpur | 2076 | 1 House completely destroyed | |
| 14 | 2.9 | 2 | 1 | Thunder lightning | Shyambad | 2076 | 14 Cows/heads and 1 house were completely destroyed | |
| 15 | 3.1 | 2 | 1 | Fire | Rudhakeshwar Tol | 2072 | Shop was fully damaged and clothes were ignited | |
| 16 | 3.2 | 2 | 1 | Fire | Gerera Tol | 2075 | Fire in poultry farm, 200-300 poultry birds were dead | |
| 17 | 4.1 | 2 | 1 | Livestock Disease | Mahara Tol | 2071 | 5-6 Cows were dead due to livestock disease which was not known | |
| 18 | 4.2 | 2 | 1 | Livestock Disease | Shyambad Tol | 2076 | 4 Goats were dead due to unknown disease | |
| 19 | 4.3 | 2 | 1 | Livestock Disease | Gerera Tol | 2076 | 15-20 Goats were dead due to the unknown like disease, which is spreading and their cow husbandry | |
| 20 | 4.4 | 2 | 1 | Livestock Disease | Tajpur, Katur | 2076 | 13 Goats and 5 buffaloes were dead | |

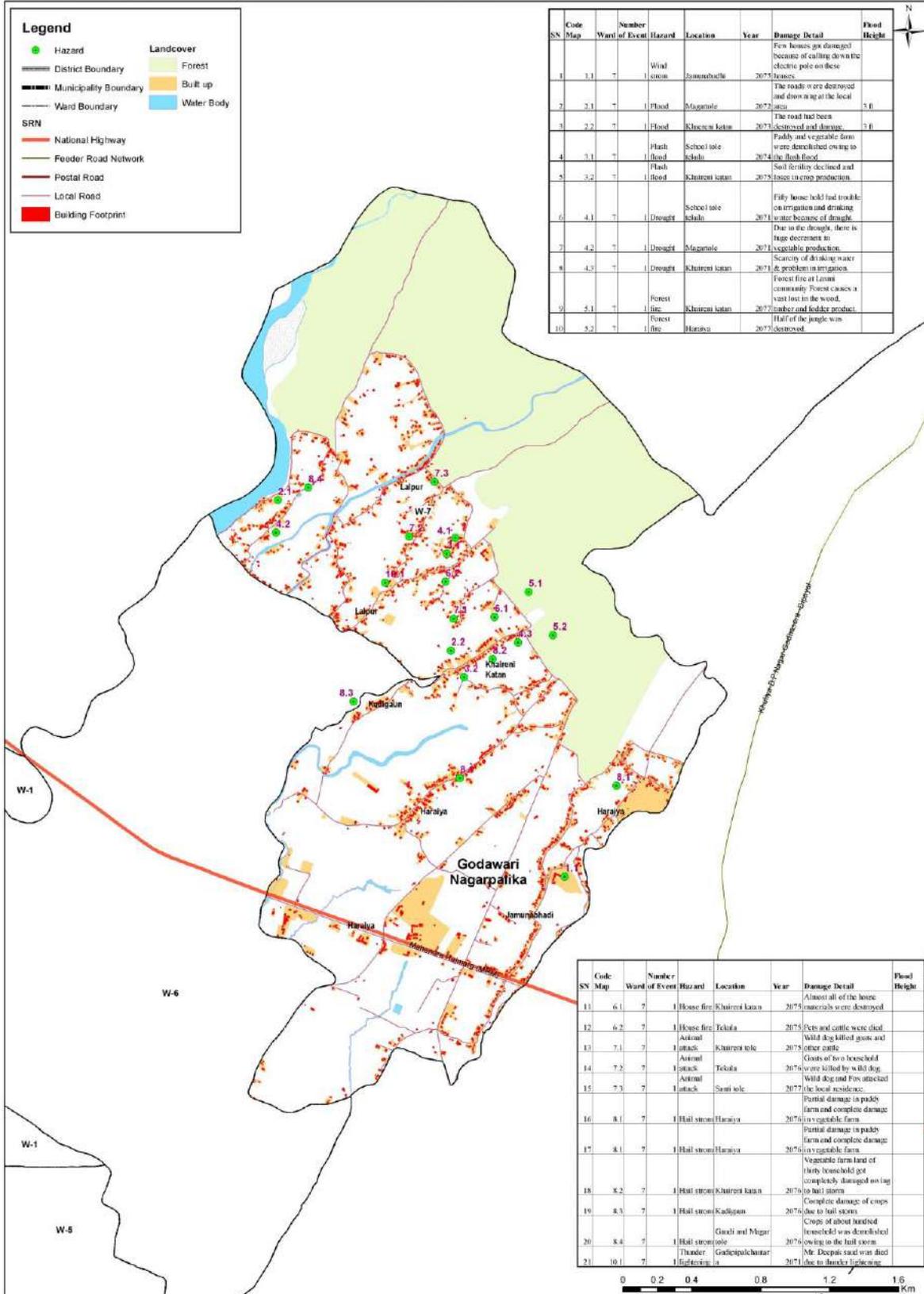


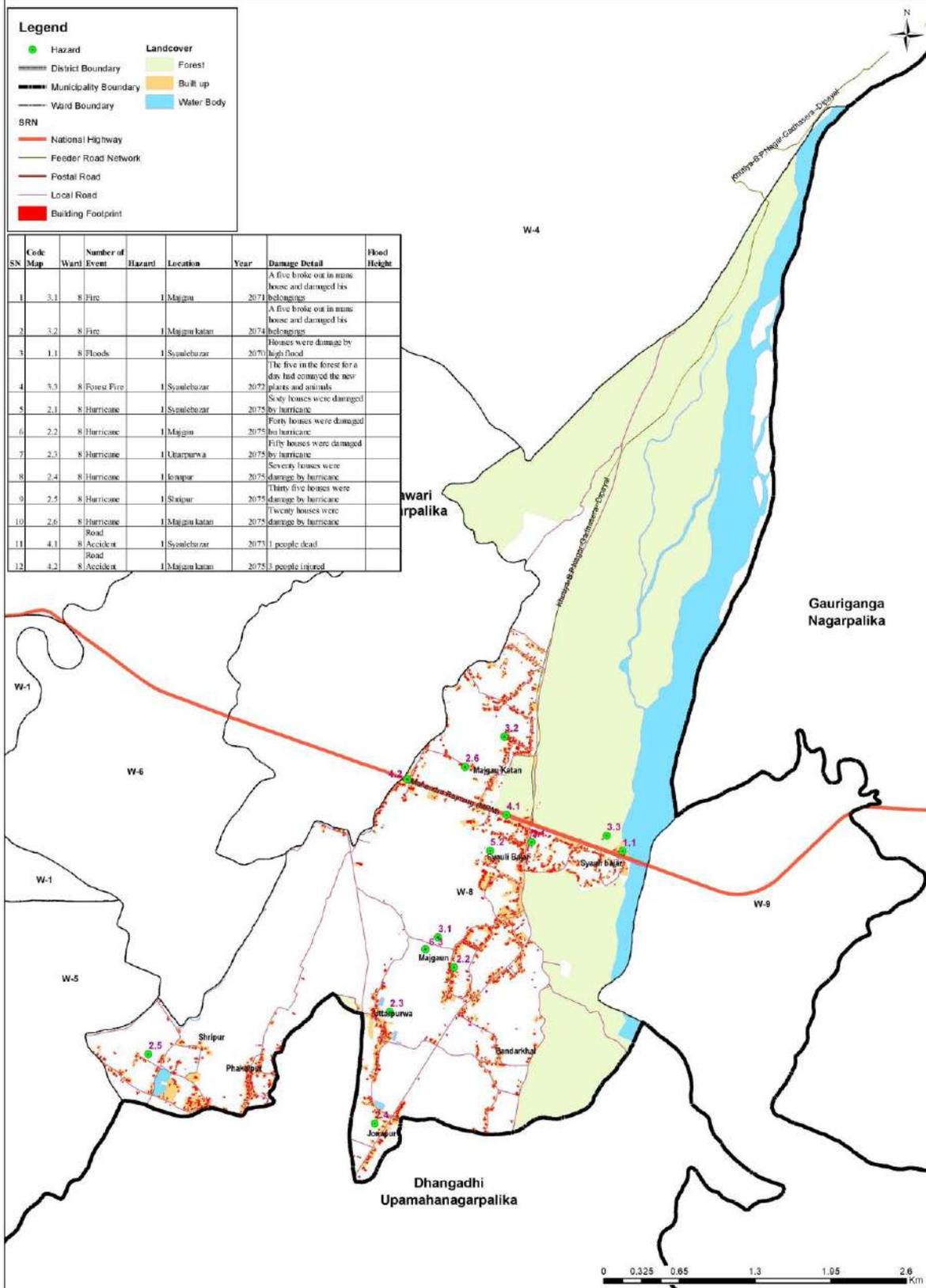
| Code SN | Map | Ward | Number of Event | Hazard | Location | Year | Damage Detail | Flood Height |
|---------|-----|------|-----------------|---------------|------------------|------|---|--------------|
| 21 | 5.1 | 2 | 1 | Road Accident | Khandakant Tol | 2077 | 1 Girl dead at Khandakant Tol in road accident (car) | |
| 22 | 5.2 | 2 | 1 | Road Accident | Rudhakeshwar Tol | 2076 | Bike accident, 2 people injured | |
| 23 | 6.1 | 2 | 1 | Bomb Blast | Sant Tol | 2065 | Death of 3 people by bomb explosion | |
| 24 | 7.1 | 2 | 1 | Landslide | Shyambad Tol | 2040 | Cultivable land cut off | |
| 25 | 7.2 | 2 | 1 | Landslide | Gerera Tol | 2076 | 7 farmer of cultivable land lost | |
| 26 | 7.3 | 2 | 1 | Landslide | Tajpur | 2074 | 5 Cows/heads, 20 livestock were dead, lots of plants were destroyed | |

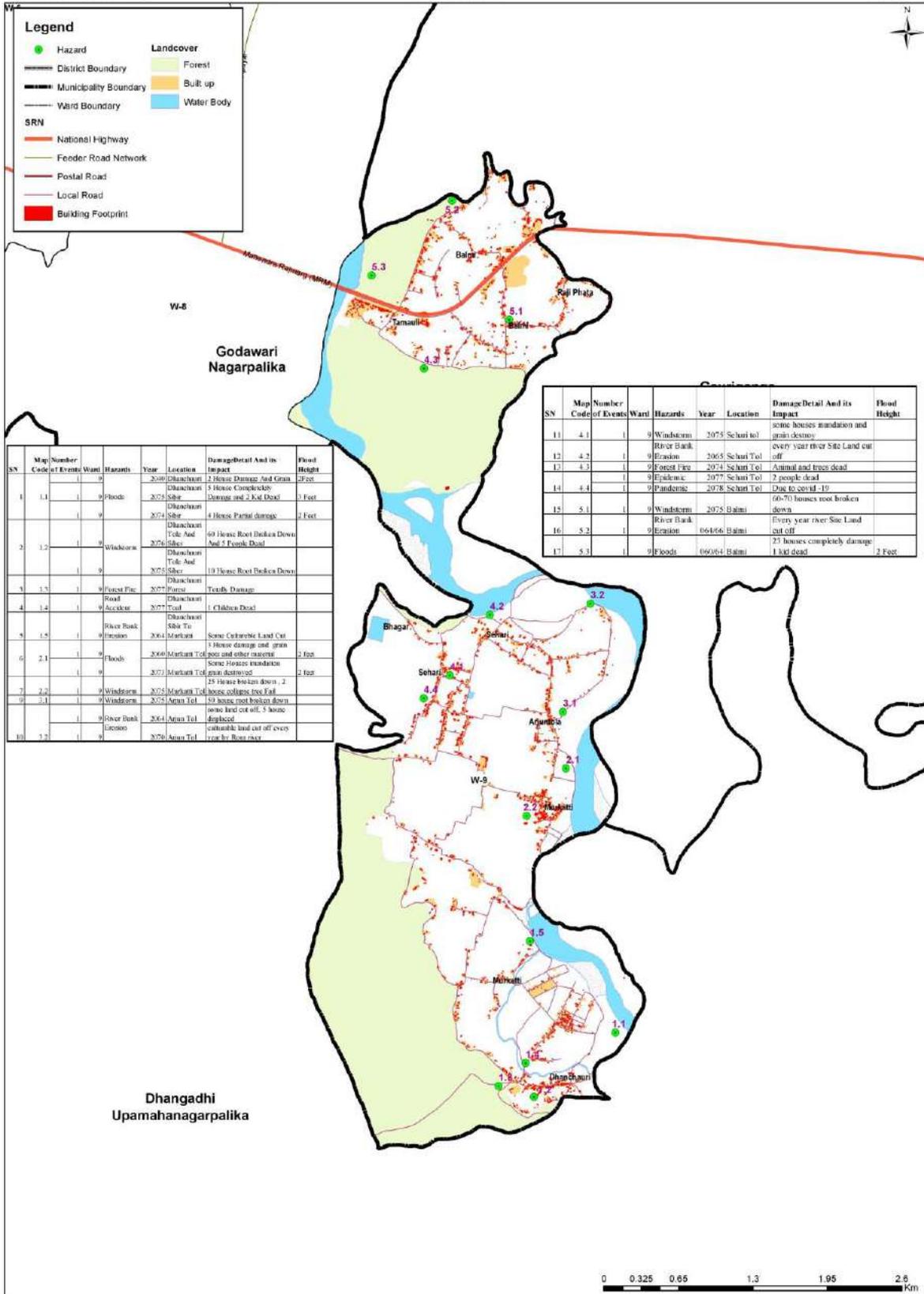


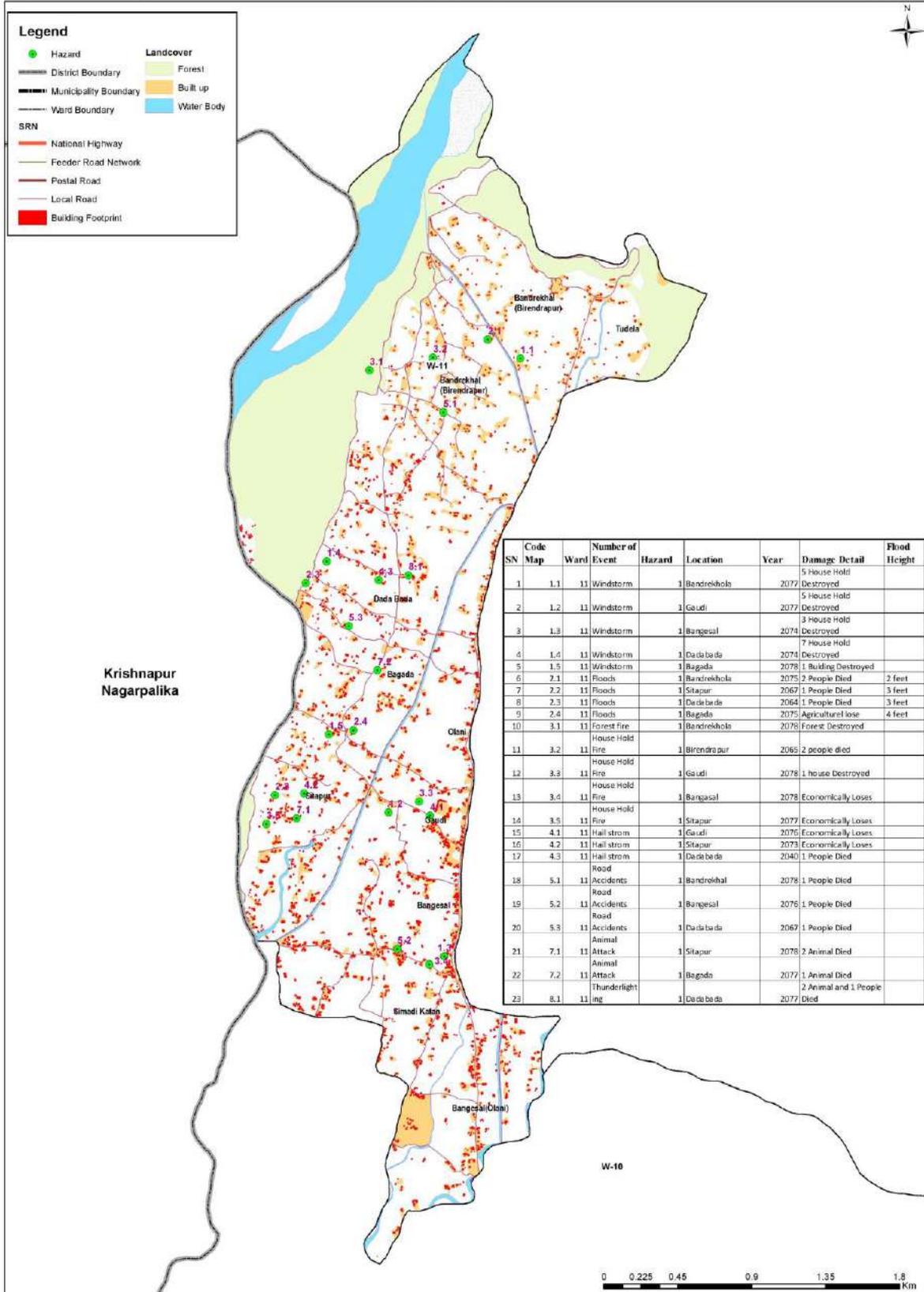


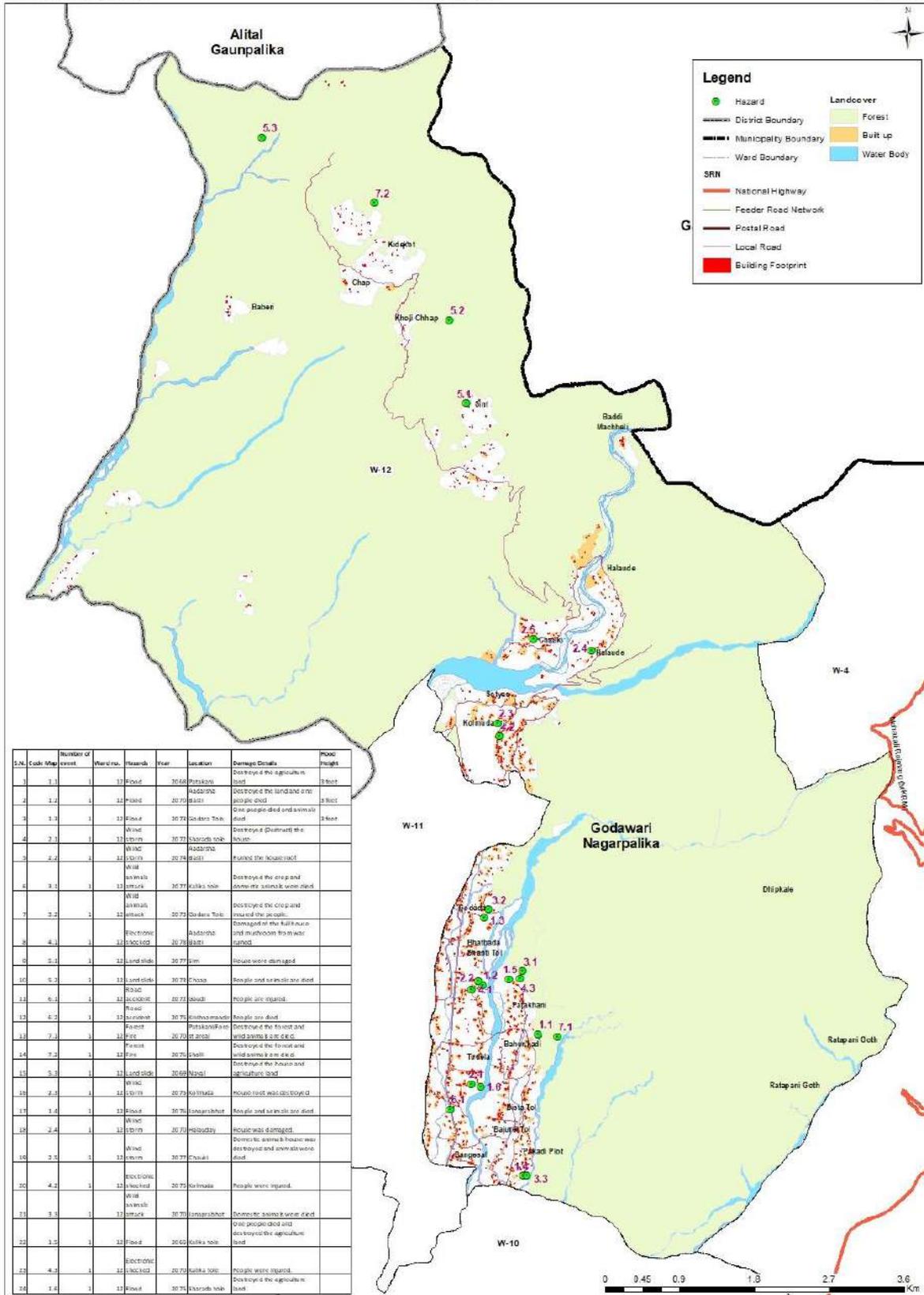
| No | Area Code | Ward or Village | Hazard | Year | Location | Damage details and its impact | Scale legend |
|----|-----------|-----------------|----------------------|------|---------------------|---|--------------|
| 1 | 1.1 | 6 | Hurricane/ Windstorm | 2040 | Wards of ward no. 6 | The roof of Godawari secondary school blown away & 20000 worth of electric by blowing and destruction of trees near destroyed 150 roof of houses and of destroyed 20000 worth of trees in the area. Destruction of roof of school building due to this resulted in losing and getting in about 200 households near school blown away laptops and secondary were overthrown. | |
| 2 | 1.1 | 6 | Hurricane/ Windstorm | 2070 | Wards of ward no. 6 | | |
| 3 | 1.3 | 6 | Hurricane/ Windstorm | 2070 | Wards of ward no. 6 | | |
| 4 | 1.3 | 6 | Lightning | 2070 | Wards of ward no. 6 | 1.31 was 200 | |
| 5 | 1.1 | 6 | Flood | 2040 | Godawari Tal | Death of a person among in the epidemic which spread | 2 feet |
| 6 | 1.1 | 6 | Flood | 2070 | Godawari Tal | 1.31 had cut off 2000 people and off | 2 feet |
| 7 | 1.1 | 6 | Flood | 2070 | Godawari Tal | 1.31 had cut off 2000 people and off | 2 feet |
| 8 | 1.1 | 6 | Earthquake | 2040 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 9 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 10 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 11 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 12 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 13 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 14 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 15 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 16 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 17 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 18 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 19 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |
| 20 | 1.1 | 6 | Earthquake | 2070 | Godawari Tal | Death of a person among in the epidemic which spread | |











| S.N. | Code | Mag | Number of event | Ward no. | Hazard | Year | Location | Damage Details | Photo Images |
|------|------|-----|-----------------|-------------|--------|--------------|--|----------------|--------------|
| 1 | 1.1 | 1 | 17 | Flood | 2075 | Pharasi | Destroyed the agriculture land | 3 floor | |
| 2 | 1.2 | 1 | 12 | Flood | 2075 | Adaraha | Destroyed the land and crop people died | 3 floor | |
| 3 | 1.3 | 1 | 13 | Flood | 2075 | Gadaha Tola | Die people died and animals died | 3 floor | |
| 4 | 2.1 | 1 | 11 | Storm | 2075 | Sharada Tola | Destroyed (damaged) the house | | |
| 5 | 2.2 | 1 | 12 | Storm | 2075 | Adaraha | Flung the house roof | | |
| 6 | 3.1 | 1 | 13 | Storm | 2075 | Balka Tola | Destroyed the crop and some its animals were died | | |
| 7 | 3.2 | 1 | 12 | Attack | 2075 | Gadaha Tola | Destroyed the crop and injured the people | | |
| 8 | 4.1 | 1 | 12 | Electricity | 2075 | Adaraha | Damaged of the full house and mushroom from electric | | |
| 9 | 5.1 | 1 | 13 | Land slide | 2075 | Sim | House were damaged | | |
| 10 | 5.2 | 1 | 12 | Land slide | 2075 | Thana | People and animals were died | | |
| 11 | 5.3 | 1 | 12 | Accident | 2075 | Shardi | People are injured | | |
| 12 | 6.1 | 1 | 12 | Fire | 2075 | Gadaha Tola | People are died | | |
| 13 | 7.1 | 1 | 11 | Fire | 2075 | Adaraha | Destroyed the forest and wild animals are die | | |
| 14 | 7.2 | 1 | 12 | Fire | 2075 | Shardi | Destroyed the house and agriculture land | | |
| 15 | 8.1 | 1 | 11 | Land slide | 2075 | Nawal | Destroyed the house and agriculture land | | |
| 16 | 2.1 | 1 | 12 | Storm | 2075 | Kulmaha | House roof was destroyed | | |
| 17 | 1.6 | 1 | 12 | Flood | 2075 | Gadaha Tola | People and animals were died | | |
| 18 | 2.4 | 1 | 12 | Storm | 2075 | Haudary | House was damaged | | |
| 19 | 3.5 | 1 | 13 | Storm | 2075 | Chawali | Some to animals house was destroyed and animals were died | | |
| 20 | 4.2 | 1 | 12 | Electricity | 2075 | Kulmaha | People were injured | | |
| 21 | 3.3 | 1 | 13 | Storm | 2075 | Gadaha Tola | Some to animals were died and people died and destroyed the agriculture land | | |
| 22 | 3.5 | 1 | 12 | Flood | 2075 | Balka Tola | | | |
| 23 | 4.5 | 1 | 12 | Electricity | 2075 | Balka Tola | People were injured | | |
| 24 | 1.4 | 1 | 12 | Flood | 2075 | Sharada Tola | Destroyed the agriculture land | | |

ANNEX II: LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY | | | | | | | | | | | | |
|---|-------------|-----------|----------|--------------------|---------------------|----------------------------|-------------------|------------|-----------------------|--------------|------------------------|-----|
| S . N | COORDINATES | | LOCATION | DEPTH OF SOIL (cm) | USCS CLASSIFICATION | FIELD RELATIVE DENSITY (%) | STIFFNESS | PLASTICITY | PLASTICITY INDEX (PI) | LIQUEFACTION | GROUND WATER TABLE (m) | |
| | x | y | | | | | | | | | MOON | DRY |
| 1 | 80.596544 | 28.812296 | 0-25 | ML | 0-50 | Friable | Plastic | 5-10 | Medium | 7.80 | 11.37 | |
| | | | 25-60 | SM | - | Firm | Plastic | 5-10 | Medium | | | |
| | | | 60-90 | CL | - | Firm | Plastic | 5-10 | Medium | | | |
| 2 | 80.6064182 | 28.829196 | 0-21 | CH | 0-50 | Loose | Very High Plastic | >40 | Low | 7.50 | 10.65 | |
| | | | 21-63 | CH | - | Loose | Very High Plastic | >40 | Low | | | |
| | | | >63 | CH | - | Loose | Very High Plastic | >40 | Low | | | |
| 3 | 80.6053911 | 28.807347 | 0-15 | CH | 0-50 | Loose | Very High Plastic | >40 | Low | 9.16 | 11.09 | |
| | | | 15-65 | CH | - | Loose | Very High Plastic | >40 | Low | | | |
| | | | >65 | SP | - | Loose | Non-Plastic | 0 | Very high | | | |
| 4 | 80.59466 | 28.806223 | 0-38 | CH | 0-50 | Loose | Very High Plastic | >40 | Low | 9.16 | 11.09 | |
| | | | 38-72 | CH | | Loose | Very High Plastic | >40 | Low | | | |
| 5 | 80.60461275 | 28.806746 | 0-40 | SP | 0-50 | Friable | Non-Plastic | 0 | Very high | 7.92 | 12.84 | |
| | | | >40 | SP | - | Loose | Non-Plastic | 0 | Very high | | | |
| 6 | 80.461275 | 28.806746 | 0-20 | SM | - | Loose | Slightly Plastic | 1-5 | High | 4.28 | 5.69 | |
| 7 | 80.641983 | 28.792278 | 0-16 | ML | 0-50 | Friable | Slightly Plastic | 1-5 | High | 10.04 | 12.04 | |
| | | | 16-30 | SM | - | Loose | Slightly Plastic | 1-5 | High | | | |
| | | | >30 | SP | - | Loose | Non-plastic | 0 | Very high | | | |
| 8 | 80.63333 | 28.78333 | 0-26 | SP | 0-50 | Friable | Non-Plastic | 0 | Very high | 10.63 | 13.13 | |
| | | | 26-40 | CH | - | Friable | Very High Plastic | >40 | Low | | | |

LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| S · N · | COORDINATES | | LOCATI ON | DE PT H OF SOI L | USCS CLASSI FICATION | FIELD RELA TIVE DENS ITY | STIFF NESS | PLASTICI TY | PLAST ICITY INDE X (PI) | LIQUEFA CTION | GROUND WATER TABLE (m) | |
|------------------|-------------|-----------|--------------|---------------------------------|----------------------------|--------------------------------------|---------------|-------------------|----------------------------------|------------------|---------------------------------|---------|
| | x | y | | | | | | | | | MO NS OO N | DR Y |
| | | | | 48-78 | CH | - | Firm | Very High Plastic | >40 | Low | | |
| | | | | >78 | SP | - | Loose | Non-Plastic | 0 | Very high | | |
| 9 | 80.655 | 28.733 | | 0-15 | ML | - | Dry - loose | Plastic | 5-10 | Medium | 8.85 | 10.62 |
| 10 | 80.619613 | 28.79899 | | 0-22 | SM | 0-50 | Loose | Plastic | 5-10 | Medium | 9.64 | 12.14 |
| 11 | 80.62191 | 28.787404 | | 0-25 | SM | 0-50 | Friable | Plastic | 5-10 | Medium | 10.62 | 13.16 |
| | | | | 0-25 | SC | 0-50 | Friable | Slightly Plastic | 1-5 | High | | |
| 12 | 80.6162 | 27.785982 | | 25-45 | SC | - | - | Slightly Plastic | 1-5 | High | 9.93 | 12.59 |
| | | | | >45 | SP | - | - | Non-Plastic | 0 | Very high | | |
| 13 | 80.6217 | 28.8054 | | 0-18 | ML | 0-50 | Friable | Plastic | 5-10 | Medium | 9.36 | 11.89 |
| | | | | >18 | SP | - | Loose | Non-Plastic | 0 | Very high | | |
| | | | | 0-20 | ML | 0-50 | Moist-Friable | Slightly Plastic | 1-5 | High | | |
| 14 | 80.698 | 28.801 | | 20-50 | CL | - | Firm | Plastic | 5-10 | Medium | 9.62 | 11.76 |
| | | | | 50-80 | CL | - | Loose | Very High Plastic | >40 | Low | | |
| | | | | 0-30 | ML | 0-50 | Friable | Slightly Plastic | 1-5 | High | | |
| 15 | 80.6069 | 28.8028 | | 30-60 | - | - | - | Slightly Plastic | 1-5 | High | 8.89 | 12.23 |
| | | | | 60-80 | - | - | - | Very High Plastic | >40 | Low | | |
| | | | | >80 | - | - | - | Plastic | 5-10 | medium | | |
| 16 | 80.51 | 28.8188 | | 0-16 | CL | 0-50 | Dry-Soft | Very High Plastic | >40 | Low | 4.56 | 5.89 |
| 17 | 80.5735 | 28.8287 | | 0-39 | ML | 0-50 | - | Plastic | 5-10 | Medium | 8.43 | 10.31 |
| 18 | 80.5732 | 28.8185 | | 0-27 | SM | 0-50 | Very Friable | 5-10 | Medium | - | 9.35 | 12.53 |
| 19 | 80.5609 | 28.7856 | | 0-18 | CL | 0-50 | Firm | Plastic | 5-10 | Medium | 7.94 | 9.75 |
| | | | | 0-22 | CL | 0-50 | - | Plastic | 5-10 | Medium | | |
| 20 | 80.5735 | 28.8287 | | 22-40 | CH | - | - | Very High Plastic | >40 | Low | 8.34 | 10.75 |

LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| S · N · | COORDINATES | | LOCA TION | DE PT H OF SOI L | USCS CLASSI FICATION | FIELD RELA TIVE DENS ITY | STIFF NESS | PLASTICI TY | PLAST ICITY INDE X (PI) | LIQUEFA CTION | GROUND WATER TABLE (m) | |
|------------------|-------------|----------|--------------|---------------------------------|----------------------------|--------------------------------------|---------------|-------------------|----------------------------------|------------------|---------------------------------|---------|
| | x | y | | | | | | | | | MO NS OO N | DR Y |
| | | | | 40-80 | CH | - | - | Very High Plastic | >40 | Low | | |
| 21 | 80.559 | 28.7842 | | 0-26 | ML | 0-50 | Firm | Plastic | 5-10 | Medium | 9.19 | 11.42 |
| 22 | 80.5943 | 28.7989 | | 0-17 | CH | 0-50 | Loose | Very High Plastic | >40 | Low | 8.73 | 12.65 |
| 23 | 80.5993 | 28.7955 | | 0-21 | CH | 0-50 | Loose | Very High Plastic | >40 | Low | 9.03 | 12.45 |
| 24 | 80.5896 | 28.8028 | | 0-27 | CH | 0-50 | Loose | Very High Plastic | >40 | Low | 8.88 | 13.28 |
| 25 | 80.5776 | 28.8186 | | 0-12 | CL | 0-50 | Friable | Plastic | 5-10 | Medium | 9.58 | 12.73 |
| | | | | 12-35 | CL | - | Firm | Plastic | 5-10 | Medium | | |
| | | | | 35-70 | CH | - | Firm | Very High Plastic | >40 | Low | | |
| | | | | >70 | SP | - | - | Non-Plastic | 0 | Very high | | |
| 26 | 80.5735 | 28.8287 | | 28 | SM | 0-50 | Loose | Plastic | 5-10 | Medium | 8.29 | 10.34 |
| 27 | 80.5732 | 28.8185 | | 0-41 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 9.26 | 11.40 |
| 28 | 80.5367 | 28.8112 | | 0-14 | ML | 0-50 | | Plastic | 5-10 | Medium | 5.65 | 7.16 |
| 29 | 80.52703 | 28.8104 | | 0-16 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 7.49 | 9.78 |
| 30 | 80.53501 | 28.82012 | | 0-51 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 4.12 | 5.29 |
| 31 | 80.5707 | 28.8148 | | 0-29 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 9.18 | 12.10 |
| 32 | 80.5699 | 28.8248 | | 0-32 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 8.42 | 10.06 |
| 33 | 80.5668 | 28.8168 | | 0-24 | SP | 0-50 | Loose | Plastic | 5-10 | Medium | 9.07 | 11.53 |
| 34 | 80.5993 | 28.77081 | | 0-25 | CH | 0-50 | - | Very High Plastic | >40 | Low | 9.59 | 12.15 |
| | | | | 25-80 | CH | - | - | Very High Plastic | >40 | Low | | |
| | | | | >80 | SP | - | - | Non-Plastic | 0 | Very high | | |
| 35 | 80.52703 | 28.8104 | | 0-22 | ML | 0-50 | Friable | Slightly Plastic | 1-5 | High | 9.13 | 12.09 |
| 36 | 80.5647 | 28.76601 | | 0-19 | SM | 0-50 | Friable | Plastic | 5-10 | Medium | 9.05 | 12.88 |
| 37 | 80.55539 | 28.76587 | | 0-18 | ML | 0-50 | loose | Plastic | 5-10 | Medium | 8.84 | 11.60 |

LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| S · N · | COORDINATES | | LOCATI ON | DE PT H OF SOI L (c m) | USCS CLASSIFIC ATION | FIELD RELA TIVE DENS ITY % | STIFF NESS | PLASTICI TY | PLAST ICITY INDE X (PI) | LIQUEFA CTION | GROUND WATER TABLE (m) | |
|------------------|-------------|-----------|--------------|---|----------------------------|---|-------------------------------|-----------------------------|----------------------------------|--------------------------|---------------------------------|---------|
| | x | y | | | | | | | | | MO NS OO N | DR Y |
| 38 | 80.534699 | 28.828987 | | 0-23 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 4.86 | 6.10 |
| 39 | 80.539656 | 28.82804 | | 0-32 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 5.36 | 6.62 |
| 40 | 80.517345 | 28.814592 | | 0-23 | SM | 0-50 | Loose | Plastic | 5-10 | Medium | 5.26 | 6.70 |
| 41 | 80.519823 | 28.8232 | | 0-31.5 | ML | 0-50 | - | Plastic | 5-10 | Medium | 4.63 | 5.94 |
| 42 | 80.524374 | 28.829168 | | 0-26 | SM | 0-50 | Loose | Plastic | 5-10 | Medium | 4.53 | 5.80 |
| 43 | 80.55025 | 28.823075 | | 0-31 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 8.53 | 10.07 |
| 45 | 80.5885 | 28.89593 | | 5 | CL | 0-50 | FRIABLE | Plastic | 5-10 | Medium | 31.65 | 38.05 |
| 46 | 80.562476 | 28.847266 | | 0-19-40-70 | SM SC SP | 0-50 - - | Friable Friable Friable | Plastic - Non-plastic | 5-10 - 0 | Medium - Very high | 7.59 | 9.10 |
| 47 | 80.5922 | 28.7747 | | 0-17 | CL | 0-50 | Loose | Plastic | 5-10 | Medium | 9.41 | 11.83 |
| 48 | 80.6001 | 28.7833 | | 0-35 >35 | SM - | 0-50 - | Friable Friable | Plastic - | 5-10 - | Medium - | 9.07 | 11.84 |
| 49 | 80.63617 | 28.7817 | | | SP | 0-50 | Loose | Non-plastic | 0 | Very high | 10.78 | 13.04 |
| 50 | 80.5556 | 28.8323 | | 0-28 | ML | 0-50 | Loose | Plastic | 5-10 | Medium | 7.93 | 9.52 |
| 51 | 80.536402 | 28.837732 | | 0-15-15-23-32-49 | ML - - | 0-50 - - | Loose - Loose | Plastic - - | 5-10 - - | Medium - - | 4.82 | 6.13 |
| 52 | 80.528359 | 28.846745 | | 0-29 | CL | 0-50 | Loose | Plastic | 5-10 | Medium | 5.28 | 6.71 |
| 53 | 80.533952 | 28.848855 | | 0-19 >19 | ML - | 0-50 - | Loose Loose | Plastic - | 5-10 - | Medium - | 5.98 | 7.42 |
| 54 | 80.529753 | 28.852341 | | 0-16-16-26 | ML - | 0-50 - | Loose Loose | Plastic - | 5-10 - | Medium - | 6.80 | 8.57 |
| 55 | 80.529753 | 28.852341 | | 0-30-30-60 | - ML | 0-50 - | Loose - | - - | - - | - - | 6.10 | 7.79 |
| 56 | 80.515128 | 28.879708 | | | SP | 0-50 | Loose | Non-plastic | 0 | Very high | 16.16 | 22.20 |

LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| S · N · | COORDINATES | | LOCA TION | DE PT H OF SOI L | USCS CLASSI FICATION | FIELD RELA TIVE DENS ITY | STIFF NESS | PLASTICI TY | PLAST ICITY INDE X (PI) | LIQUEFA CTION | GROUND WATER TABLE (m) | |
|------------------|---------------|---------------|--------------|---------------------------------|----------------------------|--------------------------------------|------------------|----------------|----------------------------------|------------------|---------------------------------|---------|
| | x | y | | (c m) | | % | | | | | MO NS OO N | DR Y |
| 6 0 | 80.549 547 | 28.79 21 | 0-16 | ML | 0-50 | Friable | Slightly Plastic | 1-5 | High | 7.40 | 9.31 | |
| | | | 16-30 | - | - | Firm | - | - | | | | |
| | | | >30 | - | - | Firm | - | - | | | | |
| 6 1 | 80.556 162 | 28.80 1497 | 0-23 | ML | 0-50 | Firm | Slightly Plastic | 1-5 | High | 9.16 | 12.15 | |
| | | | 23-51 | - | - | Friable | - | - | | | | |
| | | | >51 | - | - | Friable | - | - | | | | |
| 6 2 | 80.555 48 | 28.81 094 | 0-39 | - | 0-50 | Loose | Slightly plastic | 1-5 | Very high | 9.11 | 11.99 | |
| 6 5 | 80.625 517 | 28.83 9065 | 0 | CL | 0-50 | very friable | Plastic | 5--10 | medium | 29.54 | 39.20 | |
| | | | 28 | ML | 0-50 | Firm | slightly plastic | 1--5 | high | | | |
| | | | 100 | ML | | Firm | slightly plastic | 1--5 | high | | | |
| 6 7 | 80.647 527 | 28.85 5032 | 22 | CL | 0-50 | very friable | slightly plastic | 1--5 | high | 29.52 | 38.96 | |
| | | | 22 | SM | | very friable | plastic | 5--10 | medium | | | |
| | | | 20 | ML | 0-50 | very friable | slightly plastic | 1--5 | high | | | |
| | | | 20 | ML | | very friable | slightly plastic | 1--5 | high | | | |
| | | | 13 | CL | 0-50 | Friable | slightly plastic | 1--5 | high | | | |
| | | | 33 | SM | | Friable | slightly plastic | 1--5 | high | | | |
| | | | 33 | SP | | very friable | Non-plastic | 0 | very high | | | |
| | | | 9 | SP | 0-50 | Loose | slightly plastic | 1--5 | high | | | |
| 7 1 | 80.528 997 | 28.89 5735 | 9 | ML | | SOFT | slightly plastic | 1--5 | high | | | |
| | | | 17 | SM | 0-50 | Friable | plastic | 5--10 | medium | | | |
| | | | 24 | SP | 0-50 | Loose | Non-plastic | 0 | Very high | | | |
| | | | 24 | CL | 0-50 | very friable | plastic | 5--10 | medium | | | |
| | | | 24 | CL | | very friable | plastic | 5--10 | medium | | | |
| | | | | SC | 0-50 | Firm | slightly plastic | 1--5 | high | | | |
| | | | 27 | SC | 0-50 | Firm | slightly plastic | 1--5 | high | | | |
| 7 7 | 80.514 798 | 28.97 5658 | 25 | CL | 0-50 | Friable | slightly plastic | 1--5 | high | | | |

LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| S · N · | COORDINATES | | LOCATION | DEPTH OF SOIL (cm) | USCS CLASSIFICATION | FIELD RELATIVE DENSITY (%) | STIFFNESS | PLASTICITY | PLASTICITY INDEX (PI) | LIQUEFACTION | GROUND WATER TABLE (m) | |
|------------------|---------------|---------------|----------|-----------------------------|------------------------|-------------------------------------|-------------------|------------|--------------------------|--------------|---------------------------------|---------|
| | x | y | | | | | | | | | MO NS OO N | DR Y |
| 7 9 | 80.653 09 | 28.73 9575 | | | CL | | Friable | Plastic | 5--10 | medium | | |
| | | | 0-23 | SM | 0-50 | Friable | slightly plastic | 1--5 | high | | | |
| | | | 0-15 | sp | 0-50 | Loose | slightly plastic | 1--5 | high | | | |
| | | | 0-35 | ML | 0-50 | Friable | slightly plastic | 1--5 | high | 38.8 | 46.65 | |
| | | | 0-25 | SM | 0-50 | Friable | Plastic | 5-10 | Medium | | | |
| 8 2 | 80.654 576 | 28.75 2936 | 0-40 | SP | 0-50 | Loose | slightly plastic | 1--5 | high | | | |
| | | | >80 | SP | | Loose | slightly plastic | 1--5 | high | 39.0 | 46.97 | |
| | | | 0-28 | SM | 0-50 | Friable | plastic | 5--10 | medium | | | |
| 8 5 | 80.642 028 | 28.76 6814 | 0-20 | SM | 0-50 | Soft | slightly plastic | 1--5 | high | | | |
| | | | >50 | SP | | Loose | slightly plastic | 1--5 | high | 37.4 | 45.34 | |
| | | | 0-25 | SM | 0-50 | Soft | Plastic | 5-10 | Medium | | | |
| 8 9 | 80.574 507 | 28.77 3039 | 0-31 | ML | 0-50 | Friable | slightly plastic | 1--5 | high | | | |
| | | | >83 | ML | | Friable | slightly plastic | 1--5 | high | 31.6 | 35.69 | |
| | | | 0-30 | CH | 0-50 | Friable | very high plastic | >40 | low | | | |
| | | | 30-70 | CH | | Friable | very high plastic | >40 | low | | | |
| | | | 0-18 | ML | 0-50 | Friable | slightly plastic | 1--5 | high | | | |
| 9 8 | 80.622 643 | 28.79 7222 | 40-80 | SC | | | slightly plastic | 1--5 | high | | | |
| | | | 0-20 | SP | 0-50 | Loose | slightly plastic | 1--5 | high | | | |
| | | | 50-80 | SC | | | slightly plastic | 1--5 | high | 32.0 | 39.00 | |
| | | | 0-20 | CL | 0-50 | | very high plastic | >40 | low | | | |
| | | | 20-40 | ML | | | slightly plastic | 1--5 | high | | | |
| I I 4 | 80.518 534 | 28.83 6236 | 40-75 | ML | | | slightly plastic | 1--5 | high | | | |
| | | | 0-23 | SM | 0-50 | Friable | slightly plastic | 1--5 | high | | | |
| | | | 0-20 | SM | 0-50 | Friable | slightly plastic | 1--5 | high | | | |
| | | | 0-12 | ML | 0-50 | | very high plastic | >40 | low | 26.5 | 34.85 | |
| | | | 12-20 | SM | | | plastic | 5--10 | medium | | | |

LIQUEFACTION POTENTIAL WITH REFERENCE TO CONSISTENCY OF SOIL IN GODAWARI MUNICIPALITY

| S · N · | COORDINATES | | LOCA TION | DE PT H OF SOI L (c m) | USCS CLASSIFIC ATION | FIELD RELA TIVE DENS ITY % | STIFF NESS | PLASTICI TY | PLAST ICITY INDE X (PI) | LIQUEFA CTION | GROUND WATER TABLE (m) | |
|------------------|-------------|---|--------------|---|----------------------------|---|---------------|------------------|----------------------------------|------------------|---------------------------------|---------|
| | x | y | | | | | | | | | MO NS OO N | DR Y |
| | | | | 20_52 | ML | | | slightly plastic | 1--5 | high | | |
| | | | | 0-8 | SP | 0-50 | Friable | slightly plastic | 1--5 | high | | |
| | | | | 0-25 | SM | 0-50 | Friable | slightly plastic | 1--5 | high | | |
| | | | | >55 | SP | | Loose | slightly plastic | 1--5 | high | | |

ANNEX III: GEOTECHNICAL PROPERTIES OF SOIL IN GODAWARI MUNICIPALITY

| GEOTECHNICAL PROPERTIES OF SOIL IN GODAWARI MUNICIPALITY | | | | | | | | | | |
|--|-------------|------------|--------------------------|---------------------|------------------|--|------------------|--------------------|---------------------------------------|----|
| SN | X | Y | LOCATION | USCS CLASSIFICATION | RELATIVE DENSITY | SATURATE HYDRAULIC CONDUCTIVITY, k_{sat} (mm/hr) | MOISTURE CONTENT | UNIT WEIGHT (g/cc) | EFFECTIVE FRICTION ANGLE, ϕ' (°) | |
| 1 | 80.596544 | 28.812296 | Godawari-07, Tekulaa | CI | 0-50 | 48.4 | 0-10 | | | |
| 2 | 80.6064182 | 28.829196 | Godawari-07, Tekula | ML | 0-50 | 85.8 | 0-10 | 1.68 | | 34 |
| 3 | 80.6053911 | 28.8073469 | Godawari-06, lalpur | ML | 0-50 | 76.14 | 0-10 | 1.68 | | 34 |
| 4 | 80.59466 | 28.8062231 | Godawari-06, Gailnadi | CL | 0-50 | 10.5 | 0-10 | | | |
| 5 | 80.60461275 | 28.806746 | Godawari-07, Haraiya | ML | 0-50 | 26.14 | 0-10 | 1.68 | | 34 |
| 6 | 80.461275 | 28.8067461 | Godawari-07, Haraiya | ML | 0-50 | 46.33 | 0-10 | 1.68 | | 34 |
| 7 | 80.641983 | 28.792278 | Godawari-08, Balmi | ML | 0-50 | 43 | 0-10 | 1.68 | | 34 |
| 8 | 80.63333 | 28.78333 | Godawari-08, Balmi | CL | 0-50 | 46 | 0-10 | | | |
| 9 | 80.655 | 28.7333 | Godawari-09, Balmi | CL | 0-50 | 11 | 0-10 | | | |
| 10 | 80.619613 | 28.79899 | Godawari-08, Syaulya | ML | 0-50 | 13 | 0-10 | 1.68 | | 34 |
| 11 | 80.62191 | 28.7874039 | Godawari-08, syaula | SM | 0-50 | 33.42 | 0-10 | | | |
| 12 | 80.6162 | 27.7859817 | Godawari-08, Majgaau | CL | 0-50 | 51.66 | 0-10 | | | |
| 13 | 80.6217 | 28.8054 | Godawari-08, Syaulya | CL | 0-50 | 4 | 0-10 | | | |
| 14 | 80.698 | 28.801 | Godawari-08, Jamunabhadi | CL | 0-50 | 35.5 | 0-10 | | | |
| 15 | 80.6069 | 28.8028 | Godawari-07, kreshar | CL | 0-50 | 14 | 0-10 | | | |
| 16 | 80.51 | 28.8188 | Godawari-02, Lamitaal | CL | 0-50 | 25.28 | 0-10 | | | |
| 17 | 80.5735 | 28.8287 | Godawari-03, Attariya | CL | 0-50 | 10.2 | 0-10 | | | |
| 18 | 80.5732 | 28.8185 | Godawari-01 | ML | 0-50 | 11.18 | 0-10 | 1.68 | | 34 |
| 19 | 80.5609 | 28.7856 | Godawari, Geta | CL | 0-50 | 17 | 0-10 | | | |
| 20 | 80.5735 | 28.8287 | Godawari-03, Attariya | CL | 0-50 | 191.3 | 0-10 | | | |
| 21 | 80.559 | 28.7842 | Godawari-03 | CL | 0-50 | 18.66 | 0-10 | | | |
| 22 | 80.5943 | 28.7989 | Godawari-06, Bhuyera | CL | 0-50 | 23.3 | 0-10 | | | |
| 23 | 80.5993 | 28.7955 | Godawari-06, Bhuyera | CL | 0-50 | 15.75 | 0-10 | | | |

GEOTECHNICAL PROPERTIES OF SOIL IN GODAWARI MUNICIPALITY

| SN | X | Y | LOCATION | USCS CLASSIFICATION | RELATIVE DENSITY | SATURATE HYDRAULIC CONDUCTIVITY, k_{sat} (mm/hr) | MOISTURE CONTENT | UNIT WEIGHT (g/cc) | EFFECTIVE FRICTION ANGLE, ϕ' (°) |
|----|-----------|-----------|-----------------------------|---------------------|------------------|--|------------------|--------------------|---------------------------------------|
| 24 | 80.5896 | 28.8028 | Godawari-06, Badheya | SM | 0-50 | 64.2 | 0-10 | | |
| 25 | 80.5776 | 28.8186 | Godawari-04, Basantapur | CL | 0-50 | 14 | 0-10 | | |
| 26 | 80.5735 | 28.8287 | Godawari-06, Baskota | ML | 0-50 | 22.5 | 0-10 | 1.68 | 34 |
| 27 | 80.5732 | 28.8185 | Godawari-04, Basantapur | CL | 0-50 | 15.75 | 0-10 | | |
| 28 | 80.5367 | 28.8112 | Godawari-03 | CL | 0-50 | 335 | 0-10 | | |
| 29 | 80.52703 | 28.8104 | Godawari-03 | CL | 0-50 | 14.14 | 0-10 | | |
| 30 | 80.53501 | 28.82012 | Godawari-03 | CL | 0-50 | 97 | 0-10 | | |
| 31 | 80.5707 | 28.8148 | Godawari-04, Basantapur | CL | 0-50 | 17.25 | 0-10 | | |
| 32 | 80.5699 | 28.8248 | Godawari-04, Baskota | CL | 0-50 | 13.85 | 0-10 | | |
| 33 | 80.5668 | 28.8168 | Godawari-02 Bankhet | SP | 0-50 | 21.8 | 0-10 | 33 | 2.02 |
| 34 | 80.5993 | 28.77081 | Attariya | CL | 0-50 | 18 | 0-10 | | |
| 35 | 80.52703 | 28.8104 | Attariya | CL | 0-50 | 23.3 | 0-10 | | |
| 36 | 80.5647 | 28.76601 | Godawari-05, Geta | CL | 0-50 | 15.85 | 0-10 | | |
| 37 | 80.55539 | 28.76587 | Godawari-05, Geta | CL | 0-50 | 14 | 0-10 | | |
| 38 | 80.534699 | 28.828987 | Godawari-03 Khamaura | CL | 0-50 | 50.25 | 0-10 | | |
| 39 | 80.539656 | 28.82804 | Godawari-03 Khamaura | CL | 0-50 | 169.23 | 0-10 | | |
| 40 | 80.517345 | 28.814592 | Godawari-03 Khamaura | CL | 0-50 | 267 | 0-10 | | |
| 41 | 80.519823 | 28.8232 | Godawari-03, Saraswati Tole | CL | 0-50 | 244.66 | 0-10 | | |

GEOTECHNICAL PROPERTIES OF SOIL IN GODAWARI MUNICIPALITY

| SN | X | Y | LOCATION | USCS CLASSIFICATION | RELATIVE DENSITY | SATURATE HYDRAULIC CONDUCTIVITY, k_{sat} (mm/hr) | MOISTURE CONTENT | UNIT WEIGHT (g/cc) | EFFECTIVE FRICTION ANGLE, ϕ' (°) |
|----|-----------|-----------|---------------------------|---------------------|------------------|--|------------------|--------------------|---------------------------------------|
| 42 | 80.524374 | 28.829168 | Godawari-03, Malakheti | ML | 0-50 | 136.85 | 0-10 | 1.68 | 34 |
| 43 | 80.55025 | 28.823075 | Godawari-02, Teghari | CL | 0-50 | 25.7 | 0-10 | | |
| 44 | 80.5885 | 28.89593 | Godawari-02, Bhyagutepani | CL | 0-50 | 44.4 | 0-10 | | |
| 45 | 80.507692 | 28.857943 | Godawari-02, Bandevi | CL | 0-50 | 17 | 0-10 | | |
| 46 | 80.562476 | 28.847266 | Godawari-02, Teghari | CL | 0-50 | 27 | 0-10 | | |
| 47 | 80.5922 | 28.7747 | Godawari-06, Bhugera | CL | 0-50 | 28.25 | 0-10 | | |
| 48 | 80.6001 | 28.7833 | Godawari-04, Jonapur' | ML | 0-50 | 34.6 | 0-10 | 1.68 | 34 |
| 49 | 80.636 | 28.7817 | Godawari-07, Jonapur' | ML | 0-50 | 26.7 | 0-10 | 1.68 | 34 |
| 50 | 80.5556 | 28.8323 | Godawari-20, Teghari | CL | 0-50 | 20.58 | 0-10 | | |
| 51 | 80.536402 | 28.837732 | Godawari0-3, Khamaura | CL | 0-50 | 88.3 | 0-10 | | |
| 52 | 80.528359 | 28.846745 | Godawari-10, Khamaura | CL | 0-50 | 41.4 | 0-10 | | |
| 53 | 80.533952 | 28.848855 | Godawari-10, Khamaura | CL | 0-50 | 515 | 0-10 | | |
| 54 | 80.529753 | 28.852341 | Godawari-10, Khamaura | CL | 0-50 | 87.33 | 0-10 | | |
| 55 | 80.529753 | 28.852341 | Godawari-10, Khamaura | CL | 0-50 | 87.33 | 0-10 | | |
| 56 | 80.515128 | 28.879708 | Godawari-11, Bangesal | SM | 0-50 | 52.71 | 0-10 | | |
| 57 | 80.515659 | 28.91702 | Godawari-11, Katan | CH | 0-50 | 43.85 | 0-10 | | |
| 58 | 80.515659 | 28.91702 | Godawari-12, Kolmuda | SM | 0-50 | 173.42 | 0-10 | | |

GEOTECHNICAL PROPERTIES OF SOIL IN GODAWARI MUNICIPALITY

| SN | X | Y | LOCATION | USCS CLASSIFICATION | RELATIVE DENSITY | SATURATE HYDRAULIC CONDUCTIVITY, k_{sat} (mm/hr) | MOISTURE CONTENT | UNIT WEIGHT (g/cc) | EFFECTIVE FRICTION ANGLE, ϕ' (°) |
|----|-------------|-------------|------------------------|---------------------|------------------|--|------------------|--------------------|---------------------------------------|
| 59 | 80.53838333 | 28.93219722 | Godawari-12, Kolmuda | CH | 0-50 | 196.52 | 0-10 | | |
| 60 | 80.549547 | 28.7921 | Godawari-01, Manehara | CL | 0-50 | 8.85 | 0-10 | | |
| 61 | 80.556162 | 28.801497 | Godawari-01, Bharatpur | CL | 0-50 | 7.71 | 0-10 | | |
| 62 | 80.55548 | 28.81094 | Godawari-01, Attariya | CL | 0-50 | 80.4 | 0-10 | | |

ANNEX IV: DIFFERENT TYPOLOGIES OF BUILDING AND THEIR NUMBERS

| DIFFERENT TYPOLOGIES OF BUILDING AND THEIR NUMBER | | | |
|---|--------------------------------------|------|---------------------|
| TYPOLOGY (CONSTRUCTION TYPE AND MATERIAL) | CLASSIFIED TYPOLOGY | CODE | NUMBER OF BUILDINGS |
| Bamboo_Wood with cement | <i>Bamboo/Wood with cement</i> | T1 | 102 |
| Bamboo_Wood with GI sheet | <i>Bamboo/Wood with GI sheet</i> | T2 | 4 |
| Bamboo_Wood with mud | <i>Bamboo/Wood with mud</i> | T3 | 5769 |
| Bamboo/Wood Made with mud | | | |
| Bamboo_Wood with wood | <i>Bamboo/Wood with wood</i> | T4 | 1052 |
| Bamboo/Wood Made with wood | | | |
| Frame Structure with cement | <i>Frame Structure with cement</i> | T5 | 9132 |
| Frame_Structure with cement | | | |
| Frame_Structure with GI sheet | <i>Frame Structure with GI sheet</i> | T6 | 1 |
| Frame_Structure with metal | <i>Frame Structure with metal</i> | T7 | 2 |
| Frame_Structure with mud | <i>Frame Structure with mud</i> | T8 | 28 |
| Frame_Structure with plastic | <i>Frame Structure with plastic</i> | T9 | 1 |
| Frame_Structure with wood | <i>Frame Structure with wood</i> | T10 | 15 |
| Load Bearing with brick | <i>Load Bearing with brick</i> | T11 | 1 |
| Load Bearing with cement | <i>Load Bearing with cement</i> | T12 | 7287 |
| Load Bearing with GI sheet | <i>Load Bearing with GI sheet</i> | T13 | 9 |
| Load Bearing with metal | <i>Load Bearing with metal</i> | T14 | 4 |
| Load Bearing with mud | <i>Load Bearing with mud</i> | T15 | 3038 |
| Load Bearing with steel | <i>Load Bearing with steel</i> | T16 | 5 |
| Load Bearing with stone | <i>Load Bearing with stone</i> | T17 | 3 |
| Load Bearing with tiles | <i>Load Bearing with tiles</i> | T18 | 2 |
| Load Bearing with wood | <i>Load Bearing with wood</i> | T19 | 80 |
| Steel Structure with cement | <i>Steel Structure with cement</i> | T20 | 1 |
| Steel Structure with GI sheet | <i>Steel Structure with GI sheet</i> | T21 | 29 |
| Steel Structure with metal | <i>Steel Structure with metal</i> | T22 | 1 |
| Steel Structure with plastic | <i>Steel Structure with plastic</i> | T23 | 1 |
| Steel Structure with steel | <i>Steel Structure with steel</i> | T24 | 1 |
| Bamboo/Wood Made with plastic | <i>Bamboo/Wood with plastic</i> | T25 | 1 |
| Frame_Structure with steel | <i>Frame Structure with steel</i> | T26 | 1 |
| GI_Sheet with GI_Sheet | <i>GI Sheet with GI Sheet</i> | T27 | 4 |
| GI_Sheet with mud | <i>GI Sheet with mud</i> | T28 | 2 |
| Total | | | 26576 |

ANNEX V: RECLASSIFICATION OF DIFFERENT TYPOLOGIES INTO 5 SIMPLE TYPES

| RECLASSIFICATION OF DIFFERENT TYPOLOGIES INTO 5 SIMPLE TYPES | | |
|--|---|--------------------|
| BUILDING TYPES | TYPES | RECLASSIFIED TYPES |
| Bamboo wood with mud/wood | T3, T4 | BMW |
| Frame structure with cement | T5 | RCC |
| Loadbearing with cement | T12 | LBC |
| Loadbearing with mud | T15 | LBM |
| Others | T1,T2,T6,T7,T8,T9,T10,T11,T13,T14,T16,T17,T18,T19,T20,T21, T22,T23,T24, T25,T26,T27,T28 | OTH |

ANNEX VI: BUILDING FOOTPRINT SURVEY QUESTIONNAIRE

| SURVEY QUESTIONNAIRE - BUILDING SURVEY (PHYSICAL VULNERABILITY) | | | |
|---|---------------------------------------|--|---|
| SN | CHARACTERISTIC | CLASSES | DETAILS |
| 1 | Building Footprint ID | | |
| 2 | Latitude | | |
| 3 | Longitude | | |
| 4 | Elevation | | |
| 5 | Occupancy type or Functional Category | As detailed as possible for each building. Make subclasses under the main heading. Use the option that there may be mixed uses, by making two columns of occupancy type: | Residential (subdivide in specific classes) Health (subdivide in specific classes) Commercial (subdivide in specific classes) Agricultural (subdivide in specific classes) Industrial (subdivide in specific classes) Institutional (subdivide in specific classes) Educational (subdivide in specific classes) |
| 6 | Roof Type | | Roof type (flat, inclined, mixed) Roof material (concrete, wood, corrugated iron, thatched, tiles) Wall materials (brick in mud, brick in cement, fieldstone, adobe, infilled frame, wood, iron, etc.) Foundation type |
| 7 | Building construction type | | Construction types used internationally in order to link with vulnerability curves (reinforced concrete, mud, fieldstone, concrete blocks, brick masonry, tin/CGI sheets, Khair and mud, Bamboo etc.) |
| 8 | Age of the building | Use classes of ages. (e.g., less than 5 y, 5-10, 10-20 etc.) | |
| 9 | Condition of the building | Good, moderate, poor | Visual interpretation |
| 10 | Number of floors | | |
| 11 | Number of people | Indicate with age classes, and activities (work, school, retired). | |
| 12 | Livestock | Indicate type and number | |

ANNEX VII: WARD WISE BUILDING TYPE DISTRIBUTION WITH FLOORS

| Building construction types and number of floors | Wards | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | Total |
|--|---------------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| | BMW_SS | 241 | 116 | 389 | 1136 | 277 | 491 | 519 | 865 | 1210 | 803 | 9 | 51 | 6107 |
| | BMW_MS | 2 | 2 | 0 | 7 | 15 | 26 | 30 | 15 | 91 | 0 | 1 | 0 | 189 |
| | LBM_SS | 167 | 76 | 252 | 280 | 72 | 87 | 15 | 35 | 40 | 76 | 831 | 932 | 2863 |
| | LBM_MS | 4 | 0 | 1 | 2 | 9 | 1 | 3 | 5 | 0 | 0 | 1 | 6 | 32 |
| | LBC_SS | 946 | 106 | 599 | 1062 | 770 | 814 | 635 | 479 | 445 | 371 | 163 | 99 | 6489 |
| | LBC_MS | 20 | 2 | 1 | 16 | 137 | 54 | 35 | 32 | 24 | 0 | 0 | 3 | 324 |
| | OTH_SS | 27 | 26 | 16 | 62 | 13 | 10 | 11 | 15 | 37 | 19 | 8 | 23 | 267 |
| | OTH_MS | 5 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 0 | 1 | 12 |
| | RCC_SS | 1486 | 1821 | 1269 | 491 | 327 | 173 | 133 | 302 | 112 | 846 | 323 | 160 | 7443 |
| | RCC_MS | 402 | 434 | 71 | 53 | 132 | 13 | 10 | 36 | 3 | 22 | 11 | 4 | 1191 |
| | Total | 3300 | 2583 | 2598 | 3109 | 1753 | 1670 | 1393 | 1784 | 1964 | 2137 | 1347 | 1279 | 24917 |

ANNEX VIII: EXPOSURE SUMMARY OF ALL WARDS OF GODAWARI MUNICIPALITY

Ward I

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 3510 | 0 | 0 | 0 | 13175 | 0 | 0 | 0 | 50 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 3510 | 0 | 0 | 0 | 13175 | 0 | 0 | 0 | 50 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 1206 | 355 | 82 | 4421 | 1536 | 266 | 124 | 29 | 1 | 19 | 4 | 1 |
| Flood- 50 Yr RP | 1207 | 389 | 95 | 4480 | 1620 | 325 | 125 | 31 | 2 | 19 | 4 | 1 |
| Flood- 100 Yr RP | 1052 | 549 | 429 | 3850 | 2221 | 1711 | 111 | 53 | 22 | 16 | 8 | 4 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 3510 | 0 | 0 | 13175 | 0 | 0 | 298 | 0 | 0 | 50 | 0 | 0 |
| Landslide- 50 Yr RP | 3510 | 0 | 0 | 13175 | 0 | 0 | 298 | 0 | 0 | 50 | 0 | 0 |
| Landslide-100 Yr RP | 3510 | 0 | 0 | 13175 | 0 | 0 | 298 | 0 | 0 | 50 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 0 | 3510 | 0 | 0 | 0 | 298 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 0 | 3510 | 0 | 0 | 0 | 298 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 0 | 3510 | 0 | 0 | 0 | 298 |

Ward 2

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 2659 | 0 | 0 | 0 | 12668 | 0 | 0 | 0 | 53 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 2659 | 0 | 0 | 0 | 12668 | 0 | 0 | 0 | 53 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 891 | 333 | 10 | 4307 | 1778 | 53 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 895 | 362 | 13 | 4310 | 1928 | 71 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 784 | 639 | 119 | 3821 | 3246 | 543 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 2659 | 0 | 0 | 12668 | 0 | 0 | 282 | 0 | 0 | 53 | 0 | 0 |
| Landslide- 50 Yr RP | 2659 | 0 | 0 | 12668 | 0 | 0 | 282 | 0 | 0 | 53 | 0 | 0 |
| Landslide-100 Yr RP | 2659 | 0 | 0 | 12668 | 0 | 0 | 282 | 0 | 0 | 53 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 55 | 2584 | 20 | 0 | 14 | 263 | 5 | 0 |
| Windstorm-25 Yr RP | 0 | 55 | 2584 | 20 | 0 | 14 | 263 | 5 |
| Windstorm-50 Yr RP | 0 | 0 | 55 | 2604 | 0 | 0 | 14 | 268 |

Ward 3

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 2686 | 0 | 0 | 0 | 12251 | 0 | 0 | 0 | 41 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 2686 | 0 | 0 | 0 | 12251 | 0 | 0 | 0 | 41 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 908 | 483 | 0 | 4105 | 2298 | 0 | 96 | 21 | 0 | 16 | 3 | 0 |
| Flood- 50 Yr RP | 828 | 493 | 0 | 4207 | 2347 | 0 | 99 | 22 | 0 | 16 | 3 | 0 |
| Flood- 100 Yr RP | 889 | 536 | 158 | 4061 | 2395 | 859 | 95 | 36 | 11 | 15 | 6 | 1 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 2676 | 0 | 0 | 12218 | 0 | 0 | 243 | 0 | 0 | 40 | 0 | 0 |
| Landslide- 50 Yr RP | 2676 | 0 | 0 | 12218 | 0 | 0 | 243 | 0 | 0 | 40 | 0 | 0 |
| Landslide-100 Yr RP | 2676 | 0 | 0 | 12218 | 0 | 0 | 243 | 0 | 0 | 40 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 0 | 2669 | 0 | 0 | 0 | 243 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 0 | 2669 | 0 | 0 | 0 | 243 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 0 | 2669 | 0 | 0 | 0 | 243 |

Ward 4

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 3206 | 0 | 0 | 0 | 13433 | 0 | 0 | 0 | 98 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 3206 | 0 | 0 | 0 | 13433 | 0 | 0 | 0 | 98 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 619 | 462 | 223 | 2850 | 1994 | 1029 | 167 | 105 | 59 | 15 | 11 | 5 |
| Flood- 50 Yr RP | 609 | 447 | 240 | 2791 | 2074 | 1100 | 167 | 104 | 68 | 15 | 11 | 6 |
| Flood- 100 Yr RP | 564 | 556 | 322 | 2560 | 2424 | 1450 | 163 | 123 | 89 | 14 | 12 | 7 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 2536 | 443 | 227 | 10913 | 1632 | 888 | 59 | 20 | 19 | 53 | 0 | 0 |
| Landslide- 50 Yr RP | 2536 | 443 | 227 | 10913 | 1632 | 888 | 59 | 20 | 19 | 53 | 0 | 0 |
| Landslide-100 Yr RP | 2536 | 443 | 227 | 10913 | 1632 | 888 | 59 | 20 | 19 | 53 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 795 | 2122 | 146 | 141 | 292 | 566 | 93 | 85 |
| Windstorm-25 Yr RP | 75 | 720 | 2122 | 287 | 34 | 257 | 566 | 177 |
| Windstorm-50 Yr RP | 0 | 75 | 720 | 2409 | 0 | 34 | 257 | 743 |

Ward 5

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 1798 | 0 | 0 | 0 | 7668 | 0 | 0 | 0 | 51 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 1798 | 0 | 0 | 0 | 7668 | 0 | 0 | 0 | 51 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 801 | 72 | 0 | 3445 | 329 | 0 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 814 | 77 | 0 | 3490 | 351 | 0 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 840 | 144 | 0 | 3516 | 702 | 0 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1768 | 0 | 0 | 7540 | 0 | 0 | 746 | 0 | 0 | 51 | 0 | 0 |
| Landslide- 50 Yr RP | 1768 | 0 | 0 | 7540 | 0 | 0 | 746 | 0 | 0 | 51 | 0 | 0 |
| Landslide-100 Yr RP | 1768 | 0 | 0 | 7540 | 0 | 0 | 746 | 0 | 0 | 51 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 0 | 1756 | 0 | 0 | 0 | 744 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 0 | 1756 | 0 | 0 | 0 | 744 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 0 | 1756 | 0 | 0 | 0 | 744 |

Ward 6

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 1709 | 0 | 0 | 0 | 9463 | 0 | 0 | 0 | 29 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 1709 | 0 | 0 | 0 | 9463 | 0 | 0 | 0 | 29 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 554 | 392 | 15 | 2900 | 2221 | 147 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 570 | 398 | 30 | 3023 | 2204 | 259 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 542 | 520 | 63 | 2839 | 2893 | 532 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1709 | 0 | 0 | 9463 | 0 | 0 | 492 | 0 | 0 | 29 | 0 | 0 |
| Landslide- 50 Yr RP | 1709 | 0 | 0 | 9464 | 0 | 0 | 492 | 0 | 0 | 29 | 0 | 0 |
| Landslide-100 Yr RP | 1709 | 0 | 0 | 9463 | 0 | 0 | 492 | 0 | 0 | 29 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 0 | 1709 | 0 | 0 | 0 | 492 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 0 | 1709 | 0 | 0 | 0 | 492 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 0 | 1709 | 0 | 0 | 0 | 492 |

Ward 7

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 1415 | 0 | 0 | 0 | 8296 | 0 | 0 | 0 | 29 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 1415 | 0 | 0 | 0 | 8296 | 0 | 0 | 0 | 29 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 504 | 174 | 0 | 2944 | 963 | 0 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 510 | 182 | 0 | 2991 | 1022 | 0 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 504 | 236 | 9 | 3014 | 1275 | 65 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1415 | 0 | 0 | 8296 | 0 | 0 | 458 | 0 | 0 | 29 | 0 | 0 |
| Landslide- 50 Yr RP | 1415 | 0 | 0 | 8296 | 0 | 0 | 458 | 0 | 0 | 29 | 0 | 0 |
| Landslide-100 Yr RP | 1415 | 0 | 0 | 8296 | 0 | 0 | 458 | 0 | 0 | 29 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 51 | 1364 | 0 | 0 | 9 | 450 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 51 | 1364 | 0 | 0 | 9 | 450 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 51 | 1364 | 0 | 0 | 9 | 450 |

Ward 8

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 1825 | 0 | 0 | 0 | 7803 | 0 | 0 | 0 | 37 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 1825 | 0 | 0 | 0 | 7803 | 0 | 0 | 0 | 37 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 403 | 174 | 31 | 1735 | 786 | 133 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 407 | 186 | 34 | 1727 | 851 | 148 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 430 | 186 | 113 | 1779 | 876 | 525 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1792 | 0 | 0 | 7683 | 0 | 0 | 671 | 0 | 0 | 36 | 0 | 0 |
| Landslide- 50 Yr RP | 1792 | 0 | 0 | 7683 | 0 | 0 | 671 | 0 | 0 | 36 | 0 | 0 |
| Landslide-100 Yr RP | 1792 | 0 | 0 | 7683 | 0 | 0 | 671 | 0 | 0 | 36 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 0 | 1804 | 0 | 0 | 0 | 668 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 0 | 1804 | 0 | 0 | 0 | 668 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 0 | 1804 | 0 | 0 | 0 | 668 |

Ward 9

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 2026 | 0 | 0 | 0 | 8063 | 0 | 0 | 0 | 49 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 2026 | 0 | 0 | 0 | 8063 | 0 | 0 | 0 | 49 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 581 | 279 | 169 | 2212 | 1026 | 750 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 551 | 245 | 248 | 2086 | 957 | 1004 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 505 | 192 | 448 | 1995 | 669 | 1804 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1966 | 0 | 0 | 7764 | 0 | 0 | 689 | 0 | 0 | 47 | 0 | 0 |
| Landslide- 50 Yr RP | 1966 | 0 | 0 | 7764 | 0 | 0 | 689 | 0 | 0 | 47 | 0 | 0 |
| Landslide-100 Yr RP | 1966 | 0 | 0 | 7764 | 0 | 0 | 689 | 0 | 0 | 47 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 130 | 1849 | 1 | 0 | 44 | 638 | 6 | 0 |
| Windstorm-25 Yr RP | 0 | 130 | 1849 | 1 | 0 | 44 | 638 | 6 |
| Windstorm-50 Yr RP | 0 | 0 | 130 | 1850 | 0 | 0 | 44 | 643 |

Ward 10

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 2129 | 0 | 0 | 0 | 9480 | 0 | 0 | 0 | 34 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 2129 | 0 | 0 | 0 | 9480 | 0 | 0 | 0 | 34 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 800 | 239 | 10 | 3408 | 1047 | 41 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 809 | 256 | 14 | 3464 | 1112 | 72 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 854 | 358 | 68 | 3646 | 1491 | 357 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 2185 | 0 | 0 | 9436 | 0 | 0 | 550 | 0 | 0 | 33 | 0 | 0 |
| Landslide- 50 Yr RP | 2185 | 0 | 0 | 9436 | 0 | 0 | 550 | 0 | 0 | 33 | 0 | 0 |
| Landslide-100 Yr RP | 2185 | 0 | 0 | 9436 | 0 | 0 | 550 | 0 | 0 | 33 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 0 | 2186 | 0 | 0 | 0 | 551 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 0 | 2186 | 0 | 0 | 0 | 551 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 0 | 2186 | 0 | 0 | 0 | 551 |

Ward 11

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 1355 | 0 | 0 | 0 | 6711 | 0 | 0 | 0 | 40 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 1355 | 0 | 0 | 0 | 6711 | 0 | 0 | 0 | 40 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 576 | 168 | 6 | 2758 | 810 | 23 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 569 | 192 | 7 | 2741 | 906 | 27 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 581 | 287 | 19 | 2871 | 1366 | 77 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1351 | 0 | 0 | 6702 | 0 | 0 | 562 | 0 | 0 | 40 | 0 | 0 |
| Landslide- 50 Yr RP | 1351 | 0 | 0 | 6702 | 0 | 0 | 562 | 0 | 0 | 40 | 0 | 0 |
| Landslide-100 Yr RP | 1351 | 0 | 0 | 6702 | 0 | 0 | 562 | 0 | 0 | 40 | 0 | 0 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 326 | 1010 | 1 | 0 | 133 | 423 | 0 | 0 |
| Windstorm-25 Yr RP | 0 | 326 | 1010 | 1 | 0 | 133 | 423 | 0 |
| Windstorm-50 Yr RP | 0 | 0 | 326 | 1011 | 0 | 0 | 133 | 423 |

Ward 12

| Disaster | Number of buildings | | | | Number of people | | | | Road length in kilometers | | | |
|------------------------|---------------------|----------|------|-----------|------------------|----------|------|-----------|---------------------------|----------|------|-----------|
| | Low | Moderate | High | Very High | Low | Moderate | High | Very High | Low | Moderate | High | Very High |
| Earthquake- 475 Yr RP | 0 | 0 | 0 | 1296 | 0 | 0 | 0 | 6613 | 0 | 0 | 0 | 38 |
| Earthquake- 2475 Yr RP | 0 | 0 | 0 | 1296 | 0 | 0 | 0 | 6613 | 0 | 0 | 0 | 38 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Flood- 20 Yr RP | 376 | 179 | 28 | 2069 | 946 | 107 | 93 | 55 | 3 | 17 | 8 | 1 |
| Flood- 50 Yr RP | 376 | 187 | 32 | 2082 | 991 | 133 | 91 | 61 | 4 | 17 | 8 | 1 |
| Flood- 100 Yr RP | 375 | 232 | 62 | 2115 | 1219 | 286 | 82 | 79 | 17 | 15 | 12 | 5 |

| Disaster | Number of buildings | | | Number of people | | | Agriculture area in hectares | | | Road length in kilometers | | |
|---------------------|---------------------|----------|------|------------------|----------|------|------------------------------|----------|------|---------------------------|----------|------|
| | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High | Low | Moderate | High |
| Landslide- 20 Yr RP | 1120 | 122 | 54 | 5823 | 539 | 251 | 432 | 125 | 39 | 26 | 7 | 4 |
| Landslide- 50 Yr RP | 1120 | 122 | 54 | 5823 | 539 | 251 | 432 | 125 | 39 | 26 | 7 | 4 |
| Landslide-100 Yr RP | 1120 | 122 | 54 | 5823 | 539 | 251 | 432 | 125 | 39 | 26 | 7 | 4 |

| Disaster | Number of buildings | | | | Agriculture area in hectares | | | |
|--------------------|---------------------|------|----------|------|------------------------------|-----|----------|------|
| | Very Low | Low | Moderate | High | Very Low | Low | Moderate | High |
| Windstorm-10 Yr RP | 1422 | 1412 | 1172 | 0 | 273 | 298 | 26 | 0 |
| Windstorm-25 Yr RP | 1377 | 1422 | 1412 | 1172 | 25 | 248 | 298 | 26 |
| Windstorm-50 Yr RP | 0 | 1377 | 1422 | 2584 | 0 | 25 | 248 | 323 |

ANNEX IX: WATER LEVEL SURVEY OF GODAWARI MUNICIPALITY

| WATER LEVEL SURVEY OF GODAWARI MUNICIPALITY, KAILALI | | | | | | |
|--|---------------------------|---------|---------------------|---------|---------|---------------|
| SN | NAME OF THE TECHNICIAN | WARD NO | WATER LEVEL IN FEET | | ADDRESS | |
| | | | DRY | MONSOON | | |
| 1 | Ram Saud | | 4 | 30-40 | 23-30 | Basantapur |
| 2 | Harka Saud | | 4 | 30-35 | 20-30 | Basantapur |
| 3 | Nabraj Phulara | | 6 | 25-30 | 20-25 | Larpur |
| 4 | Ram Saud | | 6 | 20-25 | 5-10 | Larpur |
| 5 | Shiv Chaudhary | | 7 | 30-35 | 25-30 | Khairane Tole |
| 6 | Ram Saud | | 7 | 40-50 | 35-40 | Khaireni Tole |
| 7 | Solara Chaudhary | | 7 | 30-40 | 25-30 | Harriya |
| 8 | Hari Shing Sutar | | 8 | 40-50 | 30-40 | Syaule |
| 9 | Hari Shing Sutar | | 8 | 25-30 | 25-30 | Syalue |
| 10 | Suk Ram Bahadur Chaudhary | | 1 | 30-40 | 25-30 | Attariya |
| 11 | Suk Ram Bahadur Chaudhary | | 1 | 30-40 | 25-30 | Basbari |
| 12 | Suk Ram Bahadur Chaudhary | | 1 | 30-40 | 25-30 | Attaiya |
| 13 | Suk Ram Bahadur Chaudhary | | 1 | 30-40 | 25-30 | Attayira |
| 14 | Kanya Chaudhary | | 1 | 30-40 | 25-30 | Attariya |
| 15 | Kanya Chaudhary | | 1 | 30-40 | 25-30 | Basbari |
| 16 | Kanya Chaudhary | | 1 | 30-40 | 25-30 | Basbari |
| 17 | Kanya Chaudhary | | 1 | 30-40 | 25-30 | Basbari |
| 18 | Kanya Chaudhary | | 1 | 30-40 | 25-30 | Basbari |
| 19 | Kanya Chaudhary | | 1 | 30-40 | 25-30 | Attariya |
| 20 | Ram Timilsena | | 12 | 28m | 25m | Sharada Tole |
| 21 | Ram Timilsena | | 12 | 110m | 100m | Sharada Tole |
| 22 | Nabraj Updhy | | 11 | | 60 | 40 Bangi Sal |
| 23 | Nabraj Updhy | | 11 | | 160 | 150 Bangi Sal |
| 24 | Hari Ram Chaudhary | | 3 | | 17 | 14 Chaukidada |

WATER LEVEL SURVEY OF GODAWARI MUNICIPALITY, KAILALI

| SN | NAME OF THE TECHNICIAN | WARD NO | WATER LEVEL IN FEET | ADDRESS |
|----|------------------------|---------|---------------------|-----------------------|
| 25 | Hari Ram Chaudhary | 3 | 17 | 14 Chaukidada |
| 26 | Hari Ram Chaudhary | 3 | 17 | 14 Chaukidada |
| 27 | Hari Ram Chaudhary | 3 | 17 | 14 Chaukidada |
| 28 | Hari Ram Chaudhary | 3 | 17 | 14 Chaukidada |
| 29 | Rohan Balayar | 10 | 18 | 14 Damaura |
| 30 | Roshan Chaudhary | 10 | 18 | 12 Damaura |
| 31 | Ram Chaudhary | 10 | 18 | 15 Damaura |
| 32 | Ram Chaudhary | 10 | 18 | 14 Damaura |
| 33 | Rohan Balayar | 10 | 18 | 13 Damaura |
| 34 | Ganesh Chaudhary | 2 | 35 | 31 Radha Krishna Tole |
| 35 | Hari Saud | 2 | 35 | 28 Radha Krishna Tole |
| 36 | Ram Bista | 2 | 35 | 29 Garepani |
| 37 | Ganesh Chaudhary | 2 | 35 | 30 Garepani |
| 38 | Hari Saud | 5 | 40 | 35 Geti |
| 39 | Dalaram Chaudhary | 5 | 25 | 20 Geti |
| 40 | Damber Saud | 5 | 35 | 32 Bejaura |
| 41 | Damber Saud | 5 | 35 | 33 Bejaura |
| 42 | Ram Kathayat | 9 | 30 | 25 Dhanchauri |
| 43 | Ram Kathayat | 9 | 30 | 25 Dhanchauri |
| 44 | Ram Kathayat | 9 | 30 | 25 Dhanchauri |
| 45 | Ram Kathayat | 9 | 30 | 25 Dhanchauri |

ANNEX X: HISTORICAL DISASTER EVENTS AND LOSS DATA

| HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY | | | | | | | | |
|---|----------|------|------------------|---------------|------|------------------------------|--|--------------|
| SN | MAP CODE | WARD | NUMBER OF EVENTS | HAZARD | YEAR | LOCATION | DAMAGE DETAILS & ITS IMPACT | FLOOD HEIGHT |
| 1 | 1.1 | 1 | 1 | Flood | 2042 | Chaitanyapur | 10 Hectare agricultural land cut off and 5 house hold Displaced | 3 feet |
| 2 | 1.2 | 1 | 1 | Flood | 2064 | Chaitanyapur | 15 House hold displaced, animal was affected and 20-hectare land cut off | 2 feet |
| 3 | 1.3 | 1 | 1 | Flood | 2042 | Bijaura | 30 Household displaced and 15-hectare land cut off | 1 foot |
| 4 | 1.4 | 1 | 1 | Flood | 2070 | Bijaura | 20 Hectare land cut off and 15 house hold displaced | 3 feet |
| 5 | 1.5 | 1 | 1 | Flood | 2042 | Basantapur | 5 Hectares agricultural and were affected | 2 feet |
| 6 | 1.6 | 1 | 1 | Flood | 2064 | Basantapur | 15 Household inundated and 10-hectare agricultural land cut off | 2 feet |
| 7 | 1.7 | 1 | 1 | Flood | 2042 | Manhara Tol | 8 Hectares agricultural land were affected and 90 household inundated | 3 feet |
| 8 | 1.8 | 1 | 1 | Flood | 2042 | Bijayanagar | 15 Household got inundated and 10 Hectares agricultural land were affected | 2 feet |
| 9 | 2.1 | 1 | 1 | Windstorm | 2073 | Chaitanyapur | 20 House /stable roof being blown away | |
| 10 | 2.2 | 1 | 1 | Windstorm | 2076 | Chaitanyapur | 50 House/stable roof being blown away 3 people injured | |
| 11 | 2.3 | 1 | 1 | Windstorm | 2076 | Bijaura | 60 House/stable roof being blown away | |
| 12 | 2.4 | 1 | 1 | Windstorm | 2076 | Basantapur | 150 House/stable roof being blown away | |
| 13 | 2.5 | 1 | 1 | Windstorm | 2076 | Aliyan katan | 120 House/stable roof being blown away | |
| 14 | 3.1 | 1 | 1 | Fire Road | 2072 | Attariya Chok | 10 Shops in the market completely destroyed | |
| 15 | 4.1 | 1 | 1 | Accident Road | 2071 | Dhangadhi Road Mahendranagar | 3 People injured | |
| 16 | 4.2 | 1 | 1 | Accident | 2069 | Highway | 1 People dead | |

| HISTORICAL DISASTER EVENTS AND LOSS DATA IN GODAWARI MUNIIPCALITY | | | | | | | | |
|---|----------|------|-----------------|--------|------|------------------|--|--------------|
| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HEIGHT |
| 1 | 1.1 | 2 | 1 | Flood | 2052 | Radhakrishna Tol | 10 Cow ,2 buffalos were lost | 2 feet |
| 2 | 1.2 | 2 | 1 | Flood | 2060 | Radhakrishna Tol | 5 Goats dead,50 household were affected and 20 household inundated | 3 feet |
| 3 | 1.3 | 2 | 1 | Flood | 2040 | Mahara To | 60 Household affected /food, crops were affected and loss | 3 feet |

HISTORICAL DISASTER EVENTS AND LOSS DATA IN GODAWARI MUNIICPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HEIGHT |
|----|----------|------|-----------------|-------------------|------|------------------|---|--------------|
| 4 | 1.4 | 2 | 1 | Flood | 2074 | Bankhet | 20 Goats were lost | 2.5 feet |
| 5 | 1.5 | 2 | 1 | Flood | 2042 | Gaurishankar Tol | 5 Cowsheds destroyed by flood | 2 feet |
| 6 | 2.1 | 2 | 1 | Thunderstorm | 2076 | Durgalaxmi Tol | Roof of the Durgalaxmi Secondary School was blown away | |
| 7 | 2.2 | 2 | 1 | Thunderstorm | 2076 | Radhakrishna Tol | Losses of the trees of community forest were fell off | |
| 8 | 2.3 | 2 | 1 | Thunderstorm | 2076 | Gaurishankar Tol | Losses of houses were destroyed (around 16) Roof of 6 houses were destroyed /Roof of 1 poultry farm swallowed away | |
| 9 | 2.4 | 2 | 1 | Thunderstorm | 2076 | Santi Tol | | |
| 10 | 2.5 | 2 | 1 | Thunderstorm | 2076 | Teghari | Electricity poll fell off | |
| 11 | 2.6 | 2 | 1 | Thunderstorm | 2076 | Ring Road | 5 Houses were destroyed | |
| 12 | 2.7 | 2 | 1 | Thunderstorm | 2076 | Santi tol/Supa | | |
| 13 | 2.8 | 2 | 1 | Thunderstorm | 2076 | Samabesi School | Roof of Supa Samabesi School blown away | |
| 14 | 2.9 | 2 | 1 | Thunderstorm | 2076 | Teghari | 3 Houses completely destroyed | |
| 15 | 2.9 | 2 | 1 | Thunderstorm | 2076 | Shakti Cottage | 4 Cowsheds and 3 house were completely destroyed | |
| 16 | 3.1 | 2 | 1 | Fire | 2072 | Radhakrishna Tol | Shop was hilly damaged and shoppers was injured badly | |
| 17 | 3.2 | 2 | 1 | Fire | 2075 | Gererani Tol | Fire in poultry farm ,200-300 poultry birds were dead | |
| 18 | 4.1 | 2 | 1 | Livestock Disease | 2053 | Mahara To | 5-6 Goats were dead due to livestock diseases which was hot known | |
| 19 | 4.2 | 2 | 1 | Livestock Disease | 2076 | Bhupu Sainik Tol | 4 Goats were dead due to unkhown disease | |
| 20 | 4.3 | 2 | 1 | Livestock Disease | 2076 | Gererani Tol | 15-20 Goats were dead due to the symptoms like running nose, stomach swelling and later on paralysis | |
| 21 | 4.4 | 2 | 1 | Livestock Disease | 2076 | Teghari Katan | 15 Goats and 5 buffalos dead | |
| 22 | 5.1 | 2 | 1 | Road Accident | 2077 | Khanepani Tol | 1 Girl dead at khanepani tol in road accident (car accident) | |
| 23 | 5.2 | 2 | 1 | Road Accident | 2076 | Radhakrishna Tol | Bike accident, 2 people injured | |
| 24 | 6.1 | 2 | 1 | Bom Blast | 2065 | Santi Tol | Death of 3 people by bom explosion | |
| 25 | 7.1 | 2 | 1 | Landslide | 2040 | Bhupu Sainik Tol | Cultivable land cut off | |
| 26 | 7.2 | 2 | 1 | Landslide | 2076 | Gererani Tol | 7 kattas of cultivable land cutt of | |
| 27 | 7.3 | 2 | 1 | Landslide | 2074 | Teghari | 5 Cowsheds ,20 livestock were dead, lots of plants were destroyed | |

HISTORICAL DISASTER EVENTS AND LOSS DATA IN GODAWARI MUNIICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HEIGHT |
|----|----------|------|-----------------|-----------------|------|-----------------------------|-------------------------------|--------------|
| 27 | 8 | 2 | 1 | Corona Pandemic | 2076 | All Community of Ward no. 2 | 7 People dead , many infected | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD FIGHT |
|----|----------|------|-----------------|------------------|------|-----------------------------------|--|-------------|
| 1 | 1.1 | 3 | 1 | Floods | 2068 | Dachin Tol | 2 people dead ,40 hectare cultivable and flooded | 2 feet |
| 2 | 1.2 | 3 | 1 | Floods | 2068 | Shanti Tol | 200 household flooded, 20-hectare cultivable land cut | 3 feet |
| 3 | 1.3 | 3 | 1 | Floods | 2065 | Khamaura | 10 hectares cultivable and cut off 150 houses flooded and damage | 3 feet |
| 4 | 1.4 | 3 | 1 | Floods | 2063 | Malika Tol | 10-hectare agricultural land cut off | 1 foot |
| 5 | 2.1 | 3 | 1 | Windstorm | 2076 | Dachin Tol | 100 house roofs blown away community forest falling of tree | |
| 6 | 2.2 | 3 | 1 | Windstorm | 2076 | Khamaura | 70 house roofs blown away; roof of school blown away | |
| 7 | 2.3 | 3 | 1 | Windstorm | 2070 | Bojiya Tol | 50 house roofs blown away; roof of school blown away | |
| 8 | 2.4 | 3 | 1 | Windstorm | 2046 | Muktinagar Tol | 30 house roofs being blown away falling of tree in community forest | |
| 9 | 3.1 | 3 | 1 | Forest Fire | 2070 | Chaukidada Women community Forest | 2 days continuous forest fire in Chaukidada women community forest | |
| 10 | 3.2 | 3 | 2 | Forest Fire Road | 2070 | Chaukidada Women community Forest | Chaukidada women community forest fire | |
| 11 | 4.1 | 3 | 1 | Accident Road | 2069 | Mahendranagar Highway | 1 people Dead | |
| 12 | 4.2 | 3 | 1 | Accident Road | 2075 | Mahendranagar Highway | 2 people injured | |
| 13 | 5.1 | 3 | 1 | Epidemic | 2058 | Krishna Mandir Tol | 30 people due to diarrrhea | |
| 14 | 5.2 | 3 | 1 | Epidemic | 2072 | Dachin Tol | 15 people due to diarrrhea | |
| 15 | 6.1 | 3 | 1 | Hot Wave | 2072 | Malakheti | Human health affected by skin diseases and other viral diseases; small plants dried of in the community forest | |
| 16 | 7.1 | 3 | 1 | Drought | 2072 | Krishna Mandir Tol | Human health affected by respiratory food and vegetable production affected, water of nalka dried up, hard lifestyel due to extreme heat | |
| 17 | 8.1 | 3 | 1 | Pest Attack | 2058 | Kankauwa | Increase in the spread of diseases in food and crops production | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD FIGHT |
|----|----------|------|-----------------|-----------|------|-----------|---|-------------|
| 18 | 9.1 | 3 | 1 | Cold Wave | 2072 | Gairi Tol | Increase in diseases in human being specially the respiratory disease, production decrement of cash crops and food grains | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HEIGHT |
|----|----------|------|-----------------|-------------|------|--------------------------------|---|--------------|
| 1 | 1.1 | 4 | 1 | Flood | 2048 | Pragatishil Tol, Kopila Tol | 40 Household being affected and lost due to the flood. 20 hectares agricultural land cut off | 5ft |
| 2 | 1.2 | 4 | 1 | Flood | 2058 | Saraswoti Tol, Pragatishil Tol | 15 Hectors agricultural land cut off 30 household flooded and 35 lost | 3ft |
| 3 | 1.3 | 4 | 1 | Flood | 2068 | Pragatishil Tol, Kopila Tol | 30 hectors cultivable land cut off ,45 household displaced, strong food grains, utensils, clothes and livestock damaged | 4ft |
| 4 | 1.4 | 4 | 1 | Flood | 2046 | Saraswoti Tol, | 4/5 Bigha agricultural land cut off | 3ft |
| 5 | 1.5 | 4 | 1 | Flood | 2046 | Saraswoti Tol | 10 Bigha agricultural land cut off | 2ft |
| 6 | 1.6 | 4 | 1 | Flood | 2064 | Shanti Tol | 15/20 Bigha agricultural land cut off | 4ft |
| 7 | 1.7 | 4 | 1 | Flood | 2056 | Belpani | 3 Household flooded and shed got damaged | 2ft |
| 8 | 1.8 | 4 | 1 | Flood | 2048 | Ratapani Khola | Forest land cut off | 4ft |
| 9 | 1.9 | 4 | 1 | Flood | 2058 | Bairiya Khola | 3 Bigha agricultural land cut off and forest land cut off | 3ft |
| 10 | 1.11 | 4 | 1 | Flood | 2046 | Chunepani | 10 Ropani agricultural land cut off | 4ft |
| 11 | 1.12 | 4 | 1 | Flood | 2076 | Hatkholi | 2/4 bigha land cut off and 10 houses hold inundation | 3ft |
| 12 | 1.13 | 4 | 1 | Flood | 2056 | Hatkholi | 10 Bigha agricultural land cut off | 5ft |
| 13 | 1.14 | 4 | 1 | Flood | 2046 | Godawari Phulbasti | Forest land cut off and agricultural land cut off | 3ft |
| 14 | 2.1 | 4 | 1 | Flash Flood | 2053 | Kutengada | 20/30 Ropani agricultural land cut off | |
| 15 | 2.2 | 4 | 1 | Flash Flood | 2073 | Dogad | Forest land cut off and 10 houses damaged and 3 sheds | |
| 16 | 2.3 | 4 | 1 | Flash Flood | 2075 | Tallo Dogad | 10 Ropali Agricultural land cut off | |
| 17 | 2.4 | 4 | 1 | Flash Flood | 2061 | Dogad | Agricultural land cut off and 3 houses damaged | |
| 18 | 2.5 | 4 | 1 | Flash Flood | 2076 | Budhi Tola | 5 houses damaged and 20 Ropani agricultural land cut off | |
| 19 | 2.6 | 4 | 1 | Flash Flood | 2056 | Dubki | 15/20 Ropani agricultural land cut off | |
| 20 | 2.7 | 4 | 1 | Flash Flood | 2061 | Jukepani | Forest and agricultural land cut off | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HEIGHT |
|----|----------|------|-----------------|-------------|------|---------------------------|--|--------------|
| 21 | 2.8 | 4 | 1 | Flash Flood | 2042 | Jukepani | 5/7 Ropani agricultural land cut off | |
| 22 | 2.9 | 4 | 1 | Flash Flood | 2042 | Neta katan, Bandagada | 10/15 Bigha agricultural land cut off and many house damaged | |
| 23 | 2.11 | 4 | 1 | Flash Flood | 2074 | Bandagada | 20 Bigha agricultural land cut off | |
| 24 | 2.12 | 4 | 1 | Flash Flood | 2068 | Bhyagute | 30 Roapni agricultural land cut off and crops got damaged | |
| 25 | 2.13 | 4 | 1 | Flash Flood | 2061 | Bandagada | 8/10 Bigha agricultural land cut off | |
| 26 | 3.1 | 4 | 1 | Windstorm | 2076 | Shanti Tol | 10/15 household roof being blown away | |
| 27 | 3.2 | 4 | 1 | Windstorm | 2076 | SantosTol | 5/8 household were damaged due to strong wind | |
| 28 | 3.3 | 4 | 1 | Windstorm | 2076 | Khairana Saraswoti Tol | 10 house hold and school roof being blown away and their crops and food material got damaged | |
| 29 | 3.4 | 4 | 1 | Windstorm | 2055 | Bandagada | 4 house hold were damaged | |
| 30 | 3.5 | 4 | 1 | Windstorm | 2074 | Baspani | 4Shed got damaged and 5 goats died | |
| 31 | 3.6 | 4 | 1 | Windstorm | 2076 | Baspani | 10 houses were damaged and 2 cow died | |
| 32 | 3.7 | 4 | 1 | Windstorm | 2042 | Baspani | 5/7 house hold were damaged and 1 person died due to strong wind | |
| 33 | 3.8 | 4 | 1 | Windstorm | 2076 | Dhadkuwa | 15 house hold were damaged due to strong wind | |
| 34 | 3.9 | 4 | 1 | Windstorm | 2072 | Dhadkuwa | 6/10 household were damaged | |
| 35 | 3.11 | 4 | 1 | Windstorm | 2076 | Godawari | 20 household were damaged and their crops got loss | |
| 36 | 3.12 | 4 | 1 | Windstorm | 2073 | Hatkholi Kuntegada, | 5/10 hose hold roof being blown away and damaged | |
| 37 | 3.13 | 4 | 1 | Windstorm | 2056 | Hilekhali | 8 house hold were damaged | |
| 38 | 3.14 | 4 | 1 | Windstorm | 2073 | Tallo Dogad | 5 house hold were damaged due to strong wind | |
| 39 | 3.15 | 4 | 1 | Windstorm | 2068 | Takade | 2 houses roof being blown away 17 house hold were destroyed due to strong wind and there crops ,food got loss | |
| 40 | 3.16 | 4 | 1 | Windstorm | 2076 | Kainpani | | |
| 41 | 3.17 | 4 | 1 | Windstorm | 2042 | Jukepani | 10 house hold were destroyed | |
| 42 | 3.18 | 4 | 1 | Windstorm | 2073 | Bairiya Khola Road | 6/7 house hold were destroyed | |
| 43 | 5.1 | 4 | 1 | Accident | 2076 | Basantapur Bazaar Road | 1 person died | |
| 44 | 5.2 | 4 | 1 | Accident | 2047 | Godawari | 35 people died due to bus accident | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HIGHT |
|----|----------|------|-----------------|---------------------|------|-------------------------------------|--|-------------|
| 1 | 1 | 5 | 1 | Windstorm Structure | 2072 | Barbatta | 1 Person Died | |
| 2 | 2 | 5 | 1 | collapse Thunder | 2072 | Barbatta, Geta, Manhara Tol | 100 Household roofs being blown away | |
| 3 | 3.1 | 5 | 1 | lightning Thunder | 2073 | Geta | A man died while working in field | |
| 4 | 3.2 | 5 | 1 | lightning | 2077 | Geti | 2 People household Damaged | |
| 5 | 4.1 | 5 | 1 | Epidemic | 2078 | Geta Gau | 45-year-old Nabraj Rana died due to corona virus | |
| 6 | 4.2 | 5 | 1 | Epidemic | 2078 | Geta Bazaar | 39-year-old Min Bahadur Tamang Died due to corona Virus | |
| 7 | 4.3 | 5 | 1 | Epidemic | 2078 | Machhapalan Tol | 62-year-old Dipa Bhatta died due to corona virus | |
| 8 | 4.4 | 5 | 1 | Epidemic | 2078 | Eye Hospital | 66-year Buddhiram Chaudhary died due to corona virus | |
| 9 | 5 | 5 | 1 | Marshy/Wetlands | 2077 | Geti | 1 Person Died | |
| 10 | 6.1 | 5 | 1 | River bank | 2070 | Geta | 5 to 6 Bigha agricultural land cut off | |
| 11 | 6.2 | 5 | 1 | River bank | 2070 | Geta | 3 Hectares Sanghari community forest land cut off | |
| 12 | 7.1 | 5 | 1 | Plat inurdation | 2070 | Srilanka Geta | 220 household inundated, foods, crops were affected and got loss | |
| 13 | 7.2 | 5 | 1 | Floods | 2064 | Machhapalan Tol Sanghari Bhim Datta | 5 People dead , 100 household were affected and 80 household inundated | 2 feet |
| 14 | 7.3 | 5 | 1 | Floods Household | 2064 | Community Forest | 15 Hectare community forests land cut off | 2 feet |
| 15 | 8.1 | 5 | 1 | Fire Household | 2075 | Khuna Tol | 4 goats died in fire | |
| 16 | 8.2 | 5 | 1 | Fire Household | 2076 | Eye Hospital | 1 Ox died due to fire | |
| 17 | 8.3 | 5 | 1 | Fire Household | 2076 | Geta | 1 house completely destroyed | |
| 18 | 8.4 | 5 | 1 | Fire Household | 2076 | Kattha | A huge loss due to fire in shed | |
| 19 | 8.5 | 5 | 1 | Fire | 2077 | Eye Hospital Market | Due to fire in grocery shop caused huge loss | |
| 20 | 9.1 | 5 | 1 | Road Accident | 2073 | Machhapalan | A person died in Truck accident | |
| 21 | 9.2 | 5 | 1 | Road Accident | 2066 | Geta | A person died in Bike accident | |
| 22 | 9.3 | 5 | 1 | Road Accident | 2077 | Manhara Pul | A person died in Bike accident | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD HIGHT |
|----|----------|------|-----------------|---------------|------|----------|---------------------------------|-------------|
| 23 | 9.4 | 5 | 1 | Road Accident | 2078 | Gta Nala | A youth was found dead in drain | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| S N | MAP CODE | W ARD | NUMBE R OF EVENT | HAZAR D | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT |
|-----|----------|-------|------------------|----------------------|--------------------------------|--------------------------|--|
| 1 | 1.1 | 6 | 1 | Hurrricane/Windstorm | 2060 | Toles of ward no. 6 | The roof of Shaileshwori Secodary School blown away; 8 houses were affected by destroying roof destruction on fruit trees |
| 2 | 1.2 | 6 | 1 | Hurrricane/Windstorm | 2070 | Every toles of ward no.6 | Destroyed 150 roof of houses spread of transmitted disease due to air pollution |
| 3 | 1.3 | 6 | 1 | Hurrricane/Windstorm | 2076 | Every toles of ward no.6 | Destruction of roof of 5 school building due to this problem in teaching and learning in school,500 household roof being blown away, 22poles and electricity were over thrown |
| 4 | 2.5 | 6 | 1 | Thunder Lighting | 2070 | Badeha Gailnadi | 1 girl was died |
| 5 | 3.1 | 6 | 1 | Flood | 2065 | Tole Bhunyaaura Balayar | Death of one person sinking in the Khairana Khola (river) |
| 6 | 3.2 | 6 | 1 | Flood | 2075 | Tole/Lalpur Ramjaanaki | 1 Bigha land cut off/2 bigha land cut off |
| 7 | 3.3 | 6 | 1 | Flood | 2070 | Tol | 7 household affected by flood inundation, destruction of stocked grains, 10 household were inundation stocked grains destroyed |
| 8 | 4 | 6 | 1 | Cold wave | Continuousl y since 10-15 year | Every toles of ward no.6 | Public health is badly affected due to different diseases caused by cold wave like common cold respiratory related diseases-pneumonia. asthma, Because of fungus production of eatable grains and other agricultural products are decreasing in production |
| 9 | 5 | 6 | 1 | Malariya | 2063 | Kuti Tole | Death of one person, other affected |
| 10 | 6.1 | 6 | 1 | Fire/Hou sehold Fire | 2076 | Bhunyara Tol | Destroying 1 bigha of sugar cane field |
| 11 | 6.2 | 6 | 1 | Fire/Hou sehold Fire | 2076 | Badeha Tole | Destroying of 5 bigha of sugar cane field ,300 plants destroying in Fire |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| S | MAP | W | NUMBE | HAZAR | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACT |
|---|-----|----|-------|----------------------------|------|--------------------|--|
| N | CO | AR | R OF | D | | | |
| | DE | D | EVENT | | | | |
| 1 | | | | Fire/Hou | | Ramjaanaki | |
| 2 | 6.3 | 6 | 1 | sehold Fire | 2077 | Tol | 1 house destroyed ,1 stall (gotha)and 4 Goats died in fire |
| 3 | 6.4 | 6 | 1 | Fire/Hou | 2077 | Lalpur Chauraha | 2 years child was died in fire |
| 4 | 7.1 | 6 | 1 | sehold Road Accident | 2068 | Gail River | 1 Young person died in car accident |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| S | MAP | WAR | NUMBER OF | HAZARD | YEA | LOCATION | DAMAGE DETAILS AND ITS IMPACT | FLOOD |
|----|------|-----|-----------|--------|----------|-----------------------|--|--------|
| N | CODE | D | EVENT | | R | | | HEIGHT |
| 1 | | 1 | 7 | 1 | 207 5 | Jamunabadhi | Few houses got damaged because of calling down the electric pole on these houses. | |
| 2 | 2.1 | | 7 | 1 | 207 2 | Magartole | The roads were destroyed and drowning at the local area | 3 ft |
| 3 | 2.2 | | | | 207 3 | Khaereni Katan | The road had been destroyed and damage. | 3 ft |
| 4 | 3.1 | | 7 | 1 | 207 4 | School Tole Tekula | Paddy and vegetable farm were demolished owing to the flash flood | |
| 5 | 3.1 | | 7 | 1 | 207 5 | Khaireni Katan | Soil fertility declined and loses in crop production. | |
| 6 | 4.1 | | 7 | 1 | 207 1 | School Tole Tekula | Fifty house hold had trouble on irrigation and drinking water because of draught. | |
| 7 | 4.2 | | 7 | 1 | 207 1 | Mgartole | Due to the drought, there is huge decrement in vegetable production. | |
| 8 | 4.3 | | 7 | 1 | 207 1 | Khaereni Katan | Scarcity of drinking water & problem in irrigation. | |
| 9 | 5.1 | | 7 | 1 | 207 7 | Khaereni Katan | Forest fire at laxmi community forest causes a vast lost in the wood, timber and fodder product. | |
| 10 | 5.2 | | 7 | 1 | 207 7 | Haraiya | Half of the jungle was destroyed. | |
| 11 | 6.1 | | 7 | 1 | 207 5 | Khaireni Katan | Almost all of the house materials were destroyed | |

| | | | | | | | |
|----|-----|---|---|---------------------|----------|-------------------------|---|
| 12 | 6.2 | 7 | I | House Fire | 207 5 | Tekula | Pets and cattle were died. |
| 13 | 7.1 | 7 | I | Animal Attack | 207 5 | Khaireni Tole | Wild dog killed goats and other cattle |
| 14 | 7.2 | 7 | I | Animal Attack | 207 6 | Tekula | Goats of two household were killed by wild dog. |
| 15 | 7.3 | 7 | I | Animal Attack | 207 7 | Santi Tole | Wild dog and fox attacked the local residence. |
| 16 | 8.1 | 7 | I | Hail Storm | 207 6 | Haraiya | Partial damage in paddy farm and complete damage in vegetable farm. Vegetable farm land of thirty household got completely damaged owing to hail storm |
| 17 | 8.2 | 7 | I | Hail Storm | 207 6 | Khairenikatan | |
| 18 | 8.3 | 7 | I | Hail Storm | 207 6 | Kadigaun | Complete Damage of Crops Due to Hail Storm. |
| 19 | 8.4 | 7 | I | Hail Storm | 207 6 | Gaudi And Magar Tole | Crops of about hundred household was demolished owing to the hail storm |
| 20 | 9 | 7 | I | Pandemic Thunder | 207 7 | All Ward | Thirty-three people were got infected by covid-19 and one died. |
| 21 | 10 | 7 | I | Lightening | 207 1 | Gudipalchautara | Mr. Deepak saud was died due to thunder lightening |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| S N | MAP CODE | WARD NO | NO OF EVENT | HAZARD | YEA R | LOCATION | DAMAGE DETAIL ITS IMPACT | FLOOD HIGHT |
|--------|-------------|------------|----------------|---------------|----------|-------------------|--|----------------|
| 1 | 1.1 | 8 | 8 | I Floods | 2070 | Syaulebajar | houses were damage by high flood | 3 feet |
| 2 | 2.1 | 8 | 8 | I Hurricane | 2075 | Syaulebazar | sixty houses were damaged by hurricane | |
| 3 | 2.2 | 8 | 8 | I Hurricane | 2075 | Majgau | forty houses were damaged bu hurricane | |
| 4 | 2.3 | 8 | 8 | I Hurricane | 2075 | Uttarpurwa | fifty houses were damaged by hurricane | |
| 5 | 2.4 | 8 | 8 | I Hurricane | 2075 | Ionapur | seventy houses were damage by hurricane | |
| 6 | 2.5 | 8 | 8 | I Hurricane | 2075 | Shripur Majgau | thirty five houses were damage by hurricane | |
| 7 | 2.6 | 8 | 8 | I Hurricane | 2075 | Katan | twenty houses were damage by hurricane | |
| 8 | 3.1 | 8 | 8 | I Fire | 2071 | Majgau Majgau | a fire broke out in man's house and damaged his belongings | |
| 9 | 3.2 | 8 | 8 | I Fire | 2074 | Katan | a fire broke out in man's house and damaged his belongings the fire in the forest for a day had damaged the new plants and animals | |
| 10 | 3.3 | 8 | 8 | I Forest Fire | 2072 | Syaulebajar | | 13 feet |

| | | | | | | | |
|----|-----|---|---|---------------|------|--------------|------------------|
| 11 | 4.1 | 8 | I | Road Accident | 2073 | Syaulebajar | 1 people dead |
| 12 | 4.2 | 8 | I | Road Accident | 2075 | Majgau Katan | 3 people injured |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP NO. | EVENT | WARD | HAZARDS | YEAR | LOCATION | DAMAGEDDETAIL AND ITS IMPACT | FLOOD HIGHT |
|----|---------|-------|------|--------------------|------|------------------------------|--|-------------|
| 1 | 1.1 | I | 9 | Floods | 2040 | Dhanchauri | 2 House Damage and Grain | 2 Feet |
| 2 | | | 9 | | 2075 | Dhanchauri Sibir | 5 House Completely Damage and 2 Kid Dead | 3 Feet |
| 3 | | | 9 | | 2074 | Dhanchauri Sibir | 4 House Partial damage | 2 Feet |
| 4 | 1.2 | I | 9 | Windstorm | 2076 | Dhanchauri Tole and Siber | 60 House Root Broken Down And 5 People Dead | |
| 5 | | | 9 | | 2075 | Dhanchauri Tole and Siber | 10 House Root Broken Down | |
| 6 | 1.3 | I | 9 | Forest Fire | 2077 | Dhanchauri Forest | Totally Damage | |
| 7 | 1.4 | I | 9 | Road Accident | 2077 | Dhanchauri Toal | 1 Children Dead | |
| 8 | 1.5 | I | 9 | River Bank Erosion | 2064 | Dhanchauri Sibir to Murkatti | Some Cultureble Land Cut | |
| 9 | 2.1 | I | 9 | Floods | 2060 | Murkatti Tol | 3 House damage and grain pots and other material | 2 Feet |
| 10 | | | 9 | | 2073 | Murkatti Tol | Some Houses inundation grain destroyed | 2 Feet |
| 11 | 2.2 | I | 9 | Windstorm | 2075 | Murkatti Tol | 25 House broken down, 2 house collapse tree Fail | |
| 12 | 2.3 | I | 9 | Epidemic | 2077 | murkatti | 4 people died | |
| 13 | | | 9 | Pandemic | 2078 | Sehari Tol | Due to covid -19 | |
| 14 | 3.1 | I | 9 | Windstorm | 2075 | Arjun Tol | 50 house roots broken down | |
| 15 | 3.2 | I | 9 | River Bank Erosion | 2064 | Arjun Tol | some land cut off, 5 house displaced | |
| 16 | | | 9 | | 2070 | Arjun Tol | culturable land cut off every year by Rora river | |
| | 4.1 | I | 9 | Windstorm | 2075 | Sehari tol | some houses inundation and grain destroy | |
| | 4.2 | I | 9 | River Bank Erosion | 2065 | Sehari Tol | every year river Site Land cut off | |
| | 4.3 | I | 9 | Forest Fire | 2074 | Sehari Tol | Animal and trees dead | |
| | 4.4 | I | 9 | epidemic | 2077 | Sehari Tol | 2 people dead | |
| | | | 9 | Pandemic | 2078 | Sehari Tol | Due to covid -19 | |
| | 5.1 | I | 9 | Windstorm | 2075 | Balmi | 60-70 houses root broken down | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP NO. | EVENT | WARD | HAZARDS | YEAR | LOCATION | DAMAGEDDETAIL AND ITS IMPACT | FLOOD HIGHT |
|----|---------|-------|------|--------------------|--------|--------------|--|-------------|
| | 5.2 | I | 9 | River Bank Erosion | 064/66 | Balmi | every year river Site Land cut off | |
| | 5.3 | I | 9 | Floods | 060/64 | Balmi | 23 houses completely damage I kid dead | 2 Feet |
| | 6.1 | I | 9 | Forest Fire | 2074 | Tamauli Tola | | |
| | 6.2 | I | 9 | Windstorm | 2075 | Tamauli Tola | 50 house roots broken down | |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| SN | MAP CODE | WARD | NUMBER OF EVENT | HAZARD | YEAR | LOCATION | DAMAGE DETAILS AND ITS IMPACTS | FLOOD HEIGHT |
|----|----------|------|-----------------|-------------|------|----------------------------------|---|--------------|
| 1 | 1.1 | 10 | 1 | Floods | 2069 | Khalla Tol Chyakkala | 100 Hectare land cut, 30 households flooded and farm flooded | 2 feet |
| 2 | 1.2 | 10 | 1 | Floods | 2063 | Khola Gaun Shivarampur | 90 Hectare Agricultural land cutoff ,10 houses lost | 3 feet |
| 3 | 1.3 | 10 | 1 | Floods | 2043 | Tol | 70 Hectare agricultural land cutoff ,30 houses hold being affected and lost | 3 feet |
| 4 | 1.4 | 10 | 1 | Floods | 2043 | Khamaura | 30 Hectare agricultural land cutoff ,20 houses hold being affected and lost | 2 feet |
| 5 | 1.5 | 10 | 1 | Floods | 2063 | Pragati Tol | 60 Hectare agricultural land cutoff | 1 feet |
| 6 | 2.1 | 10 | 1 | Windstorm | 2076 | Damaura | 90 Household affected by roof being School roof blown away | |
| 7 | 2.2 | 10 | 1 | Windstorm | 2076 | Khamaura Shivarampur | 30 House roof blown away and community forest falling of tree | |
| 8 | 2.3 | 10 | 1 | Windstorm | 2072 | Tol Ganteshwor | 80 House hold affected by the roof being blown away, community forest of tree | |
| 9 | 2.4 | 10 | 1 | Windstorm | 2072 | Tol | 20 House hold affected by the roof being blown away, community forest affected due to the falling of tree | |
| 10 | 2.5 | 10 | 1 | Windstorm | 2060 | Sitapur Tol Ganteshwor community | 70 House hold affected due to the roof blow out roof blown away of school | |
| 11 | 3.1 | 10 | 1 | Forest Fire | 2056 | forest Ganteshwor community | Ganteshwor community forest burned | |
| 12 | 3.2 | 10 | 1 | Forest Fire | 2060 | forest Dhayiyasalani Community | Ganteshwor community forest burned | |
| 13 | 3.3 | 10 | 1 | Forest Fire | 2068 | Forest | Dhayiyasalani community forest burned | |

| | | | | | | | |
|----|-----|----|---|---|------|-------------------------------|---|
| 14 | 4.1 | 10 | I | House hold Fire | 2056 | Khamaura | 14 Houses destroyed due to fire |
| 15 | 5.1 | 10 | I | Epidemic Animal Disease and animal terror | 2048 | Bisti Tol | 1 house completely damaged and 8 livestock dead |
| 16 | 6.1 | 10 | I | | 2058 | Belani community forest | Destroying houses and crops in storage, people being injured and dying |
| 17 | 7.1 | 10 | I | Drought | 2072 | Janaki Tol and Sitapur Tol | Human health affected by skin diseases and other viral diseases, small plants dried up in the community forest, water level gone down |
| 18 | 8.1 | 10 | I | Pest Attack | 2058 | Kalika Tol Ghanteshwor | Increase in the spread of diseases in food and crops production |
| 19 | 9.1 | 10 | I | Cold Wave | 2072 | Tol | Increase in Diseases in human being specially the respiratory diseases |

HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

| S. N | MAP CODE | WARD | EVENT | HAZARDS | DATE | LOCATION | DAMAGE DETAIL AND ITS IMPCT | FLOOD HEIGHT |
|------|----------|------|-------|-----------------|------|-------------|-----------------------------|--------------|
| 1 | 1.1 | 11 | I | Wind Storm | 2077 | Bandrekhol | 5 House Hold Destroyed | |
| 2 | 1.2 | 11 | I | Wind Storm | 2077 | Gaudi | 5 House Hold Destroyed | |
| 3 | 1.3 | 11 | I | Wind Storm | 2074 | Bangesal | 3 House Hold Destroyed | |
| 4 | 1.4 | 11 | 2 | Wind Storm | 2074 | Dadabada | 7 House Hold Destroyed | |
| 5 | 1.5 | 11 | I | Wind Storm | 2078 | Bagada | 1 Bulding Destroyed | |
| 6 | 2.1 | 11 | I | Floods | 2075 | Bandrekhol | 2 People Died | 2 feet |
| 7 | 2.2 | 11 | I | Floods | 2067 | Sitapur | 1 People Died | 3 feet |
| 8 | 2.3 | 11 | I | Floods | 2064 | Dadabada | 1 People Died | 3 feet |
| 9 | 2.4 | 11 | I | Floods | 2075 | Bagada | Agriculture loses | 4 feet |
| 10 | 3.1 | 11 | I | Forest Fire | 2078 | Bandrekhal | Forest Destroyed | |
| 11 | 3.2 | 11 | I | House Hold Fire | 2065 | Birendrapur | 2 people died | |
| 12 | 3.3 | 11 | I | House Hold Fire | 2078 | Gaudi | 1 house Destroyed | |
| 13 | 3.4 | 11 | I | House Hold Fire | 2055 | Bangasal | Economically Loses | |
| 14 | 3.5 | 11 | I | House Hold Fire | 2077 | Sitapur | Economically Loses | |
| 15 | 4.1 | 11 | I | Hail Strom | 2076 | Gaudi | Economically Loses | |
| 16 | 4.2 | 11 | I | Hail Strom | 2073 | Sitapur | Economically Loses | |

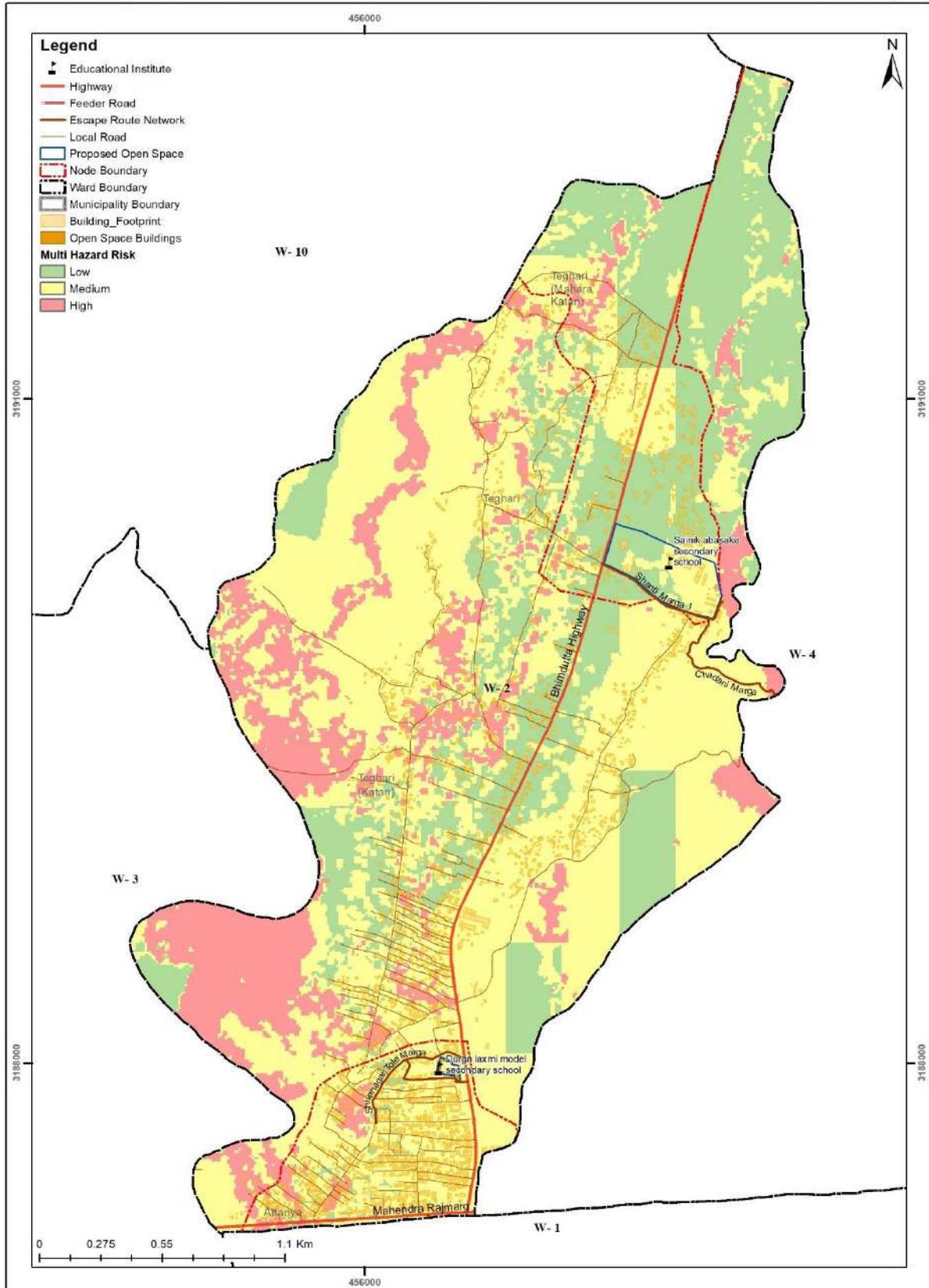
| | | | | | | | |
|----|-----|----|---|------------------|------|------------|----------------------------|
| 17 | 4.3 | 11 | I | Hail Strom | 2040 | Dadabada | I People Died |
| 18 | 5.1 | 11 | I | Road Accidents | 2078 | Bandrekhal | I People Died |
| 19 | 5.2 | 11 | I | Road Accidents | 2076 | Bangesal | I People Died |
| 20 | 5.3 | 11 | I | Road Accidents | 2067 | Dadabada | I People Died |
| 21 | 6.1 | 11 | I | Electrical Shock | 2070 | Bangesal | I people Died |
| 22 | 7.2 | 11 | I | Animal Attack | 2078 | Sitapur | 2 Animal Died |
| 23 | 7.3 | 11 | I | Animal Attack | 2077 | Bagada | I Animal Died |
| 24 | 8.1 | 11 | I | Thunder lighting | 2077 | Dadabada | 2 Animal and I People Died |

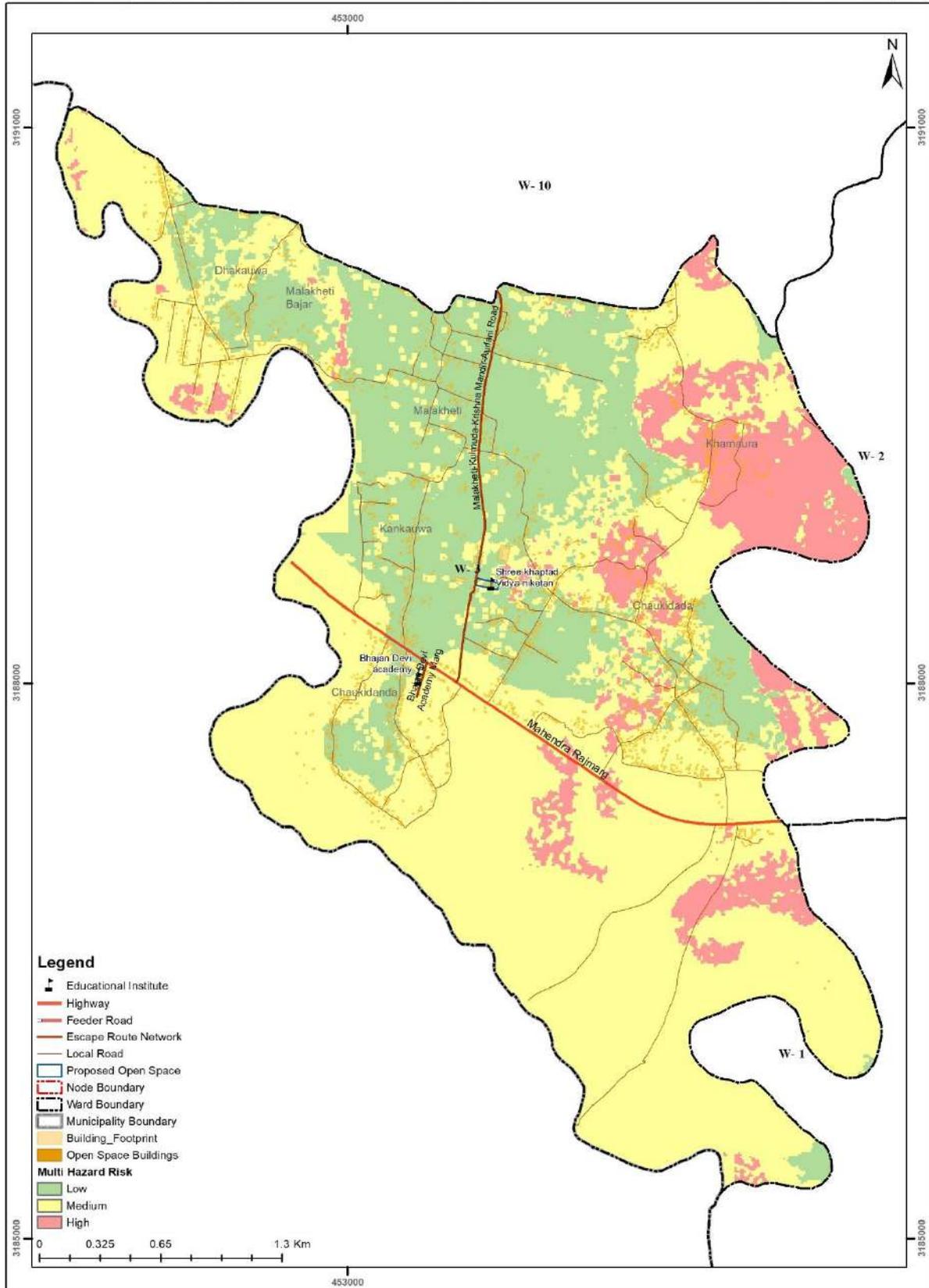
HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

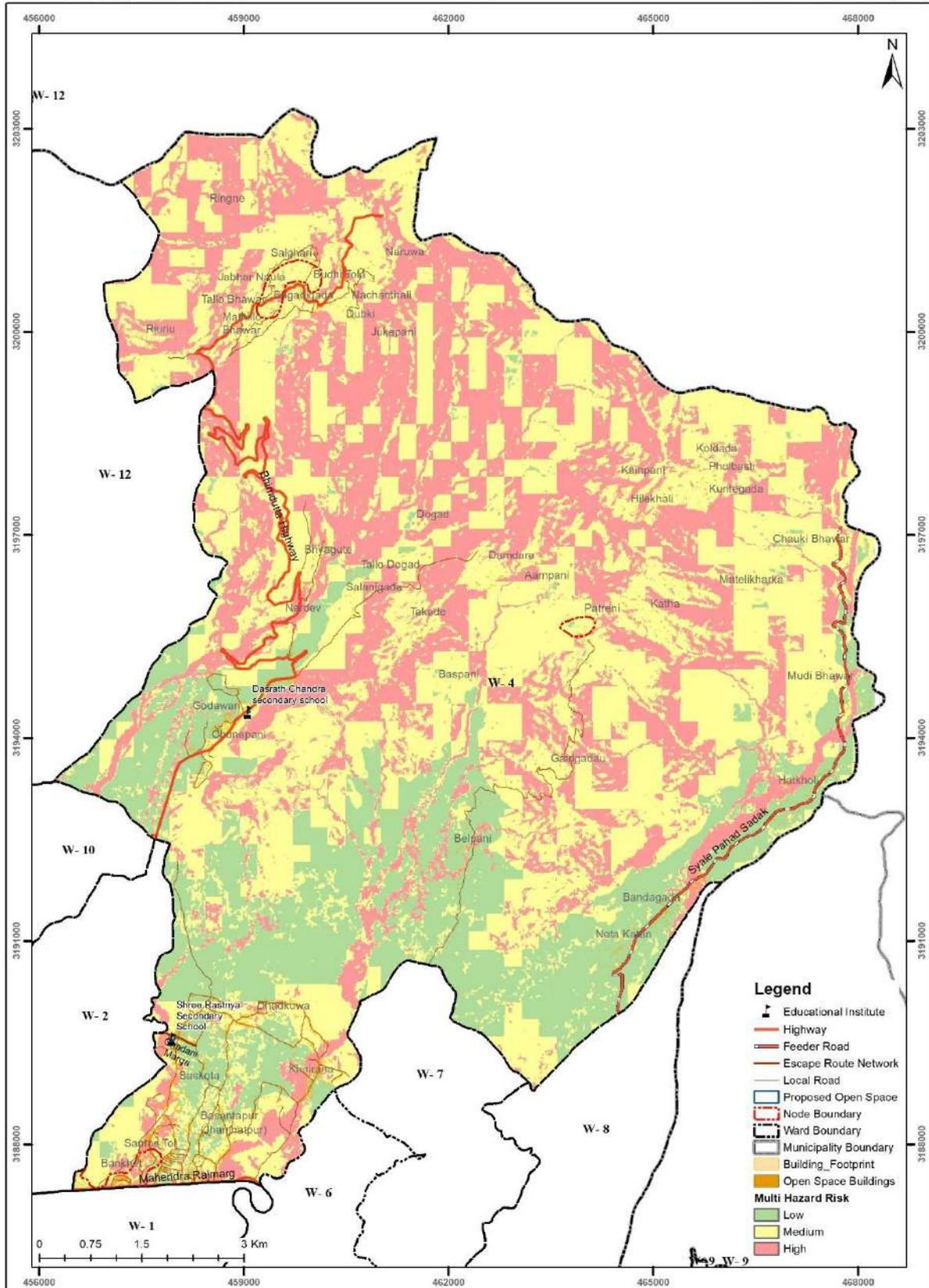
| S.N. | CODE NO. | EVENT | WARD NO. | HAZARDS | DATE | LOCATION | DETAILS OF EVENTS (LOSS OF EVENTS) | FLOOD FEIGHT |
|------|----------|-------|----------|---------------------|------|-----------------------|---|--------------|
| 1 | 1.1 | I | 12 | Flood | 2068 | Patakani | Destroyed the agriculture land | 3 feet |
| 2 | 1.2 | I | 12 | Flood | 2070 | Aadarsha Basti | Destroyed the land and one people died | 3 feet |
| 3 | 1.3 | I | 12 | Flood | 2073 | Godara Tole | one people died and animals died | 3 feet |
| 4 | 2.1 | I | 12 | Wind Storm | 2072 | Sharada Tole | destroyed (Destruct)the house. | |
| 5 | 2.2 | I | 12 | Wind Storm | 2074 | Aadarsha Basti | ruined the house roof | |
| 6 | 3.1 | I | 12 | Wild Animals Attack | 2077 | Kalika Tole | Destroyed the crop and domestic animals were died. | |
| 7 | 3.2 | I | 12 | Wild Animals Attack | 2073 | Godara Tole | Destroyed the crop and insured the people. | |
| 8 | 4.1 | I | 12 | Electronic Shocked | 2078 | Aadarsha Basti | Damaged of the full house and mushroom from was ruined. | |
| 9 | 5.1 | I | 12 | Land Slide | 2077 | Sim | House was damaged | |
| 10 | 5.2 | I | 12 | Land Slide | 2073 | Chaap | People and animals are died | |
| 11 | 6.1 | I | 12 | Road Accident | 2072 | Gaudi | People are injured. | |
| 12 | 6.2 | I | 12 | Road Accident | 2075 | Krishnamandir | People are died. | |
| 13 | 7.1 | I | 12 | Forest Fire | 2070 | Patakani(Forest Area) | Destroyed the forest and wild animals are died. | |
| 14 | 7.2 | I | 12 | Forest Fire | 2076 | Shalli | Destroyed the forest and wild animals are died. | |
| 15 | 5.3 | I | 12 | Land Slide | 2069 | Nayal | Destroyed the house and agriculture land | |
| 16 | 2.3 | I | 12 | Wind Storm | 2075 | Kolmuda | House root was destroyed | |
| 17 | 1.4 | I | 12 | Flood | 2076 | Janaprabhat | People and animals are died. | |

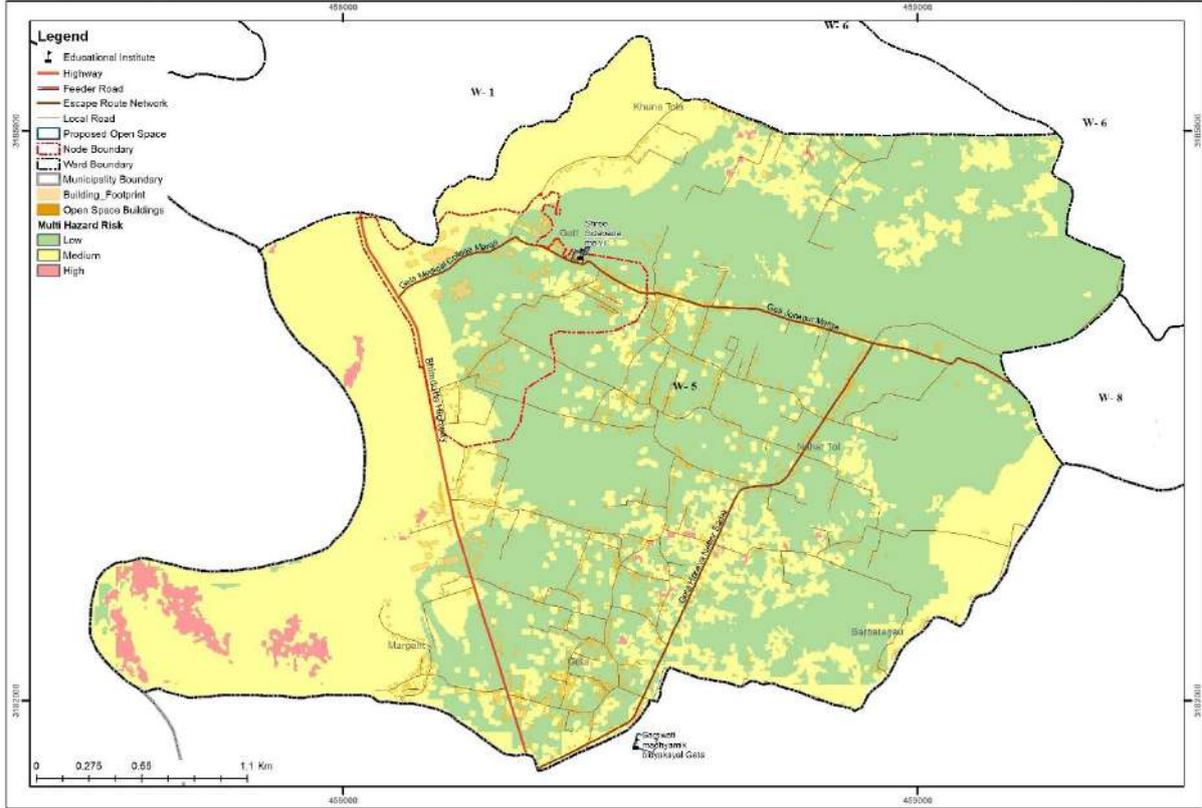
HISTORICAL DIASATER EVENTS AND LOSS DATA IN GODAWARI MUNICIPALITY

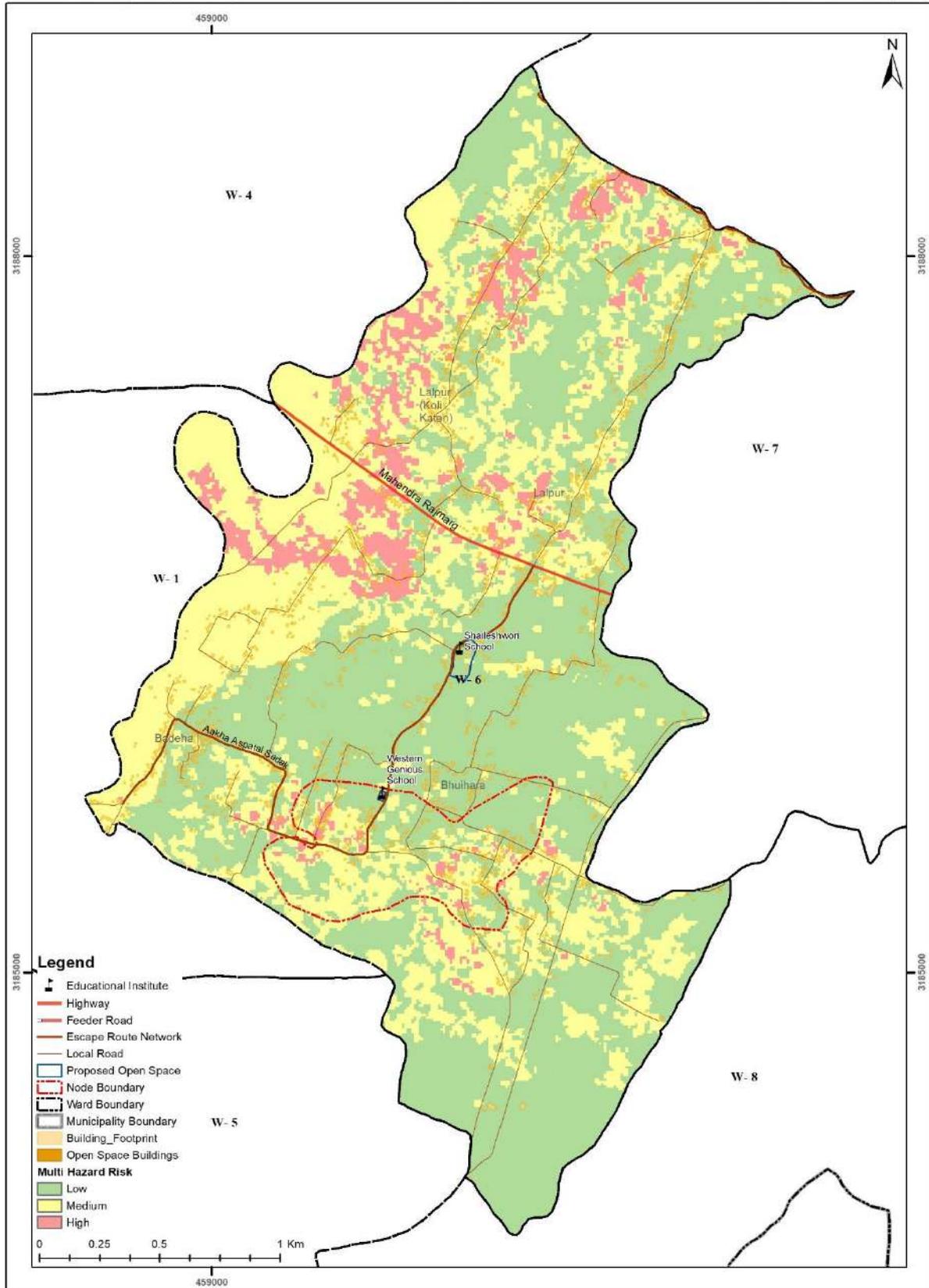
| S.N. | CODE NO. | EVENT | WARD NO. | HAZARDS | DATE | LOCATION | DETAILS OF EVENTS (LOSS OF EVENTS) | FLOOD FEIGHT |
|------|----------|-------|----------|---------------------|------|--------------|---|--------------|
| 18 | 2.4 | I | 12 | Wind Storm | 2070 | Haladay | House was damaged. | |
| 19 | 2.5 | I | 12 | Wind Storm | 2077 | Chauki | Domestic animals house was destroyed and animals were died. | |
| 20 | 4.2 | I | 12 | Electronic Shocked | 2075 | Kolmuda | People were injured. | |
| 21 | 3.3 | I | 12 | Wild Animals Attack | 2070 | Janaprashat | Domestic animals were died | |
| 22 | 1.5 | I | 12 | Flood | 2065 | Kalika Tole | One people died and destroyed the agriculture land | |
| 23 | 4.3 | I | 12 | Electronic Shocked | 2070 | Kalika Tole | People were injured. | |
| 24 | 1.6 | I | 12 | Flood | 2075 | Sharada Tole | Destroyed the agriculture land. | |

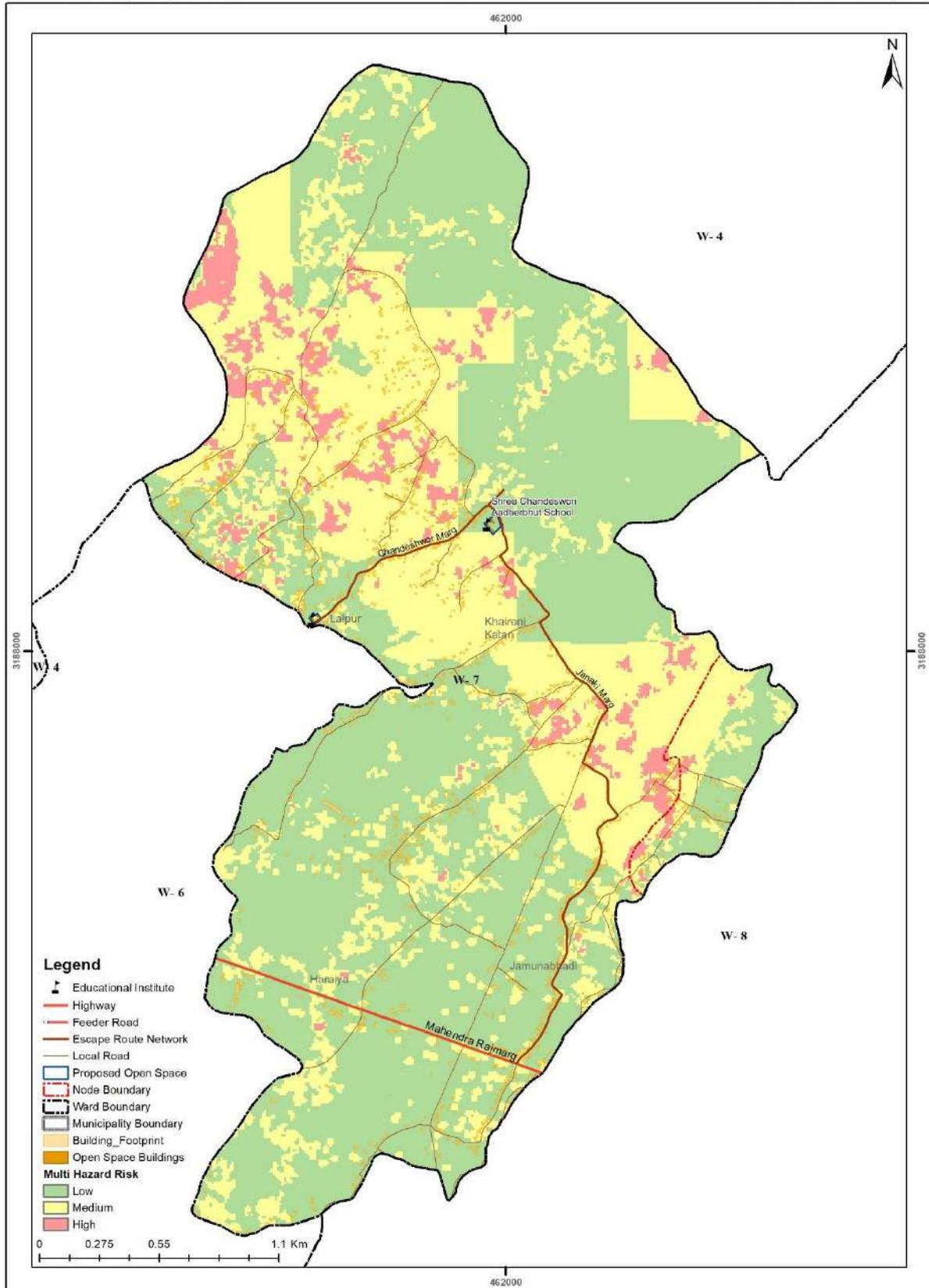


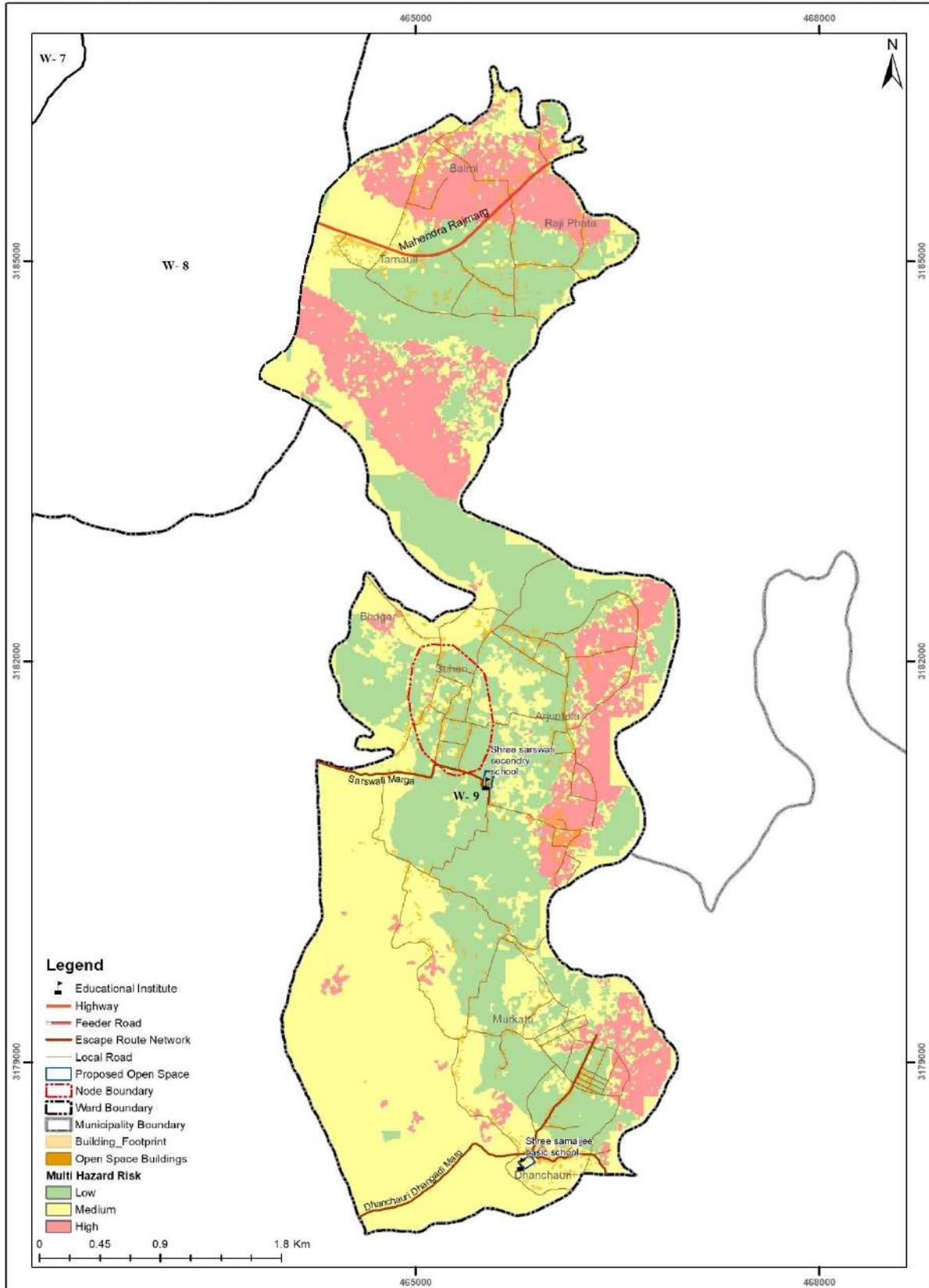


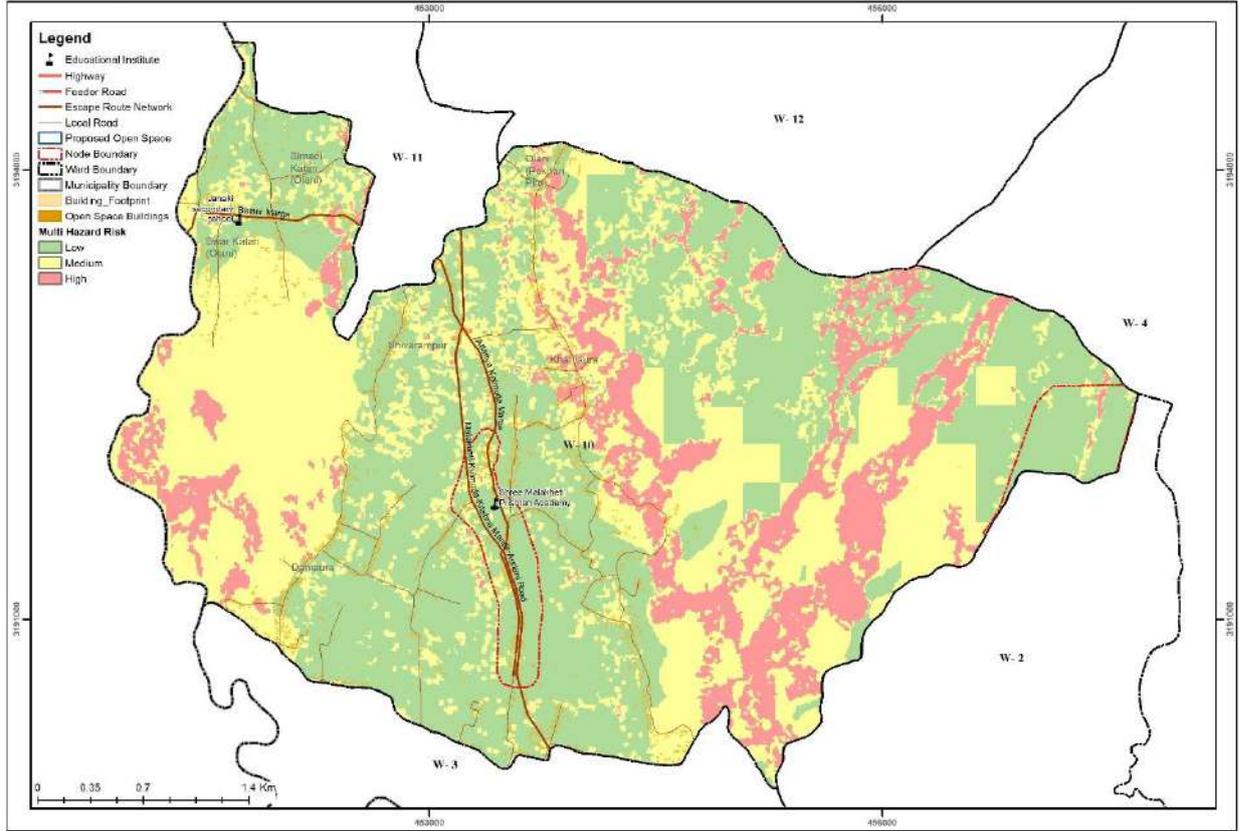


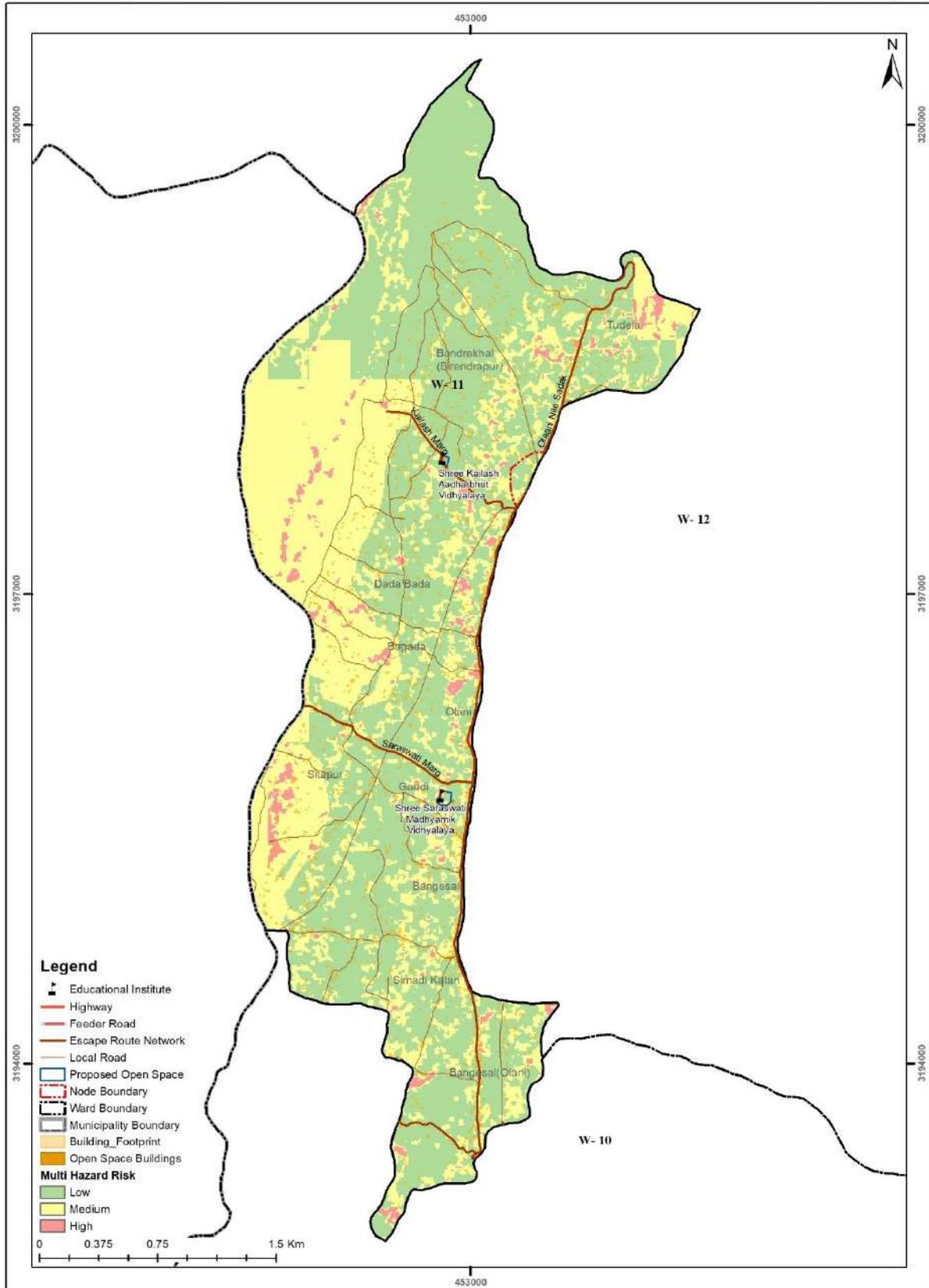


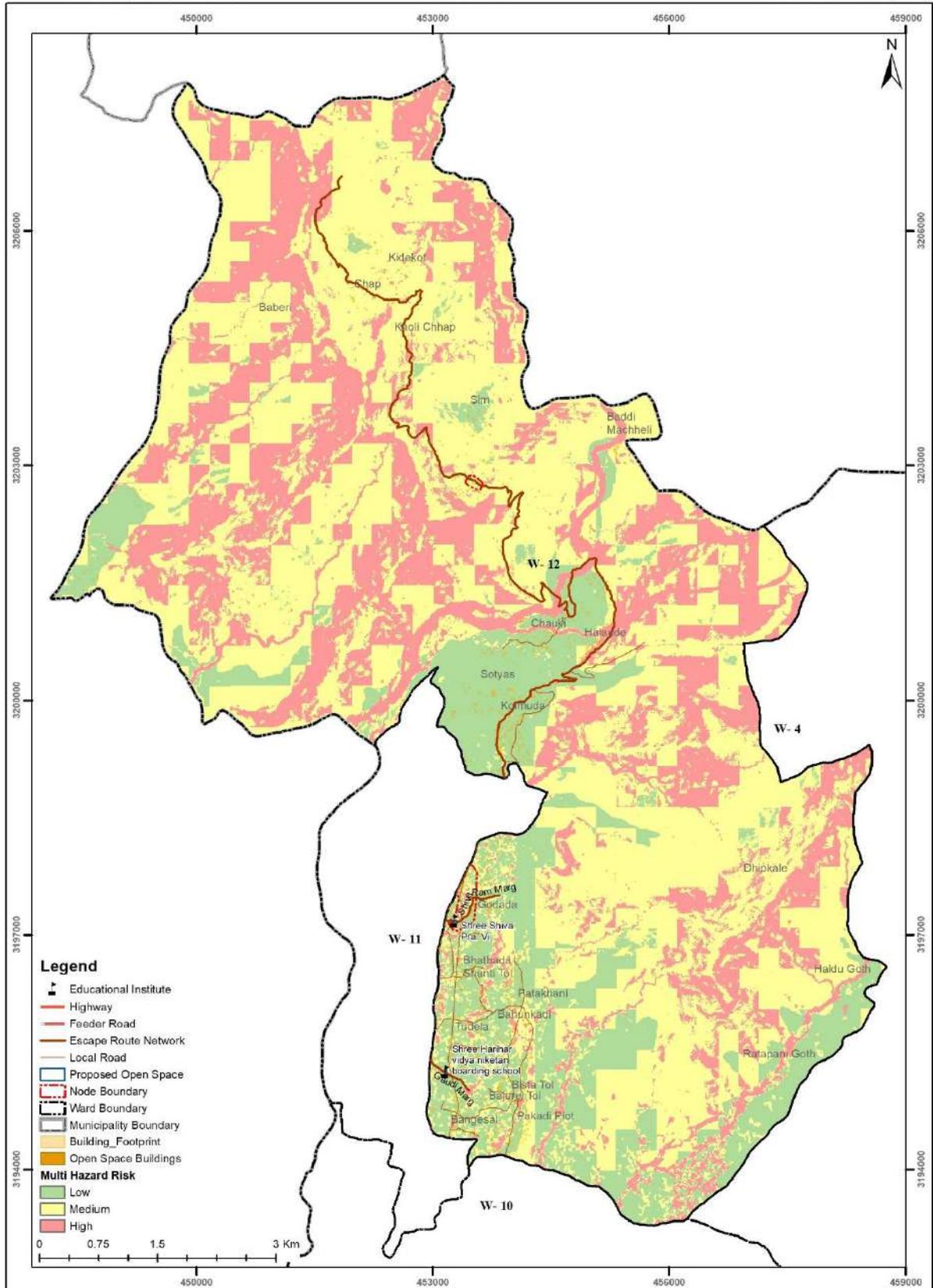




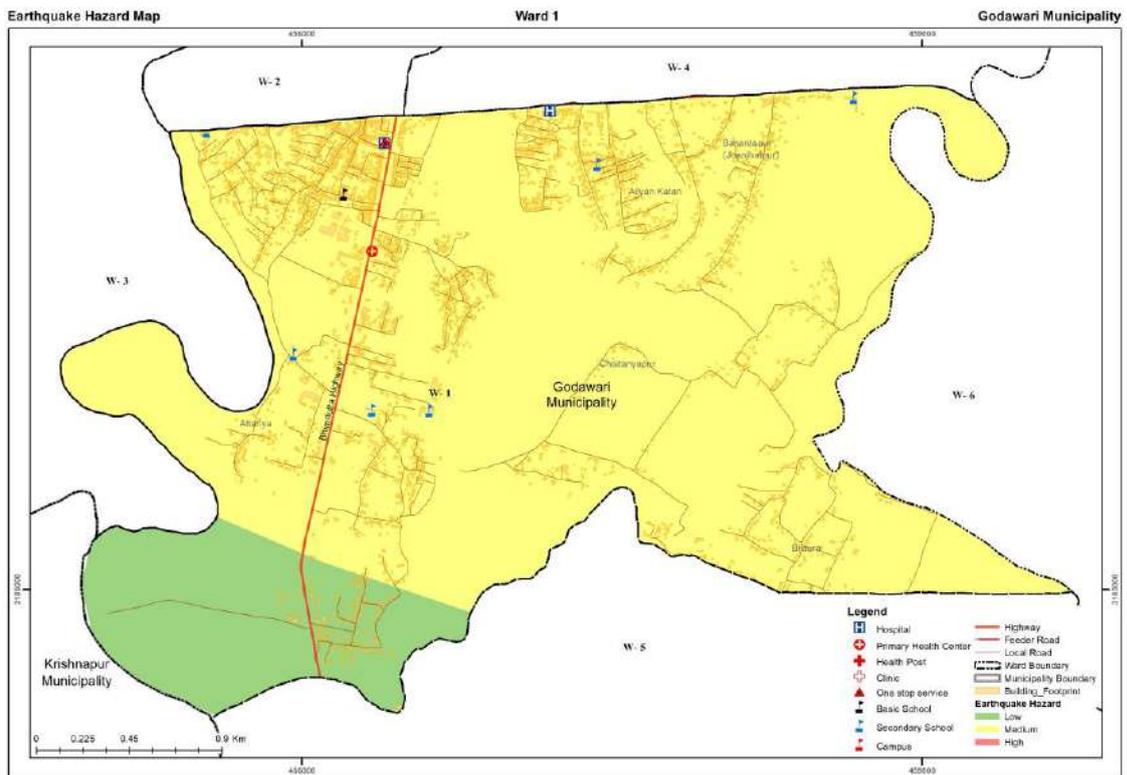
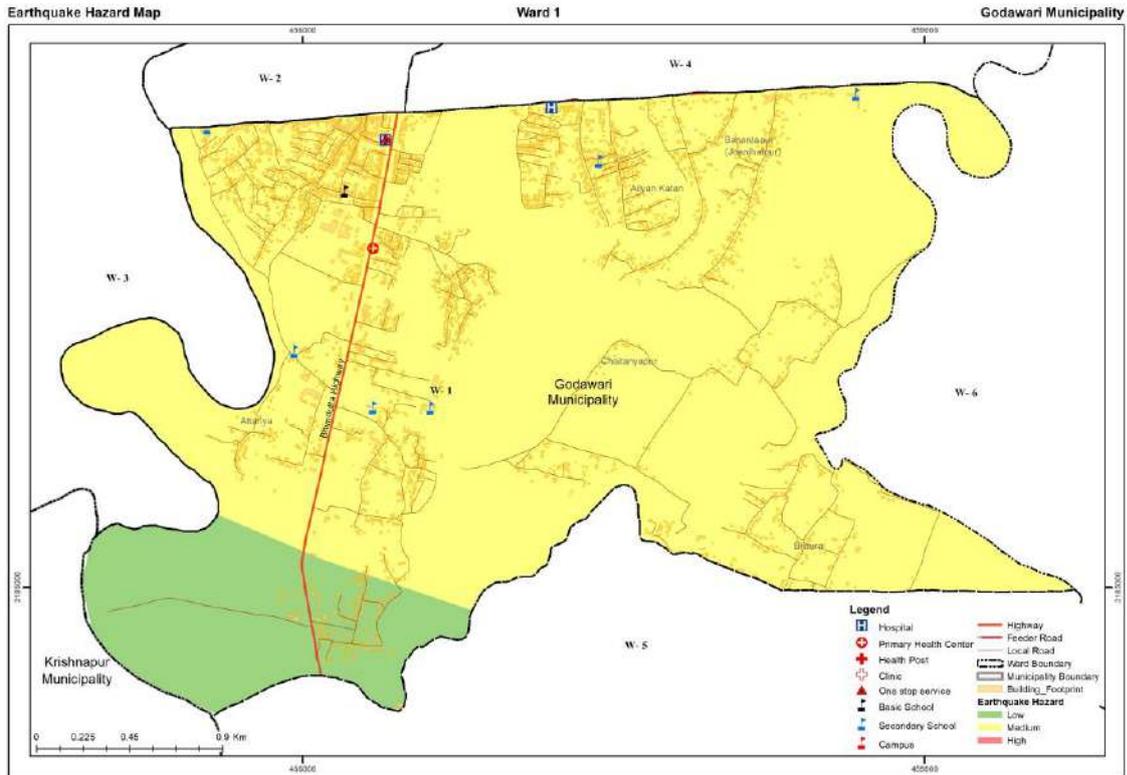


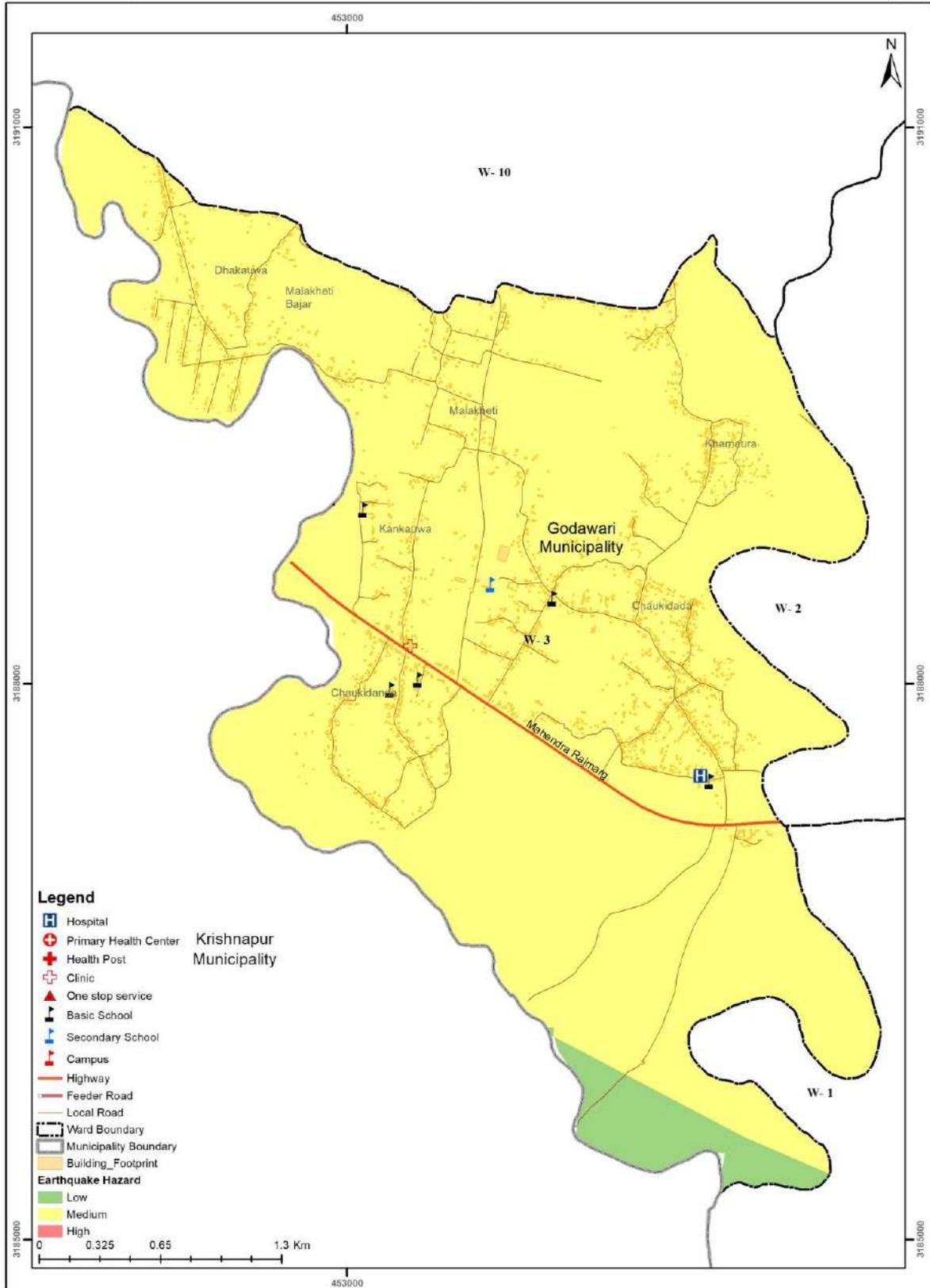


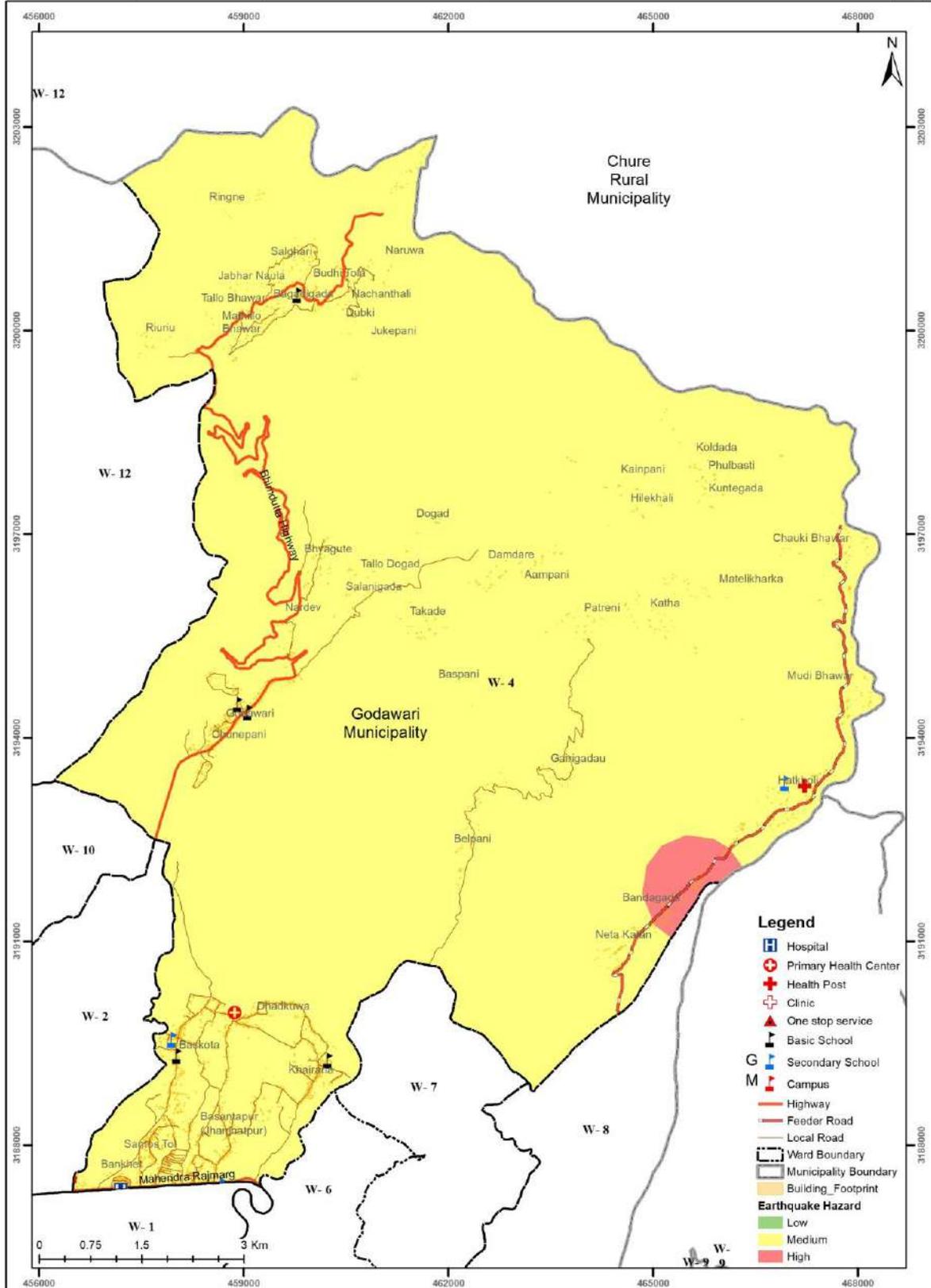


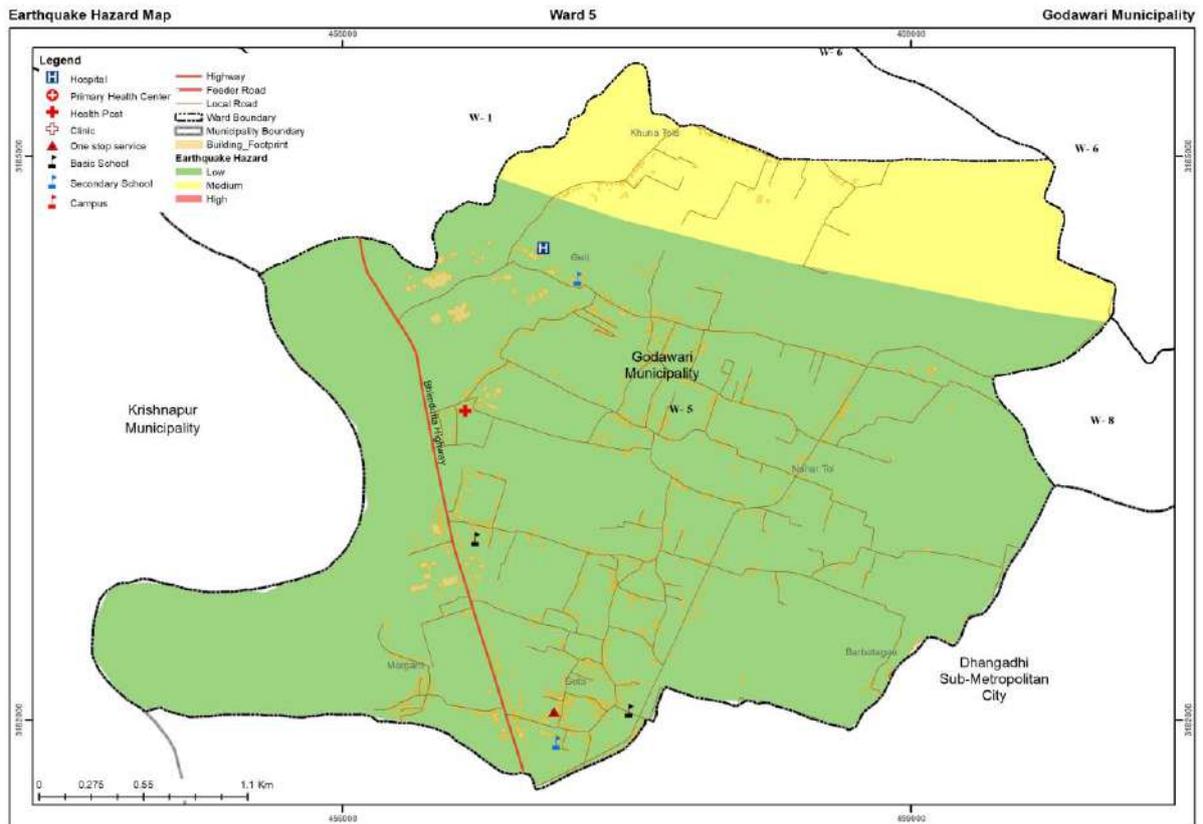


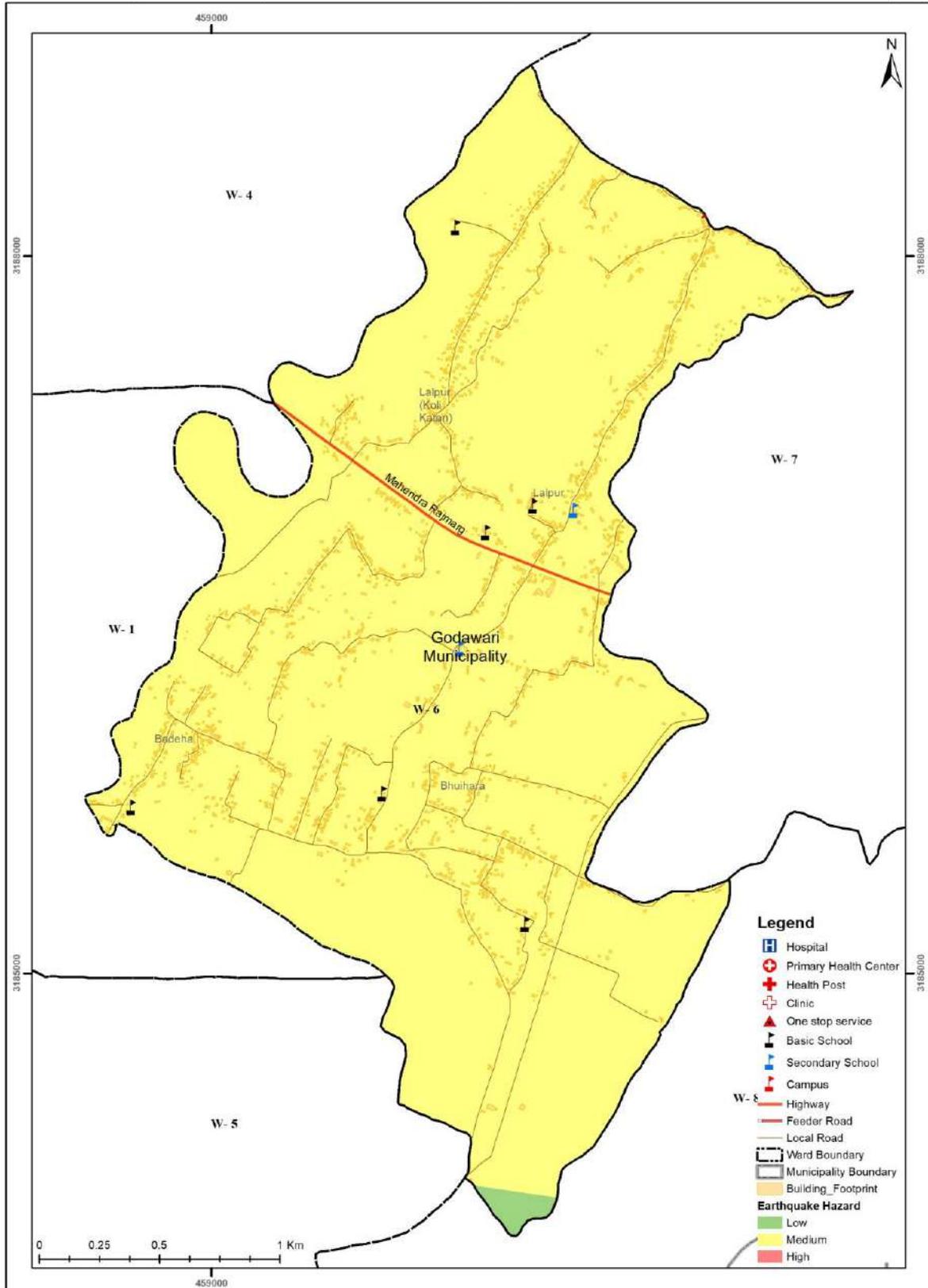
ANNEX XII: WARDWISE EARTHQUAKE HAZARD MAP OF GODAWARI MUNICIPALITY

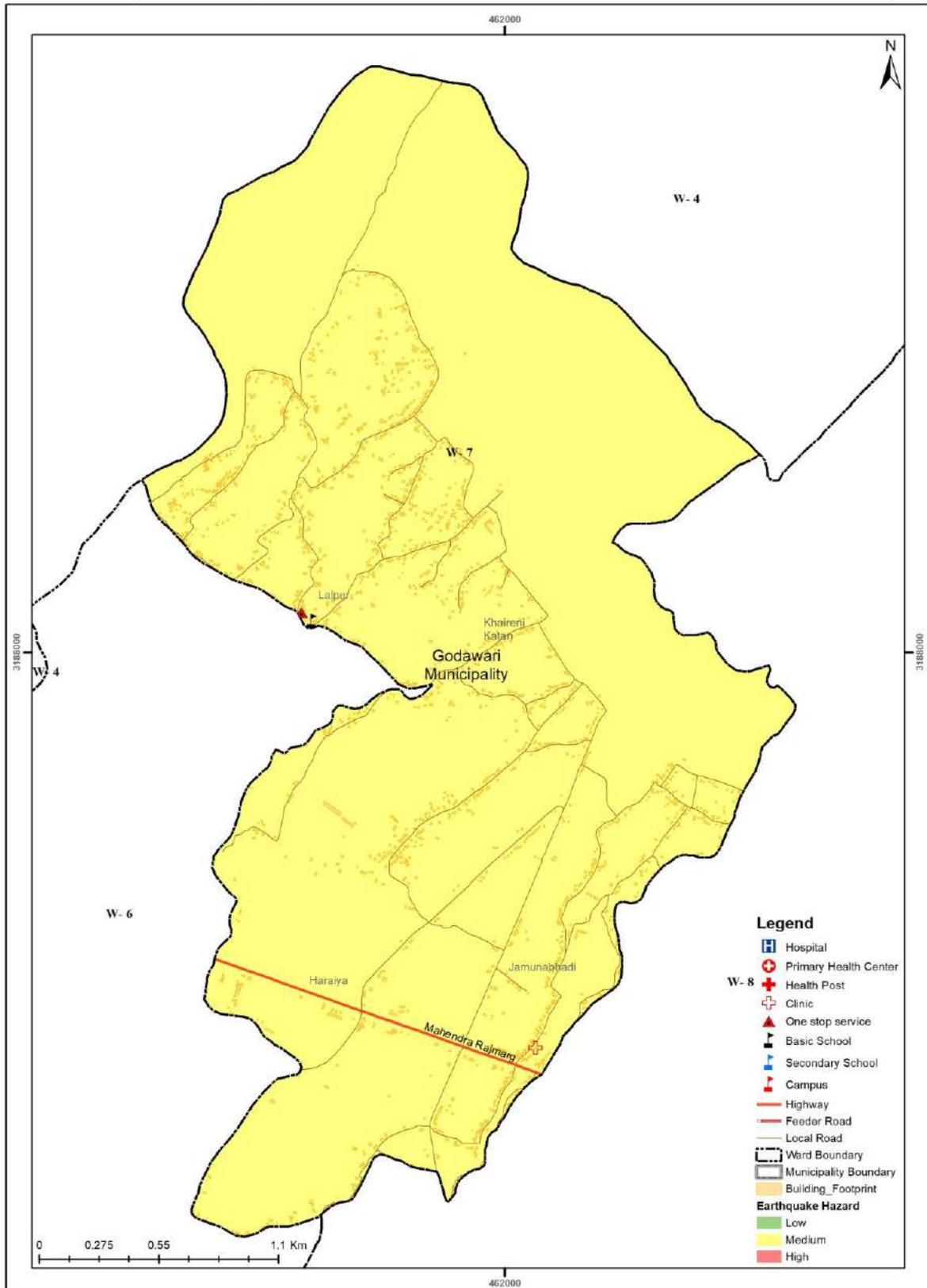


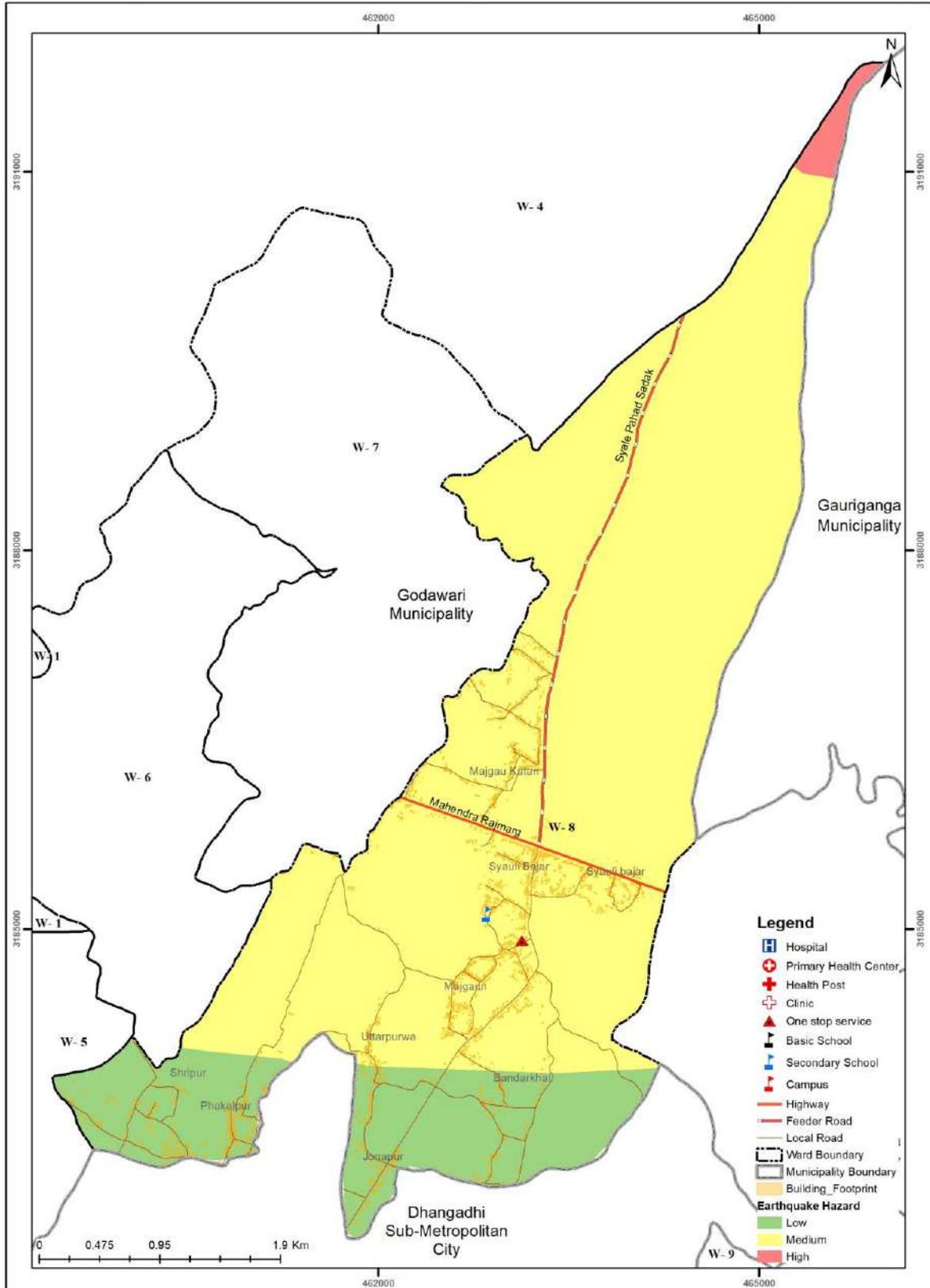


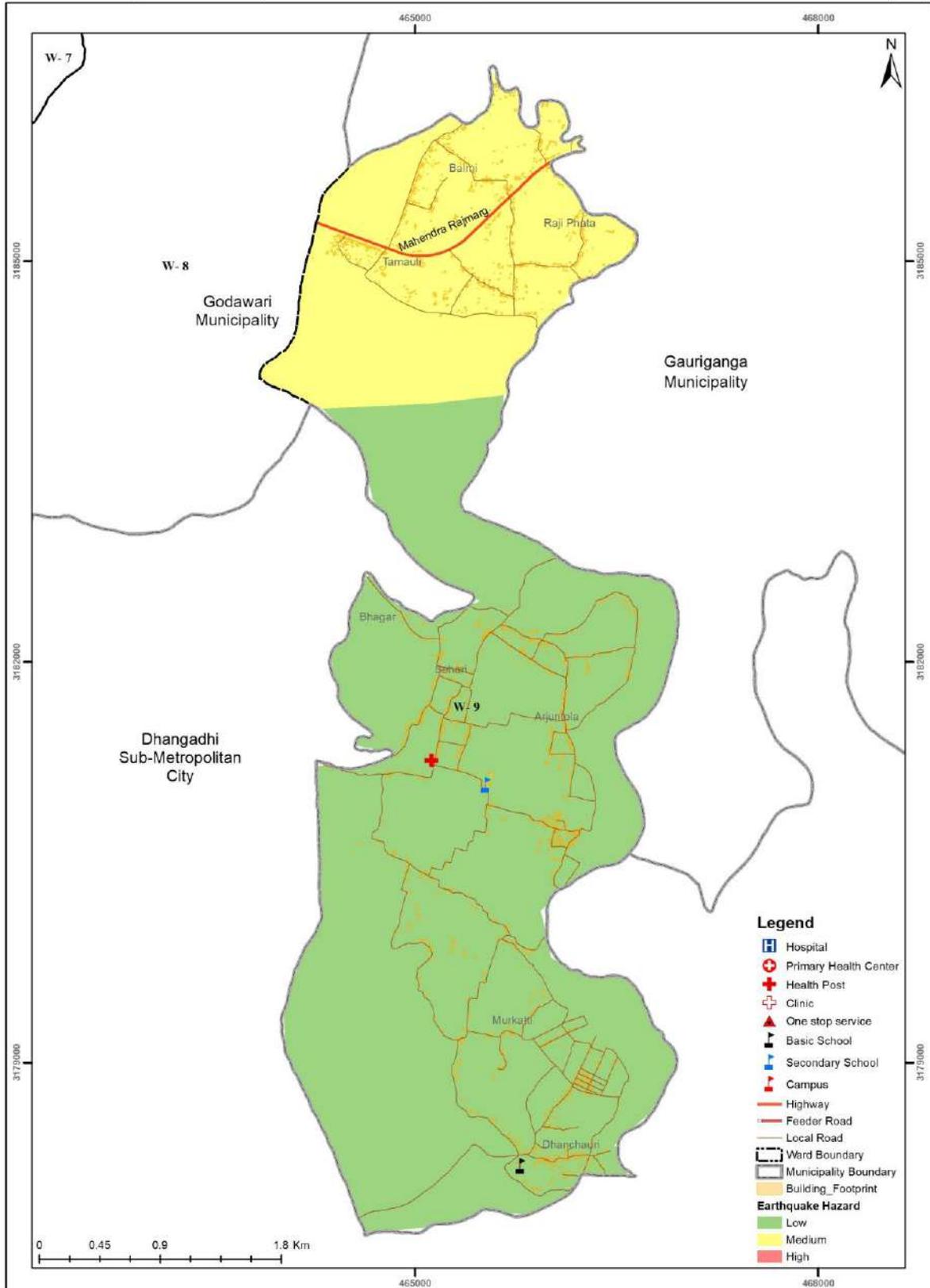


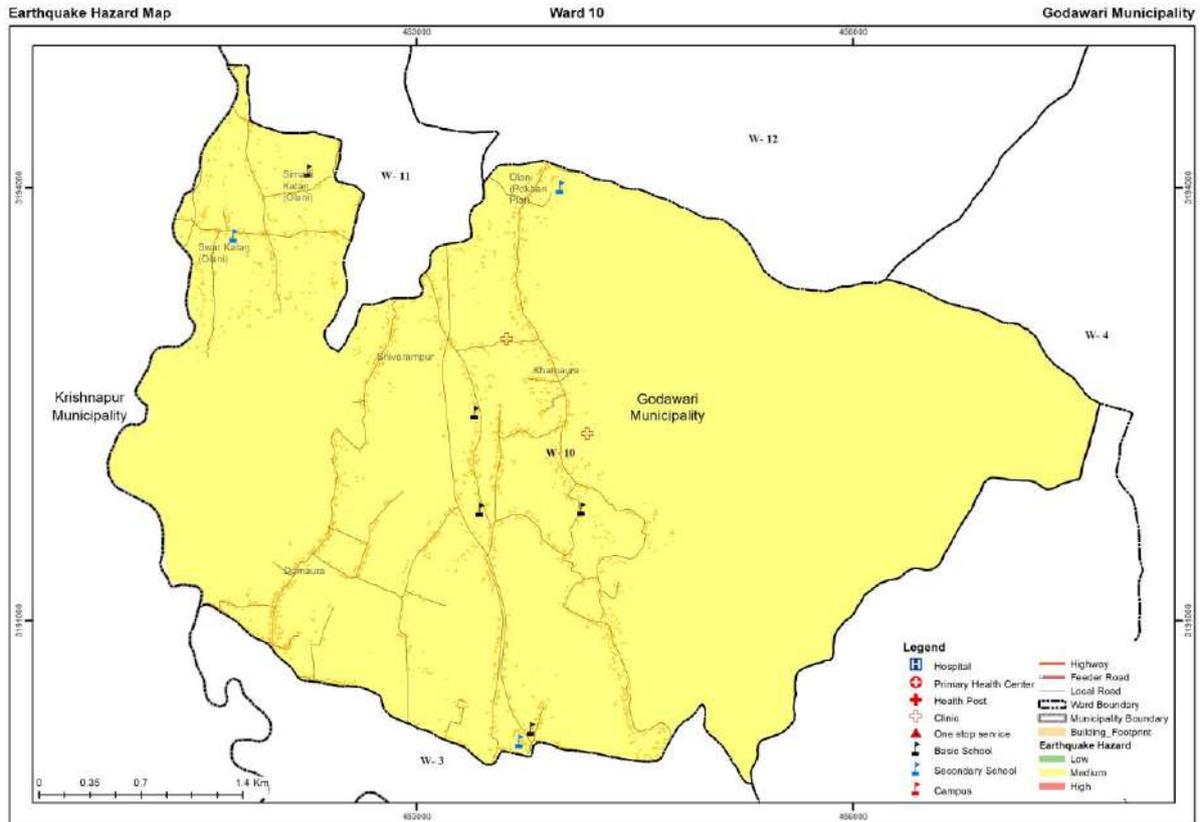


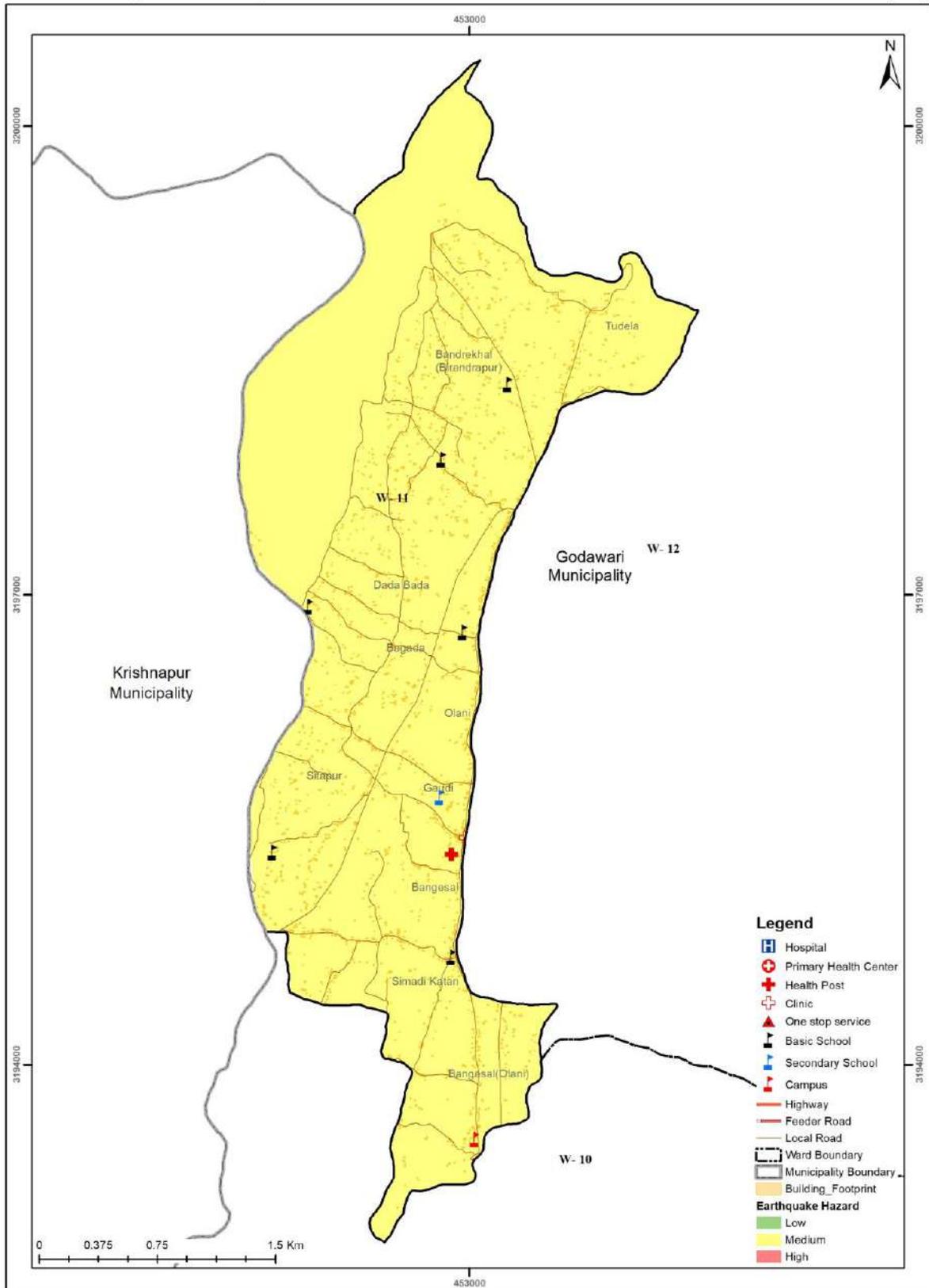


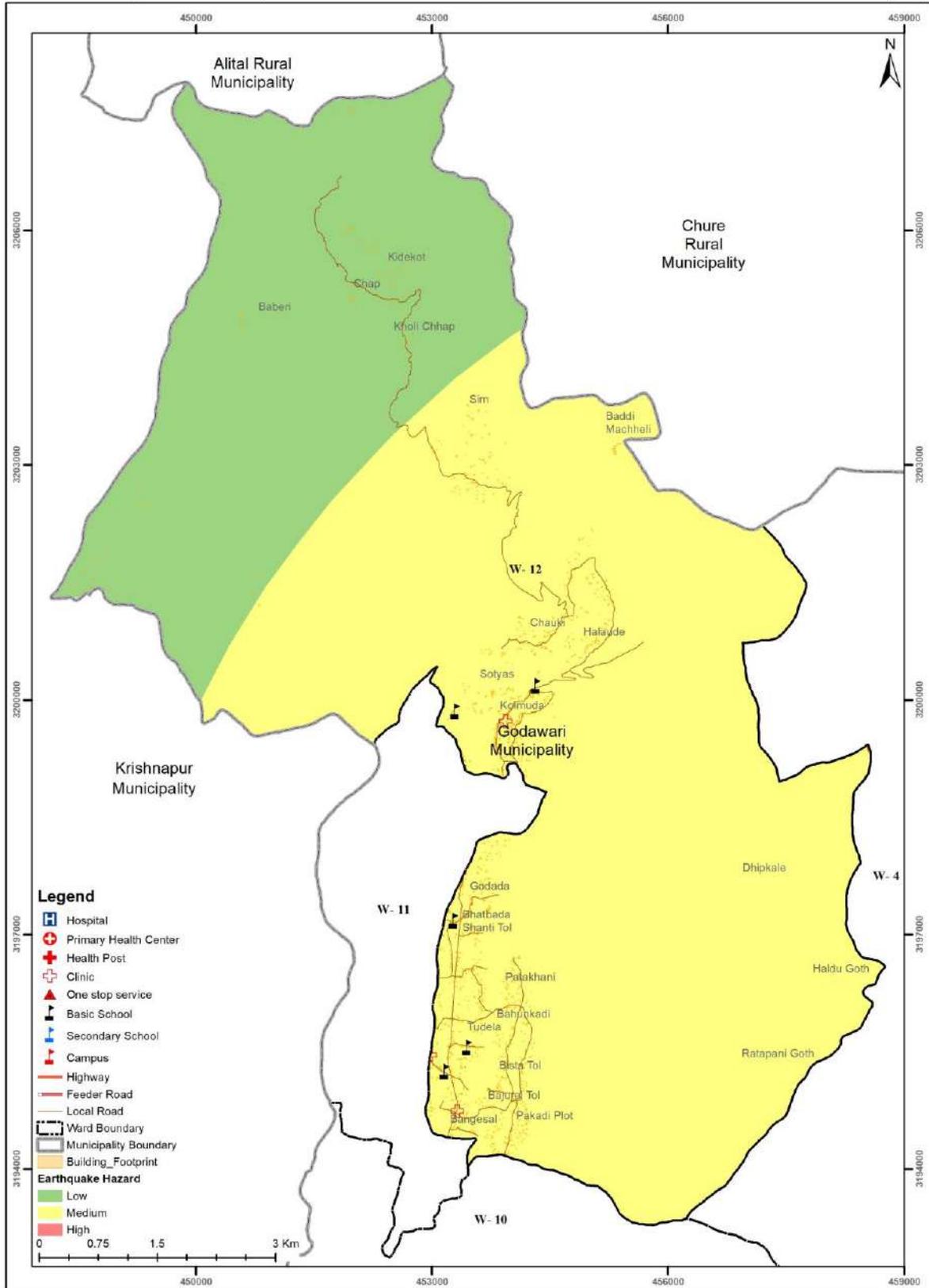




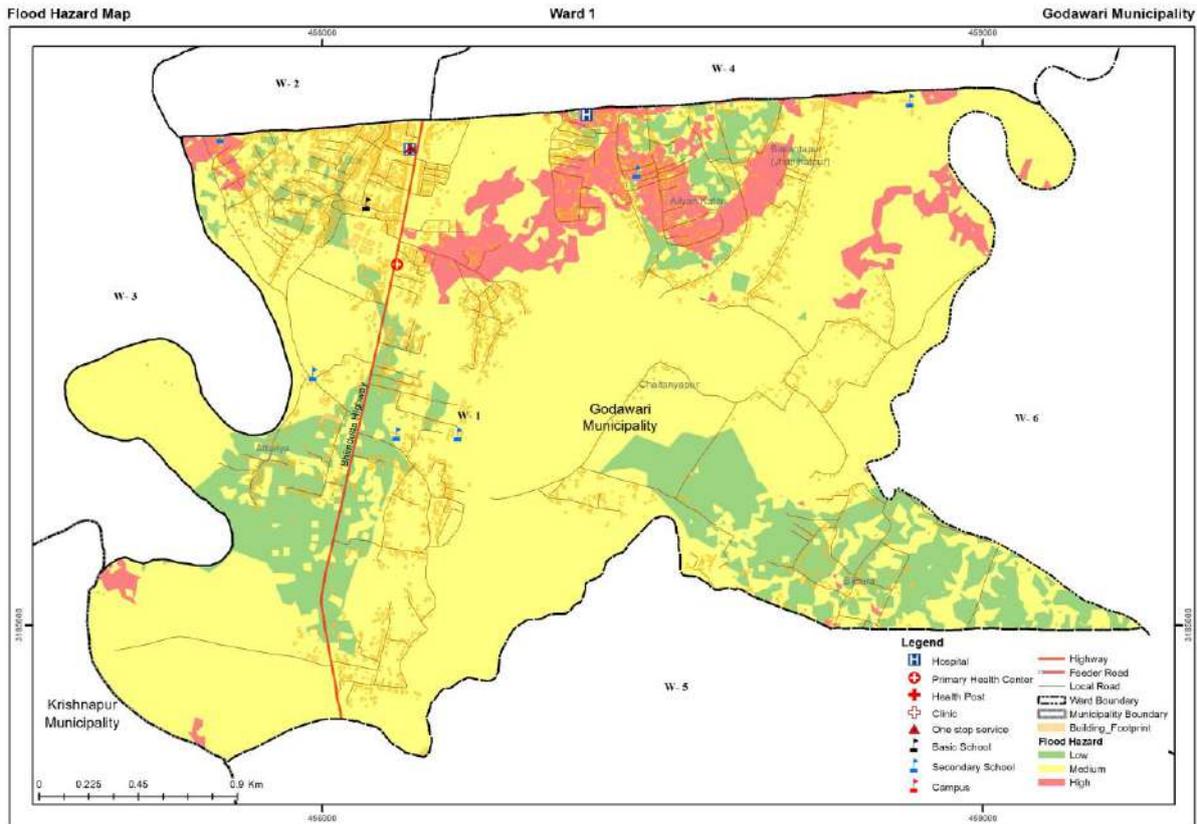


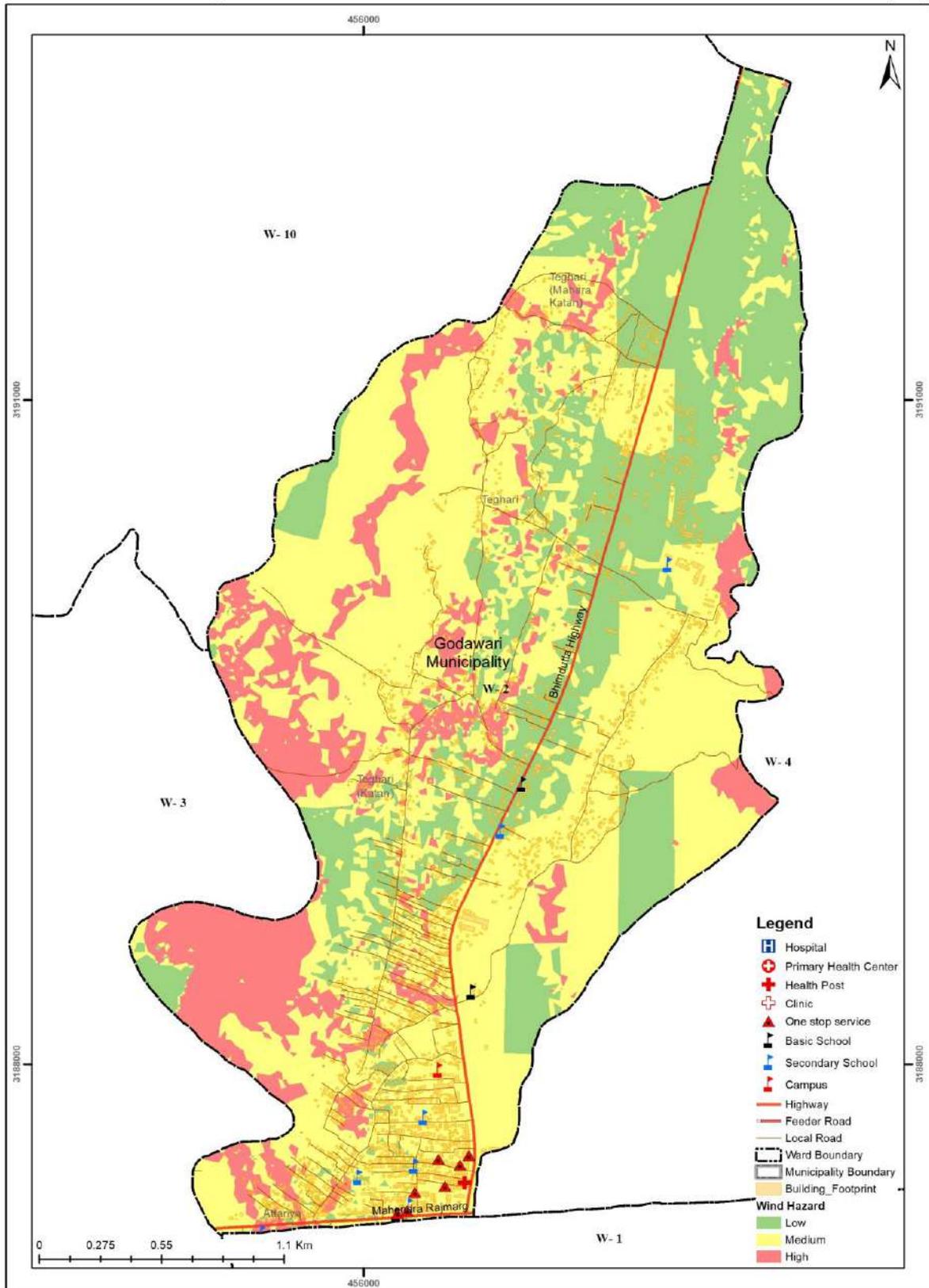


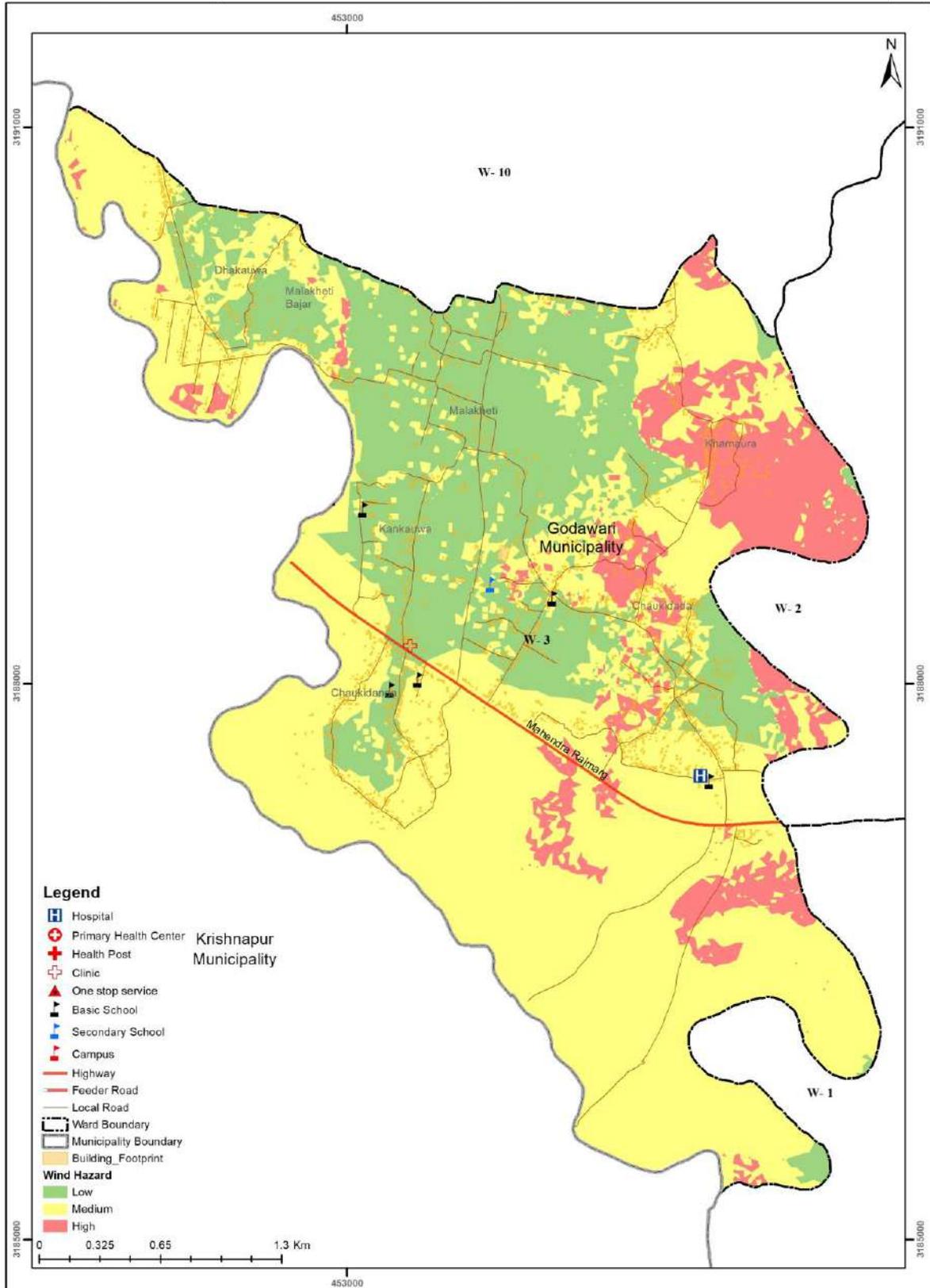


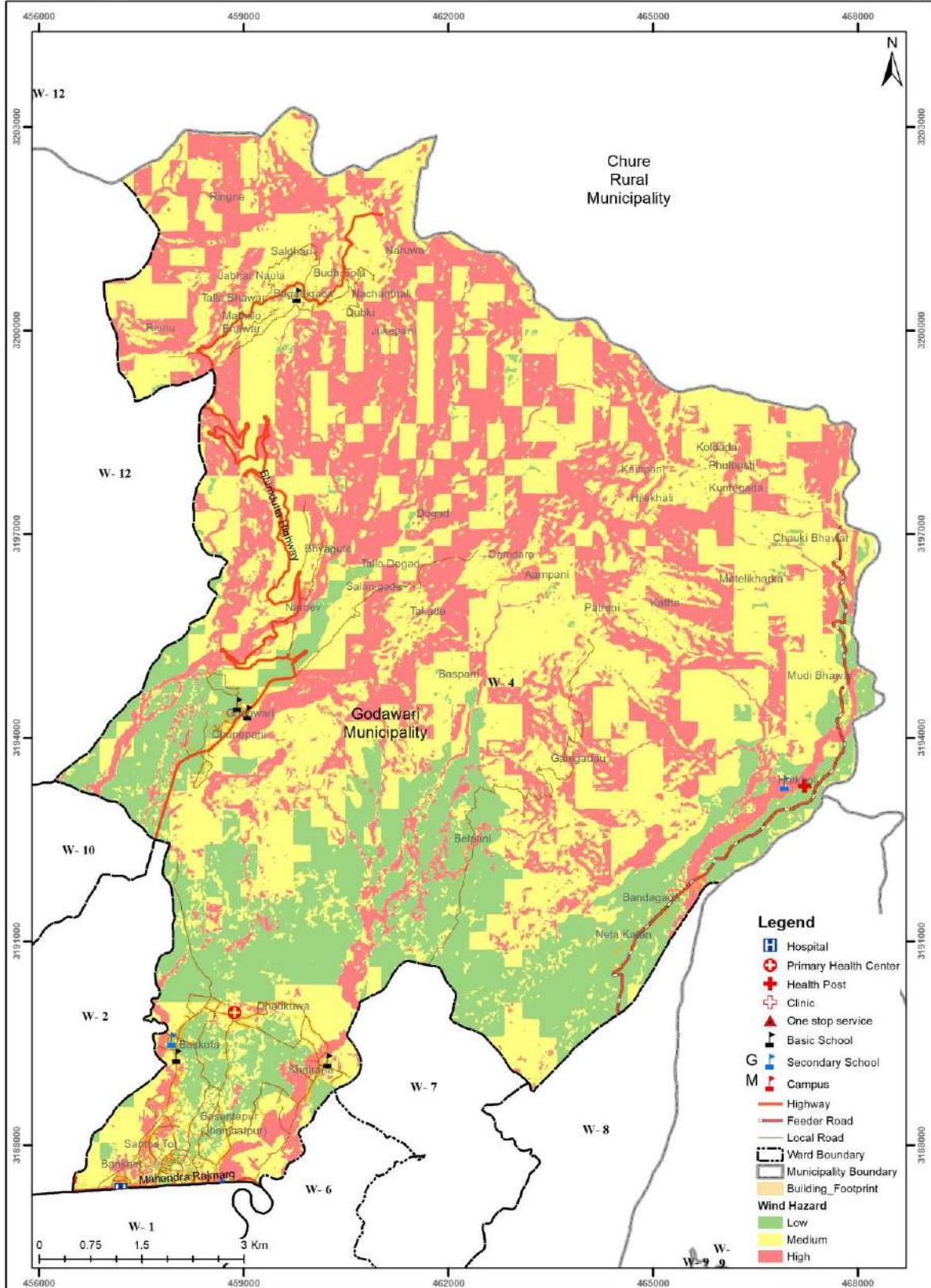


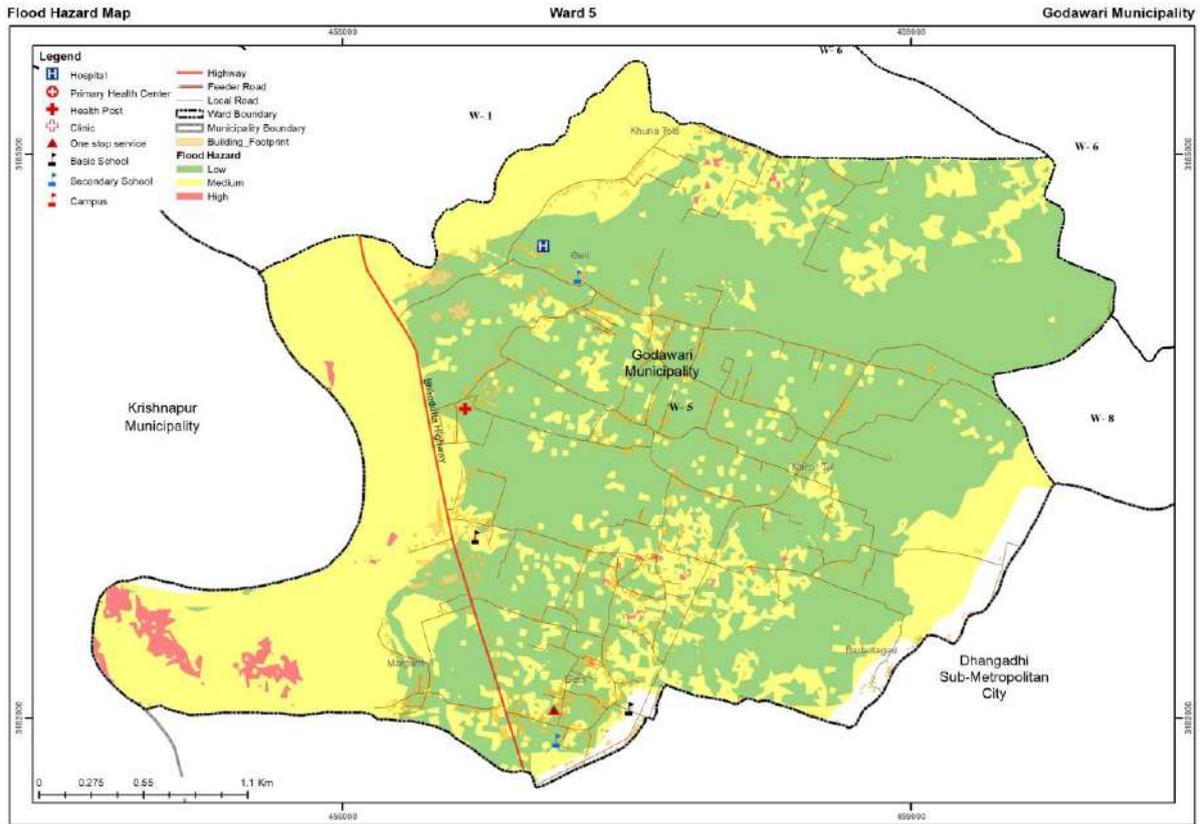
ANNEX XIII: WARDWISE FLOOD HAZARD MAP OF GODAWARI MUNICIPALITY

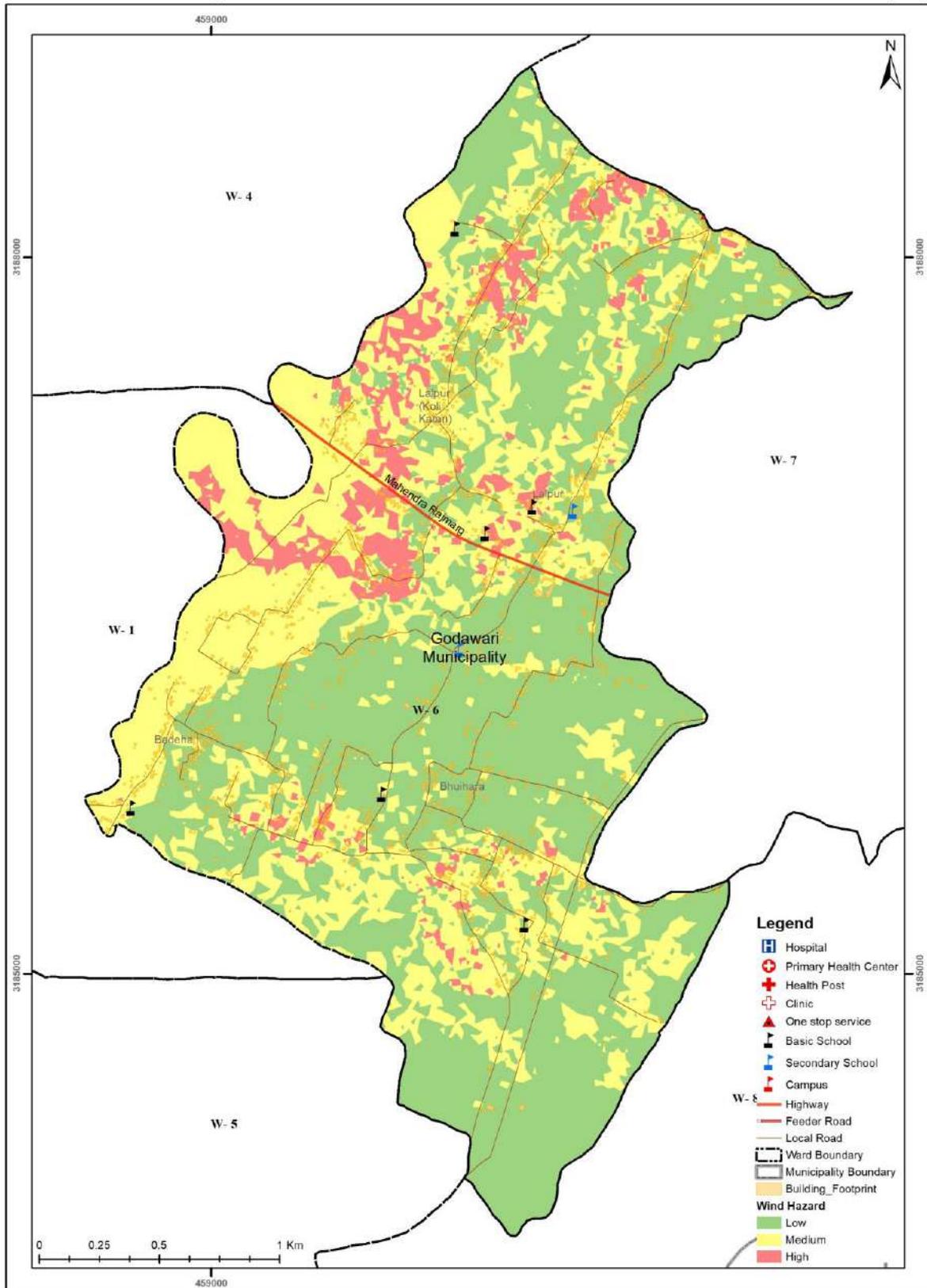


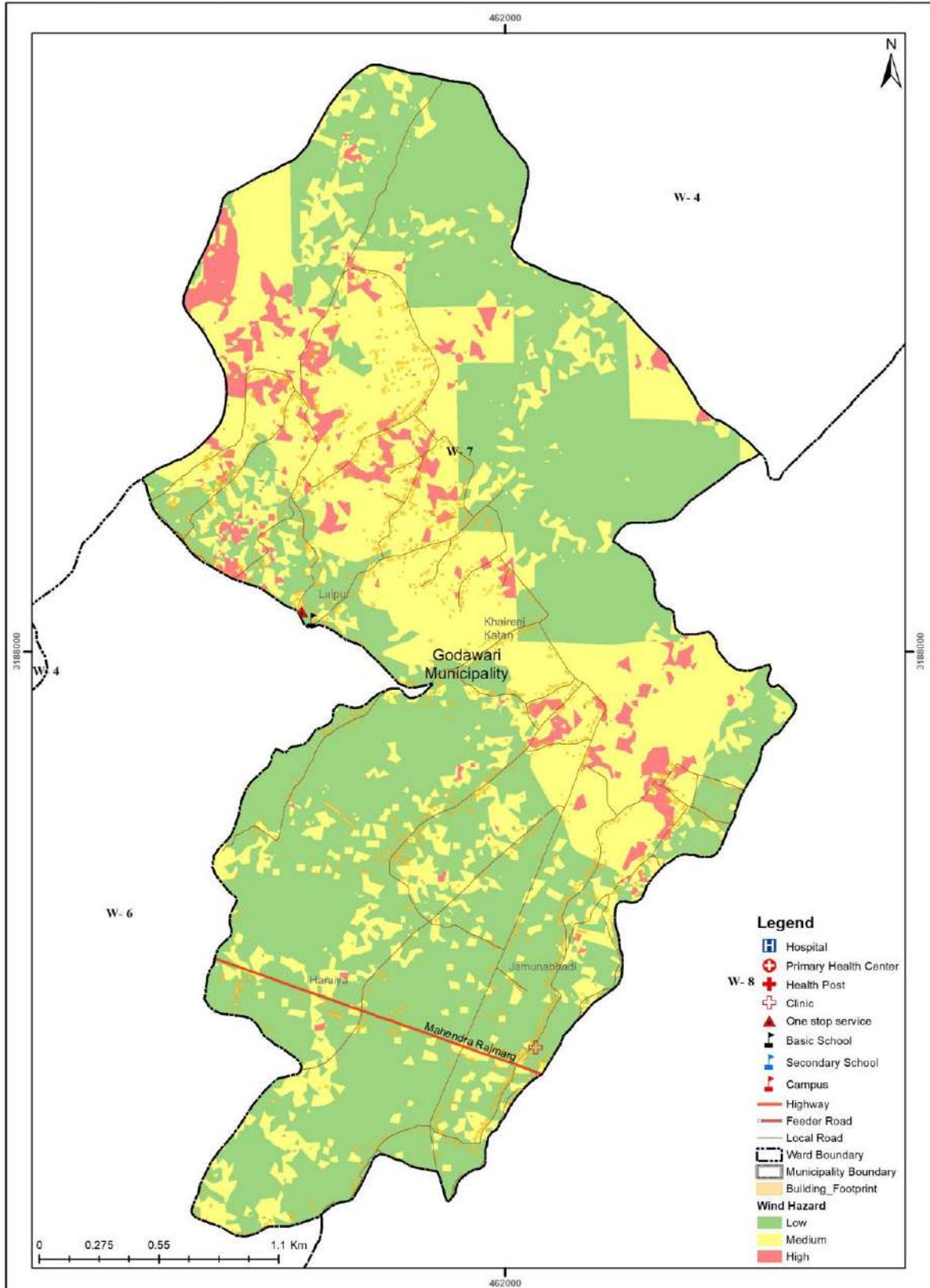


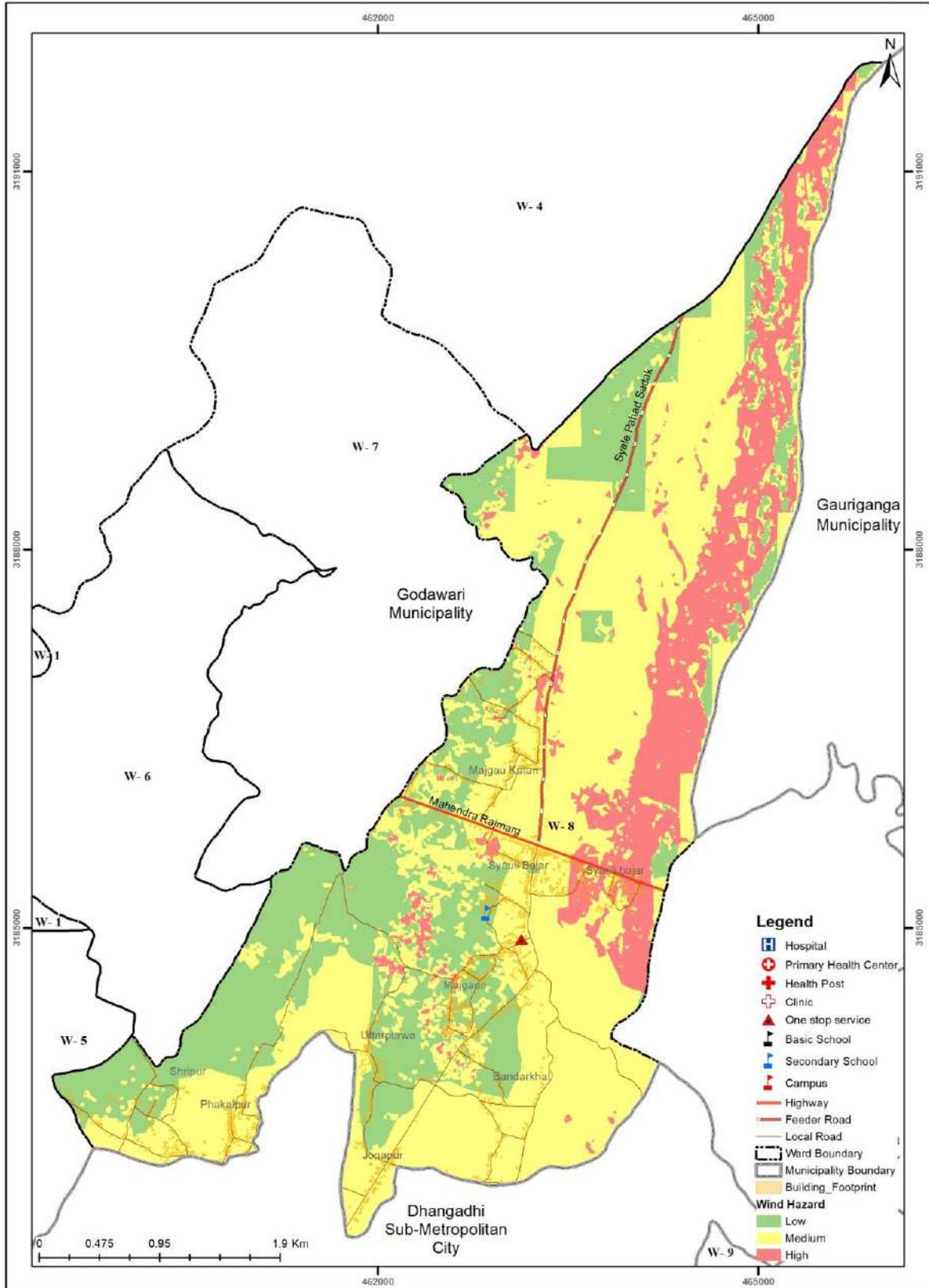


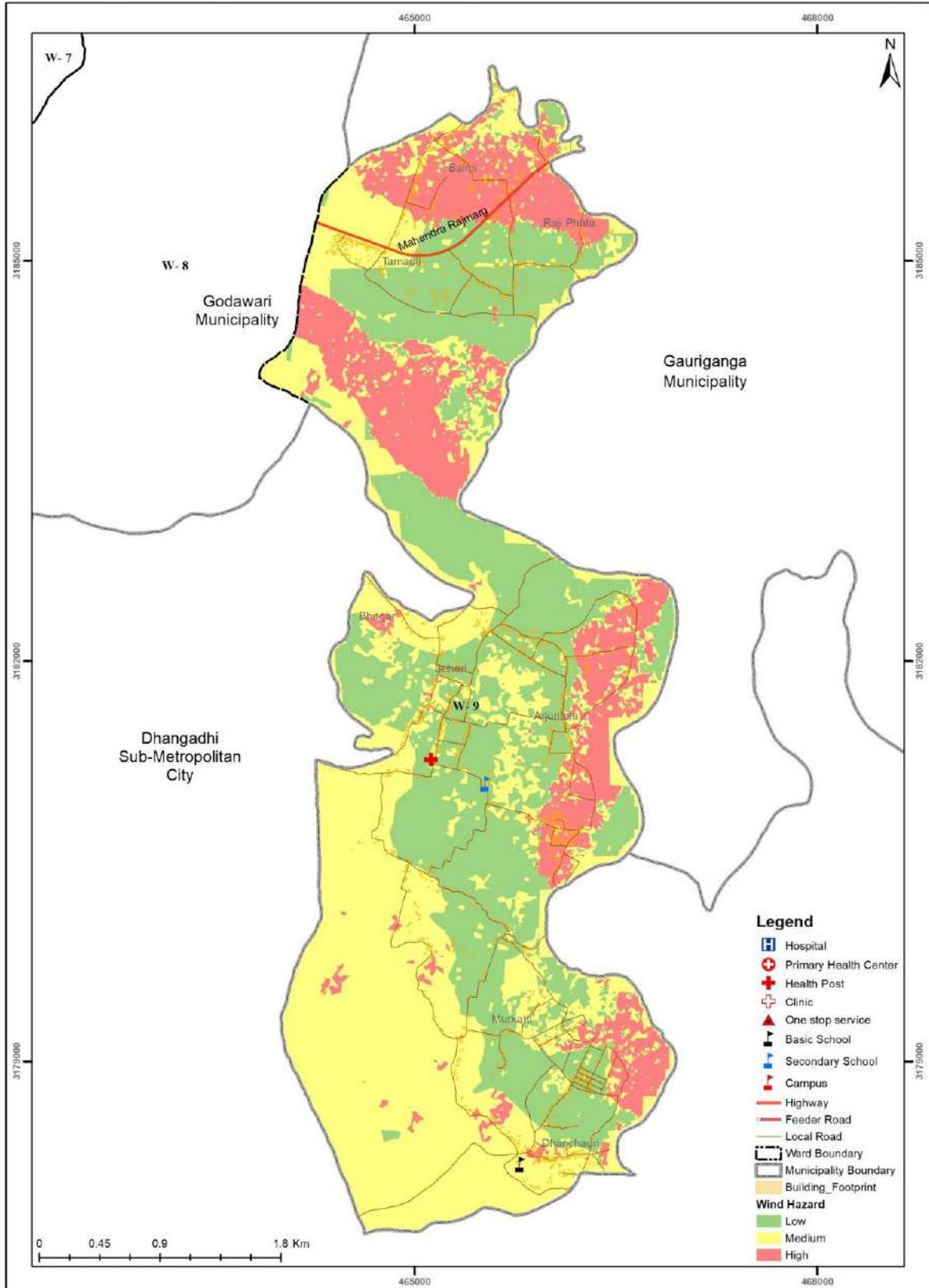


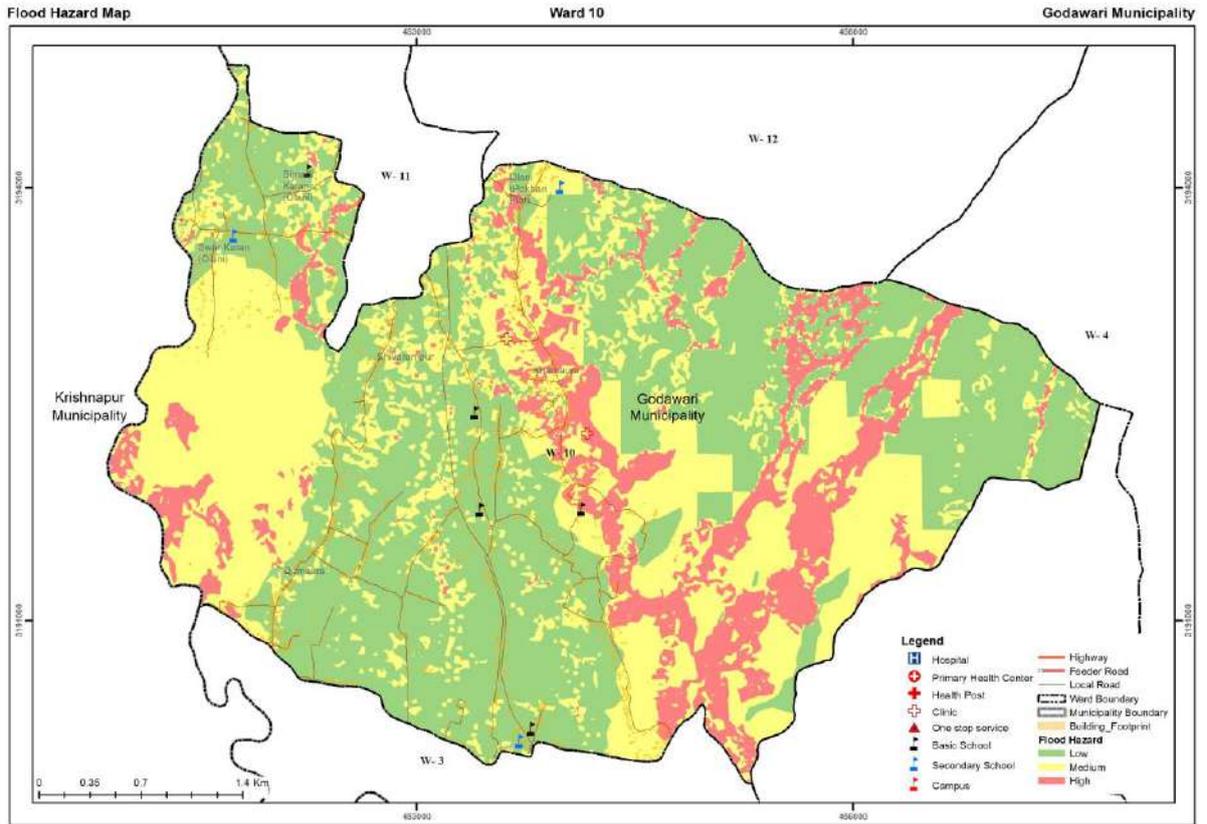


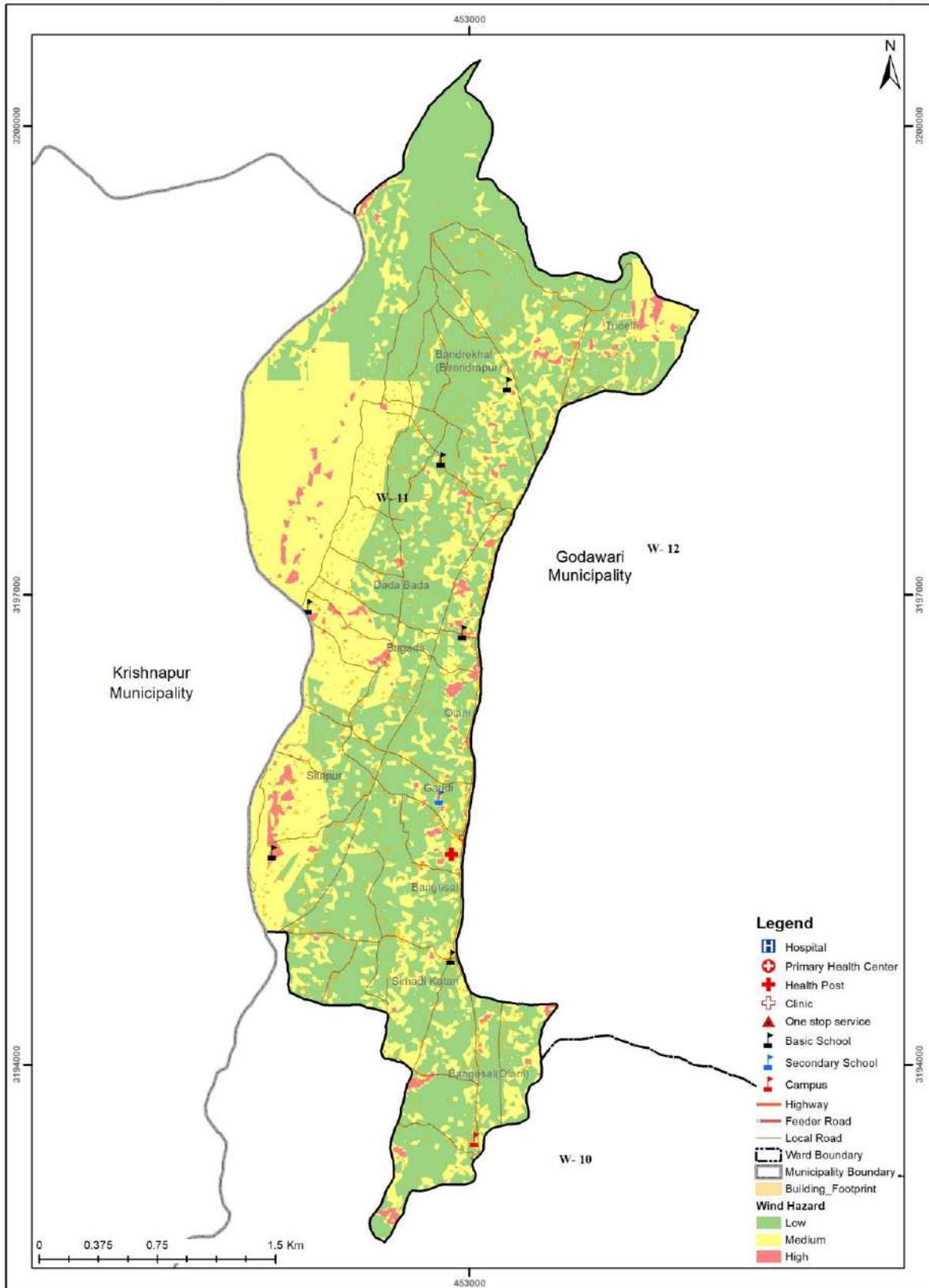


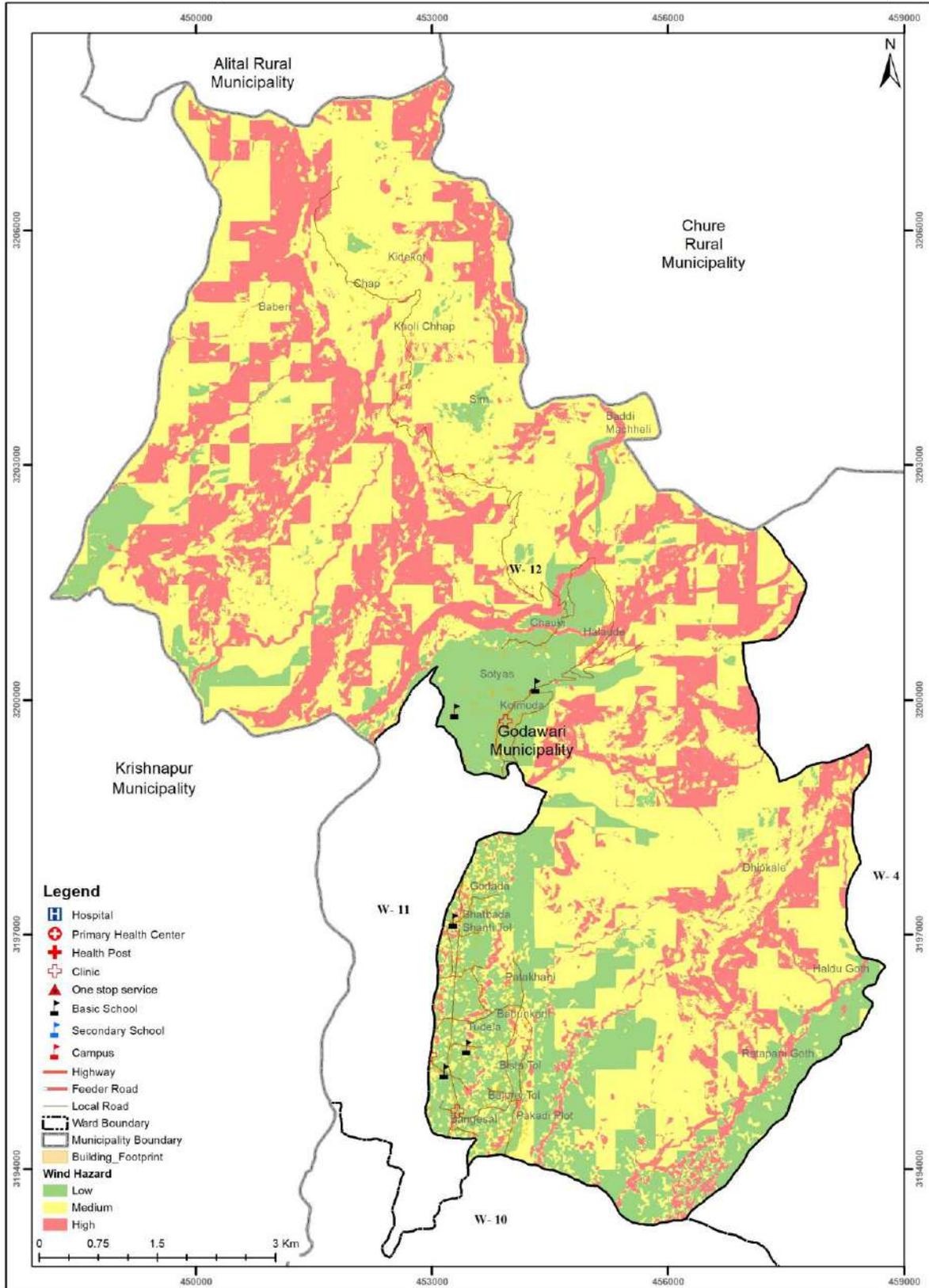




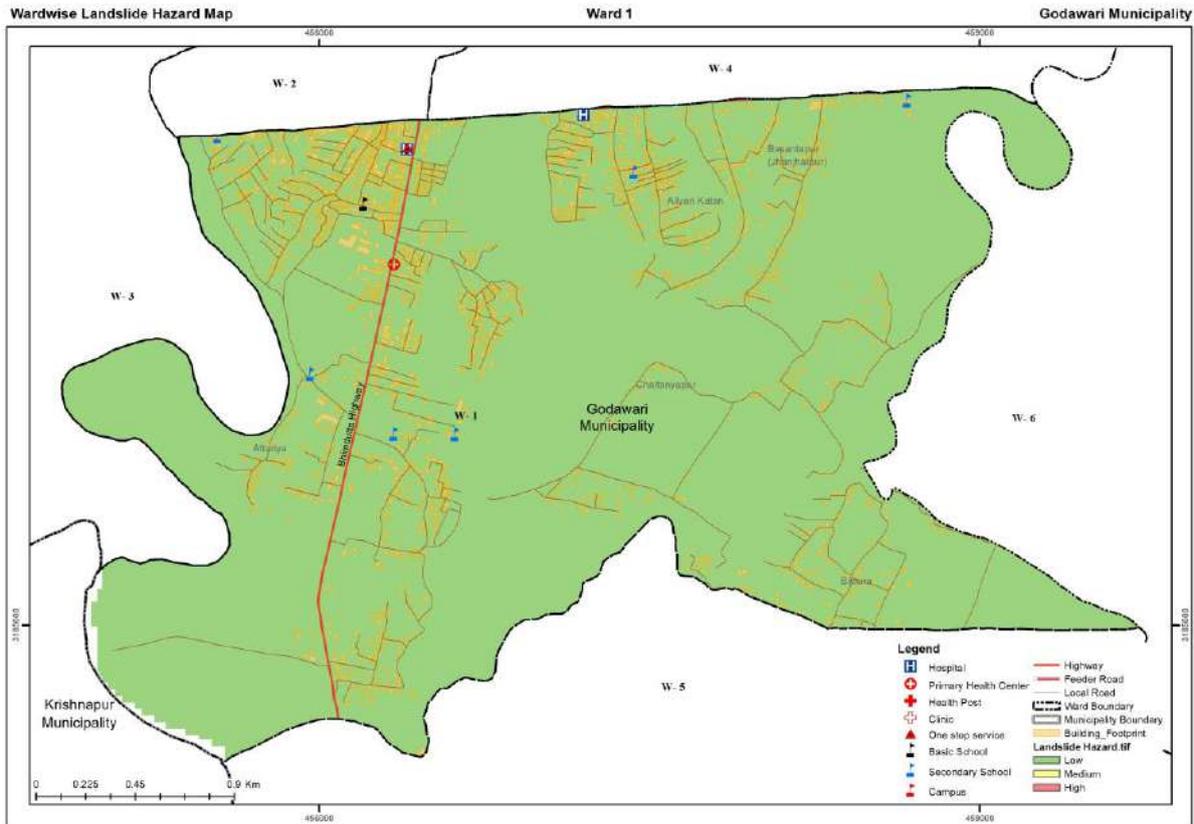


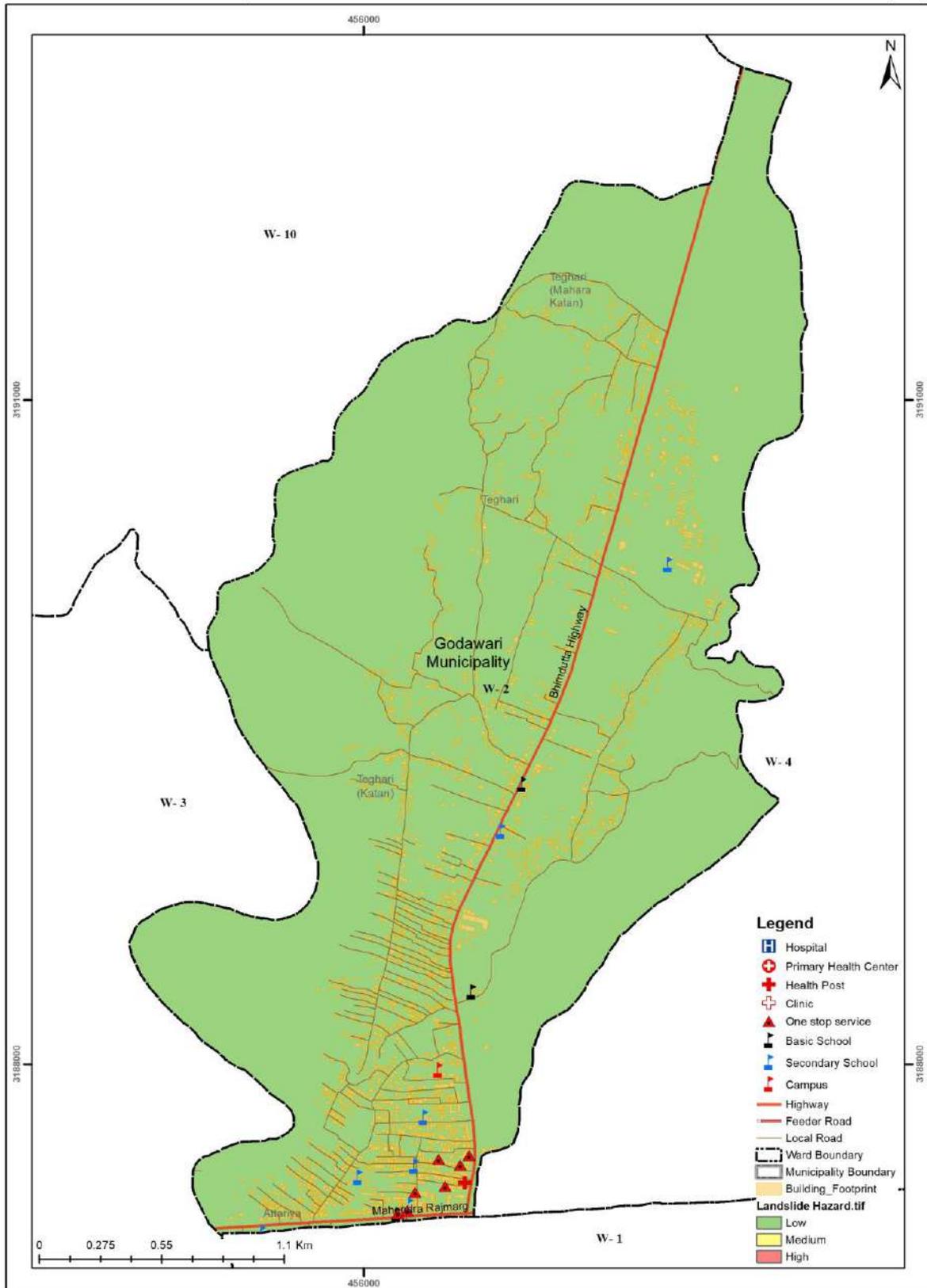


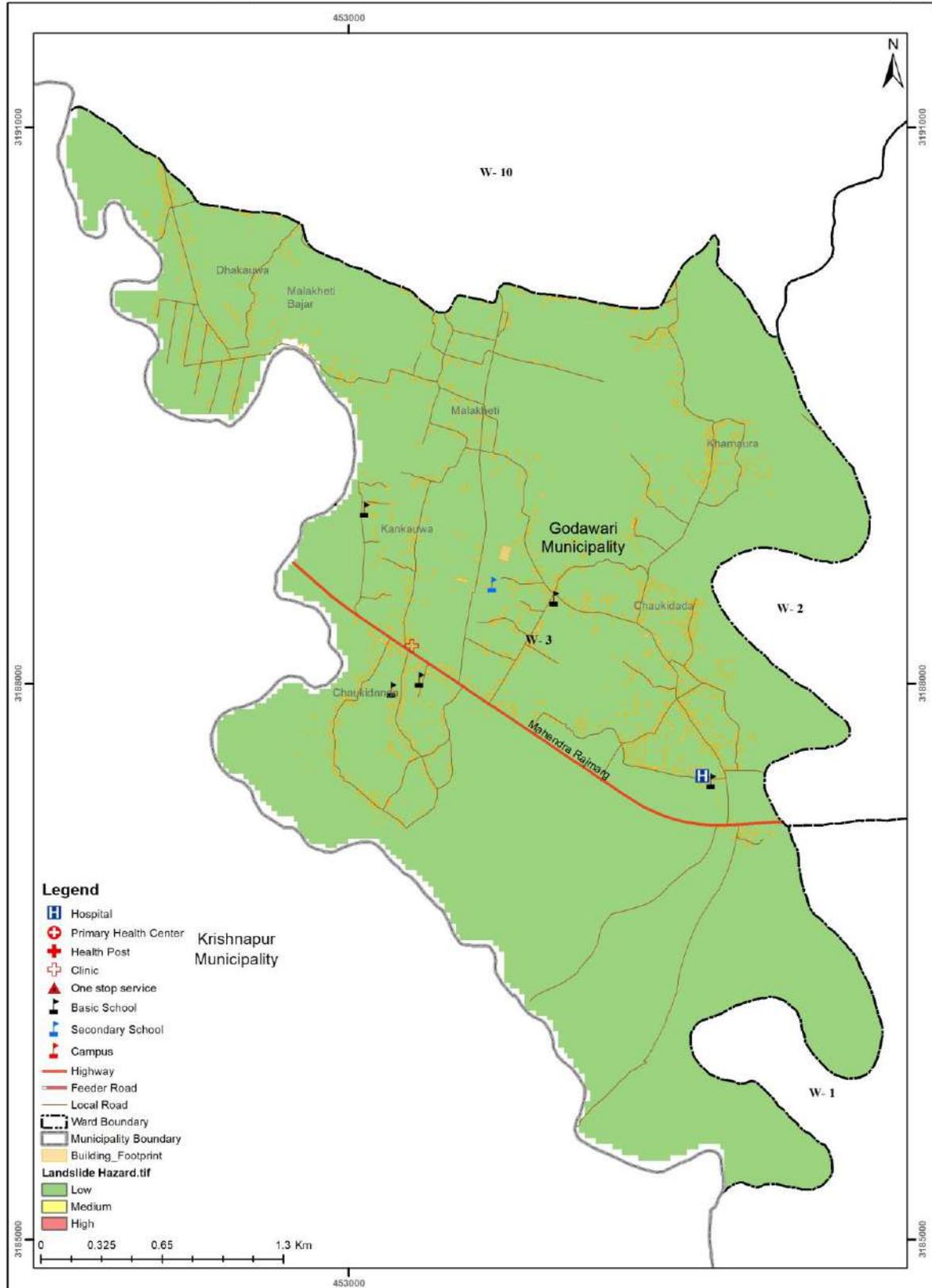


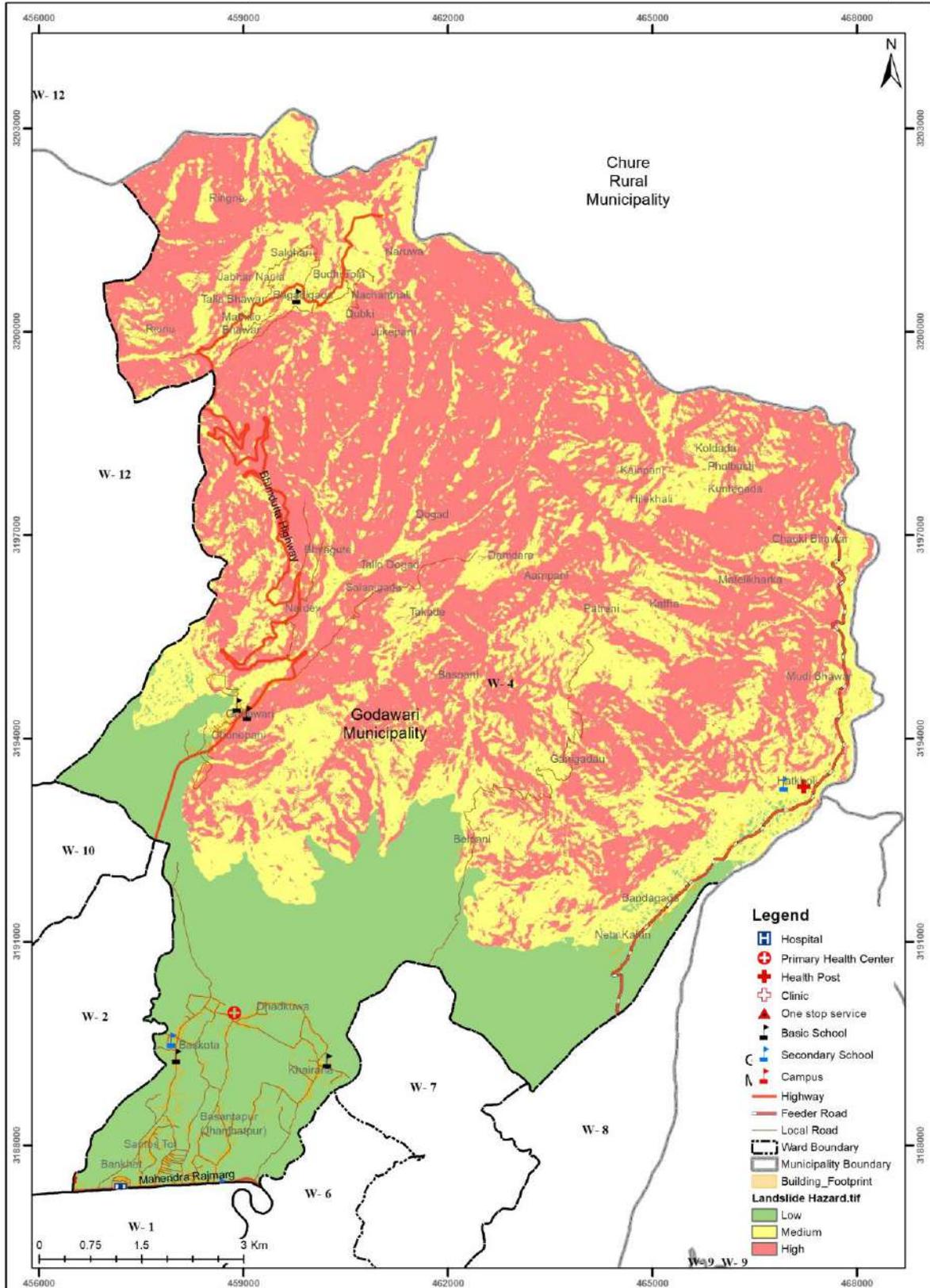


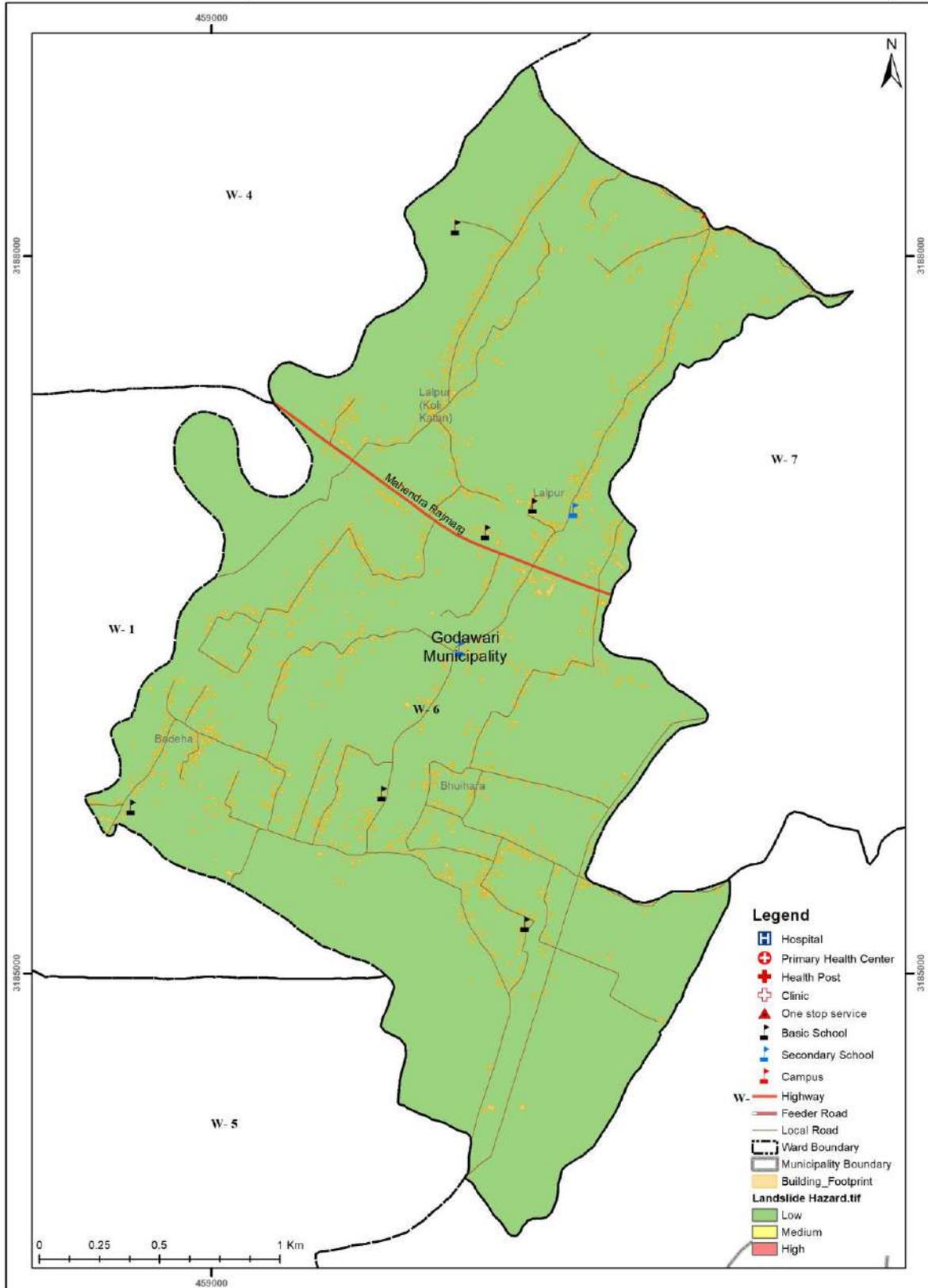
ANNEX XIV: WARDWISE LANDSLIDE HAZARD MAP OF GODAWARI MUNICIPALITY

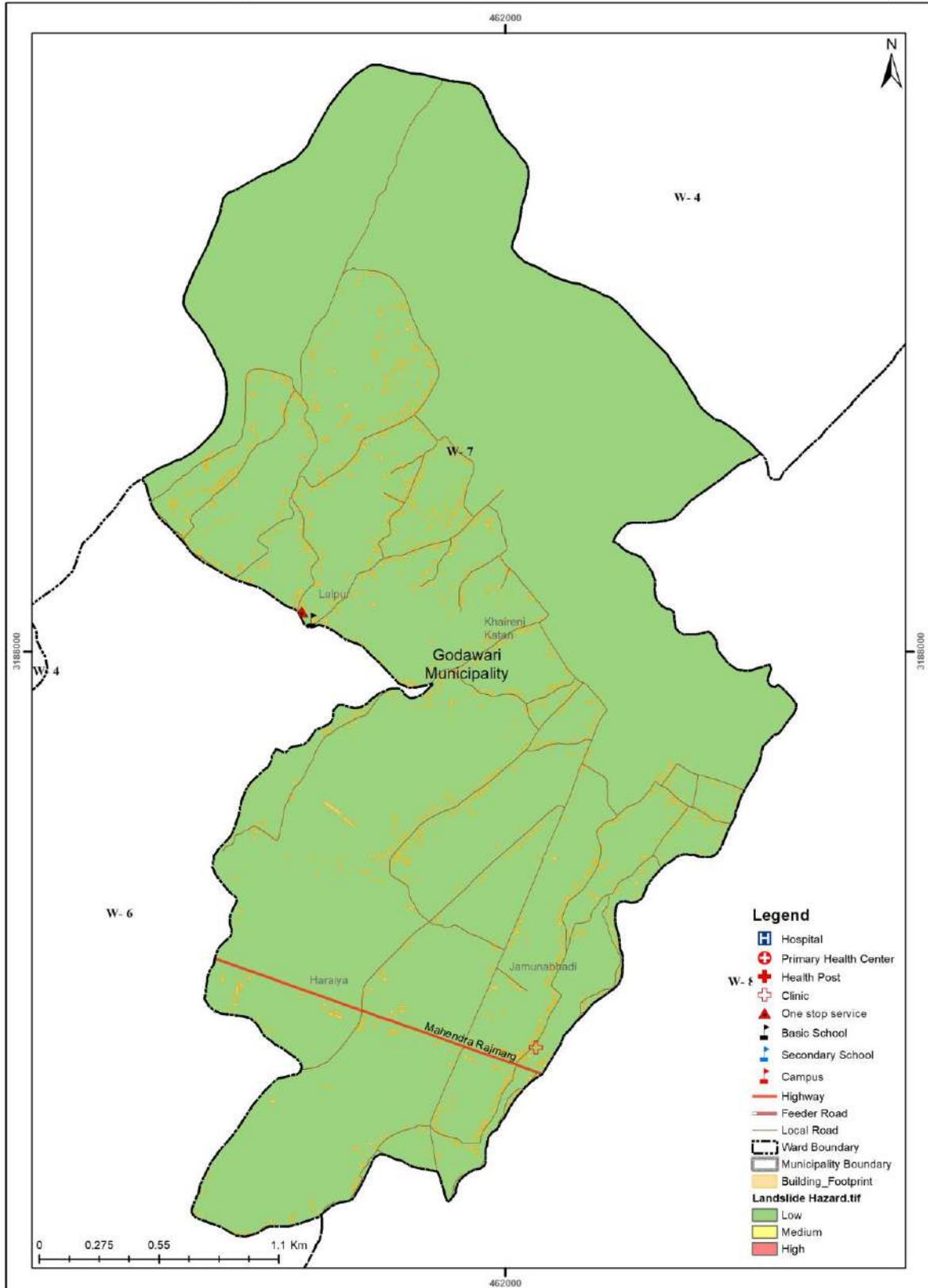


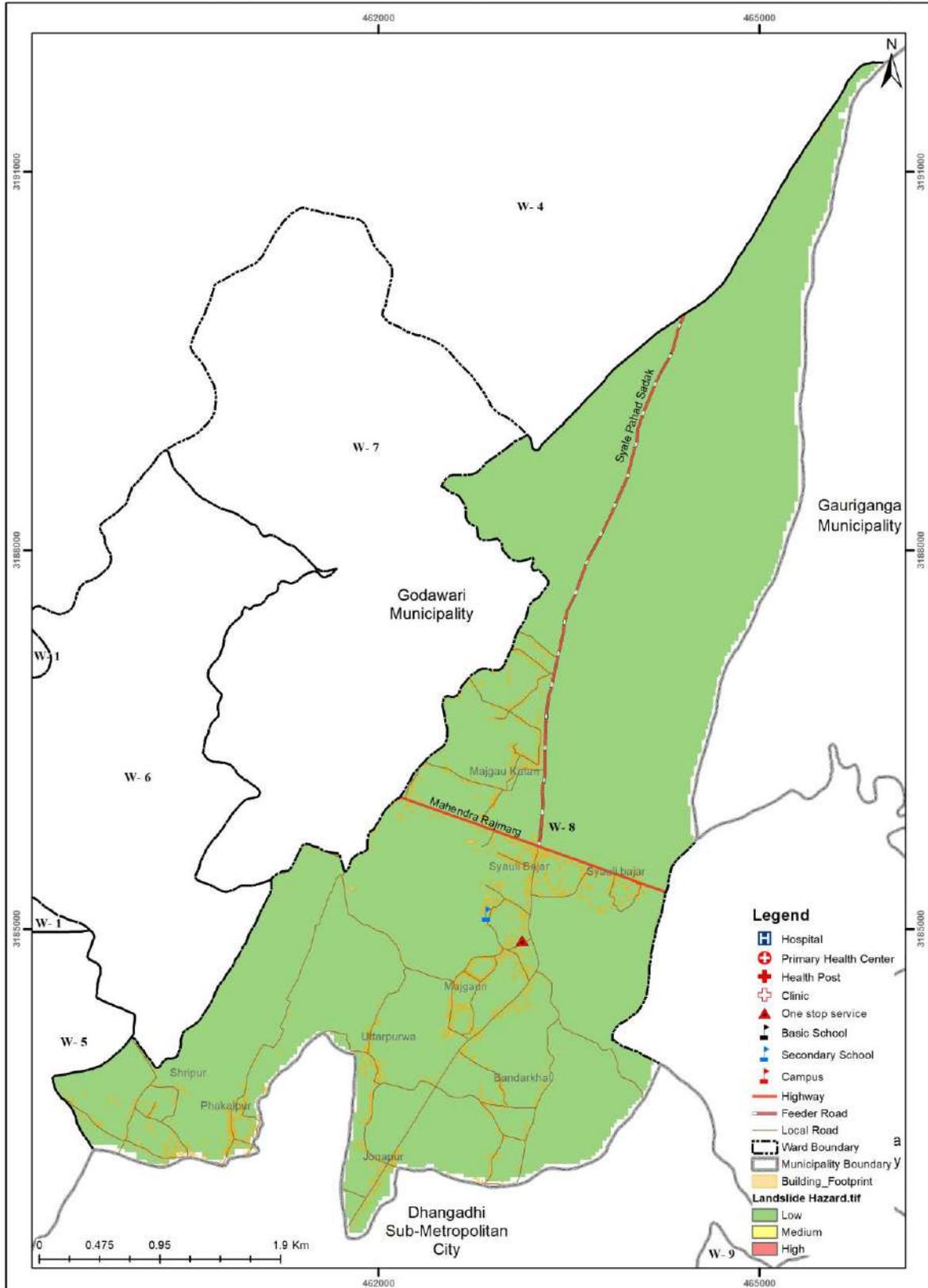


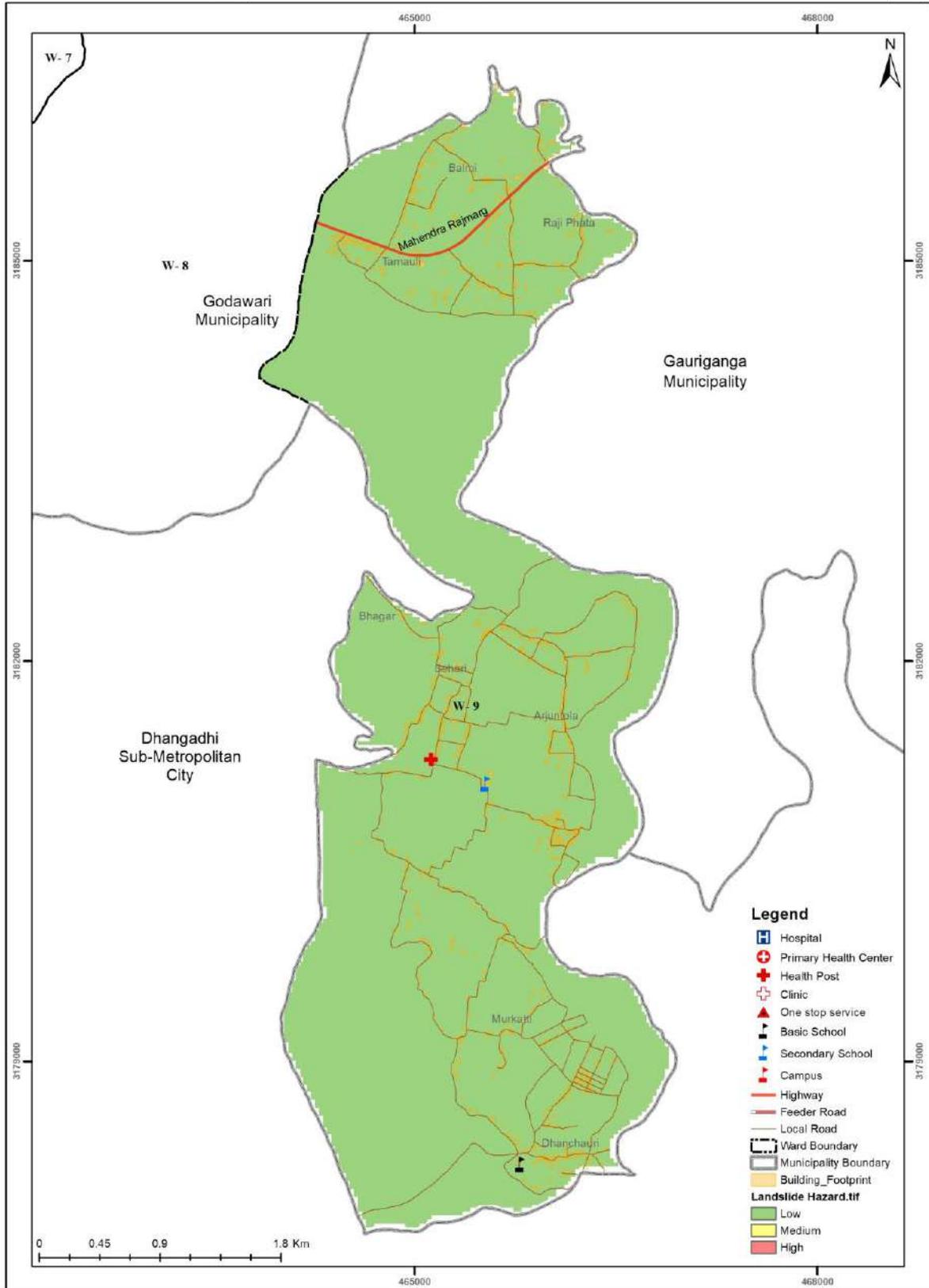


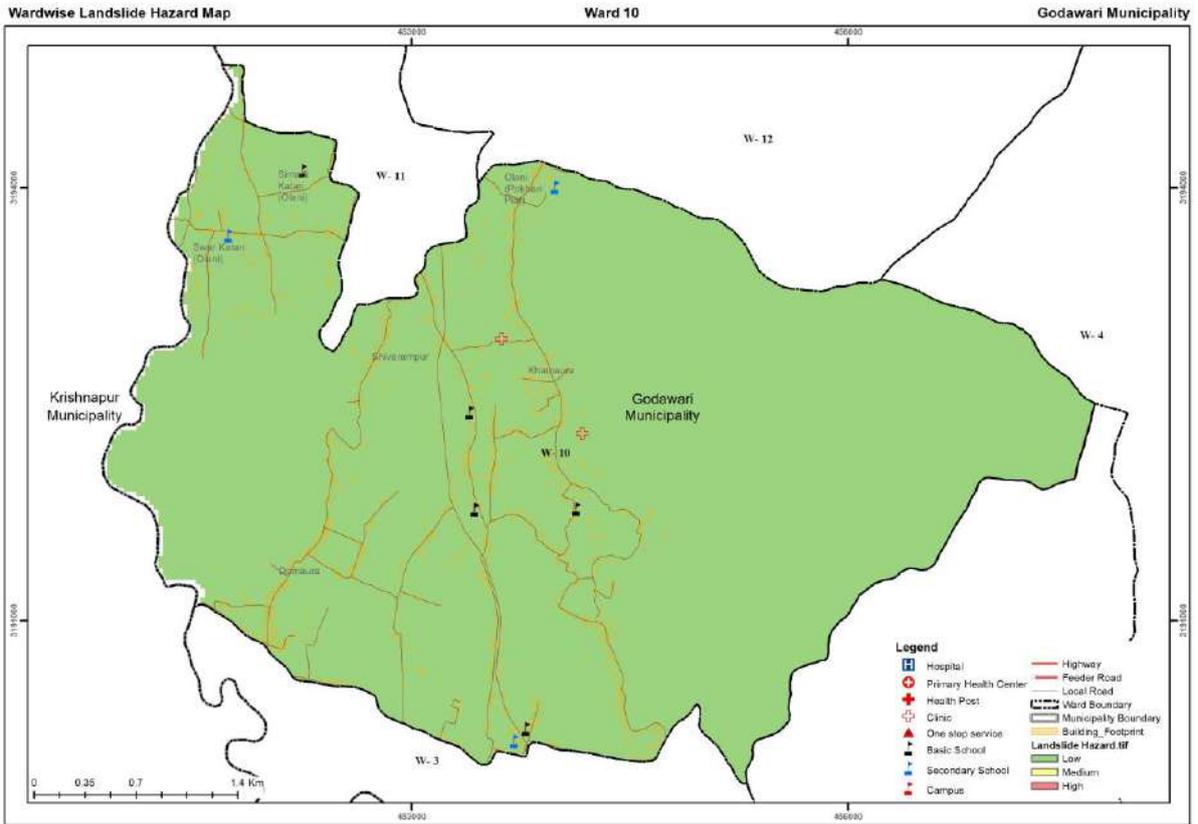


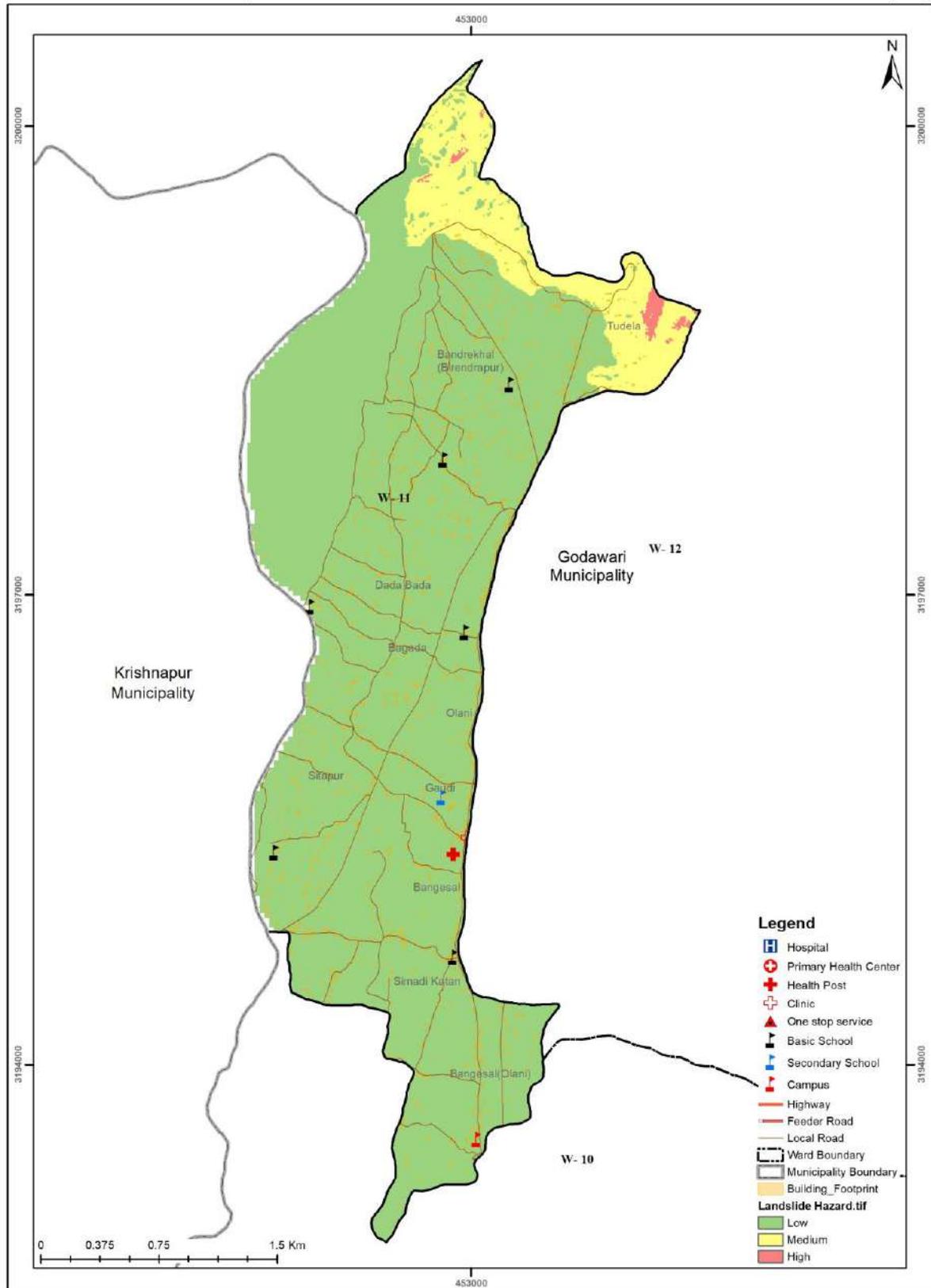


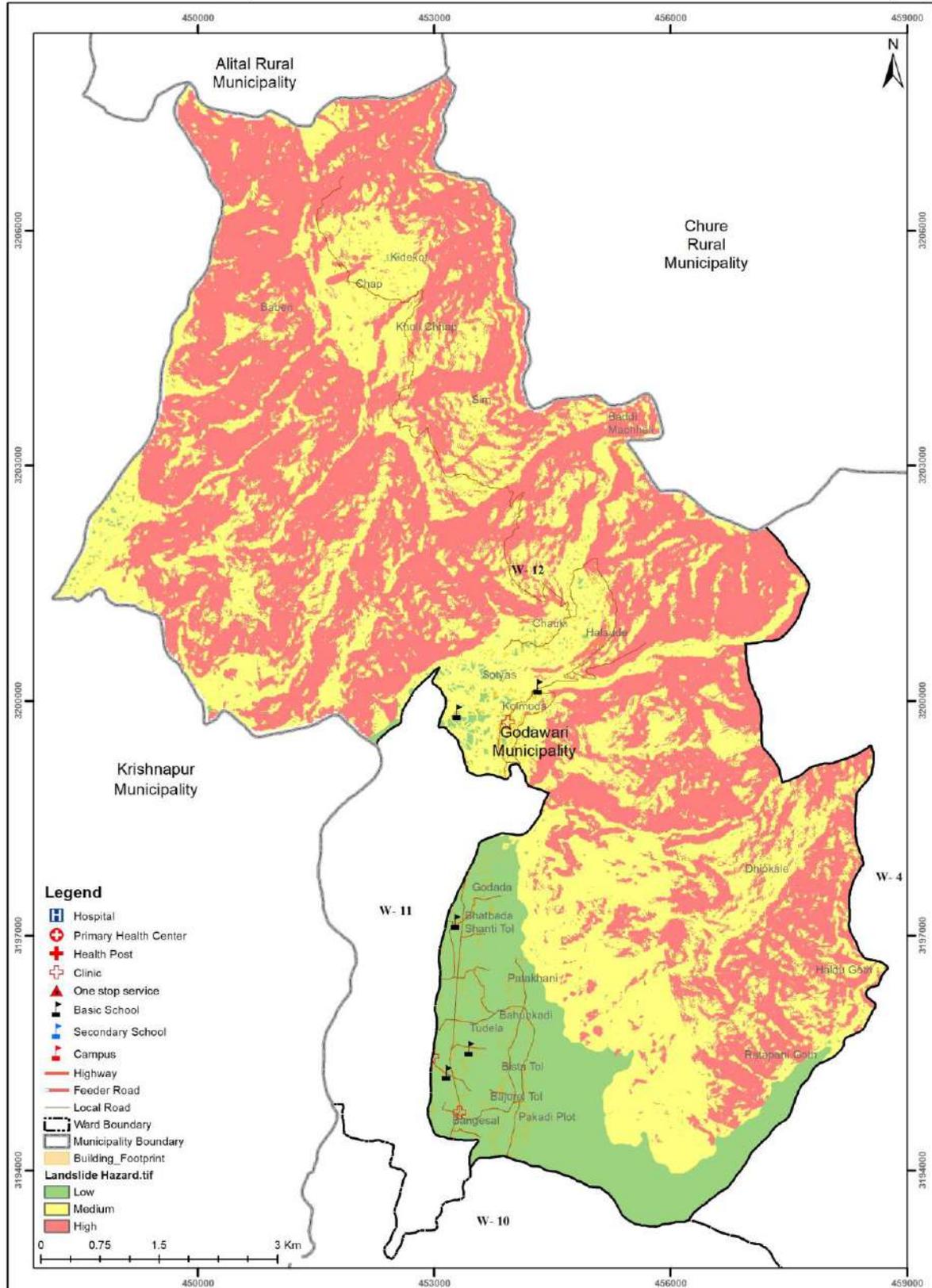




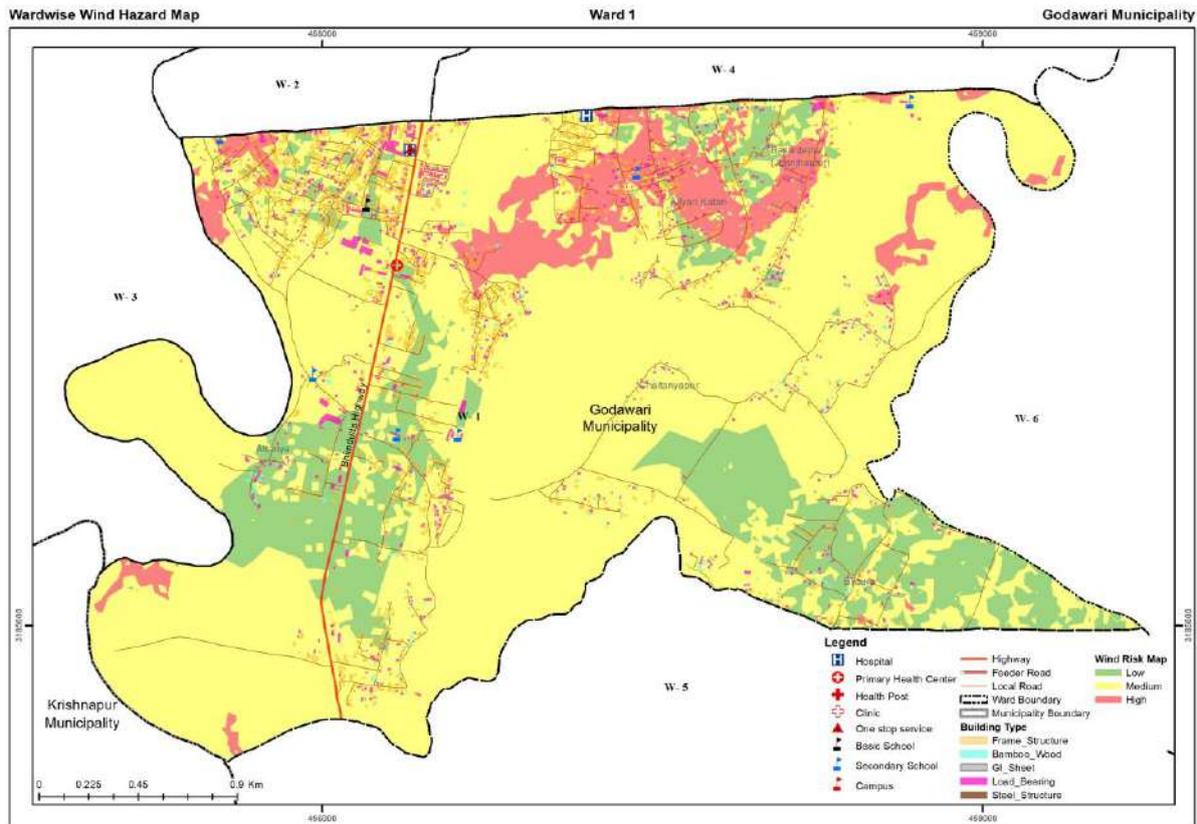


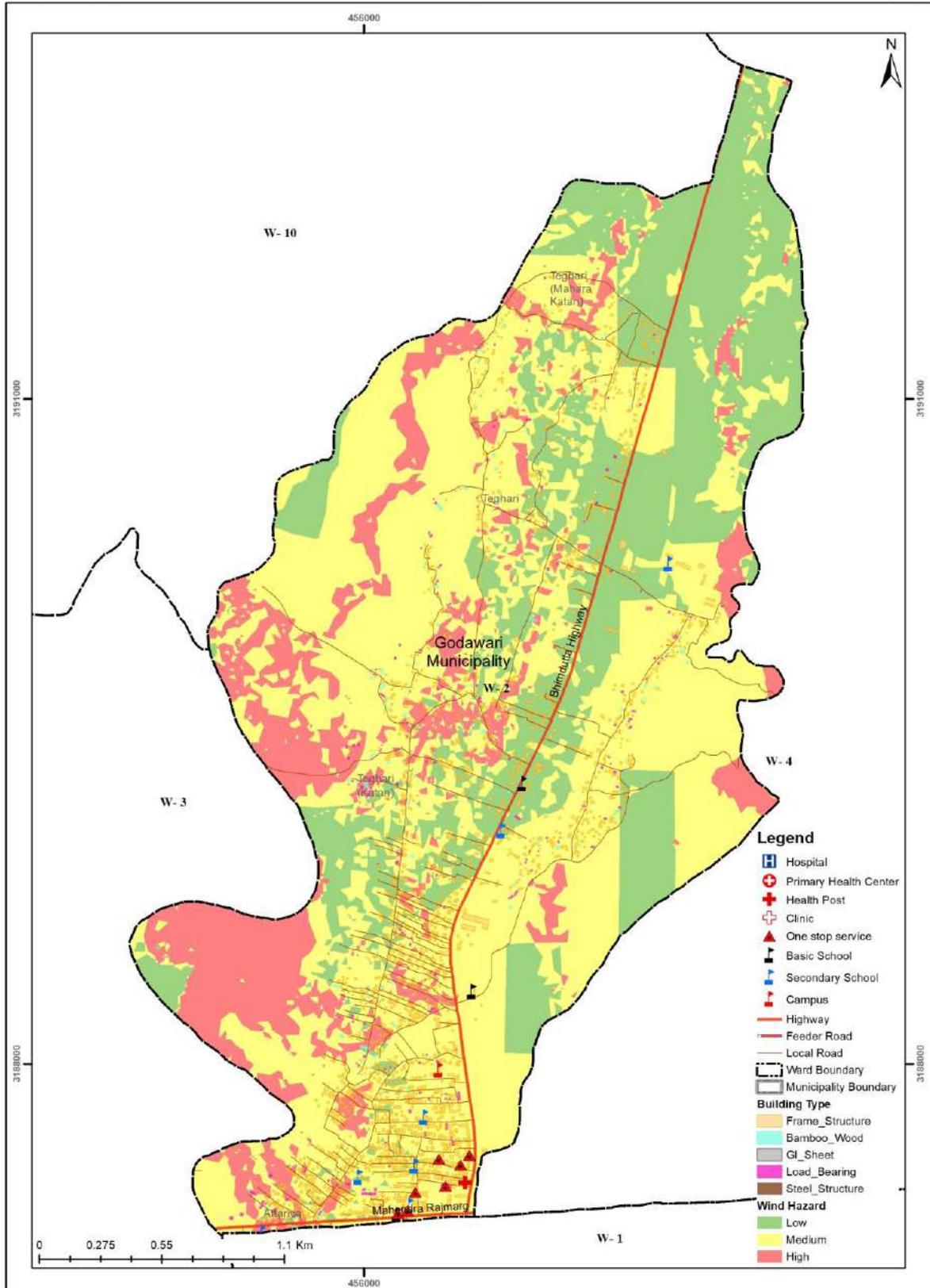


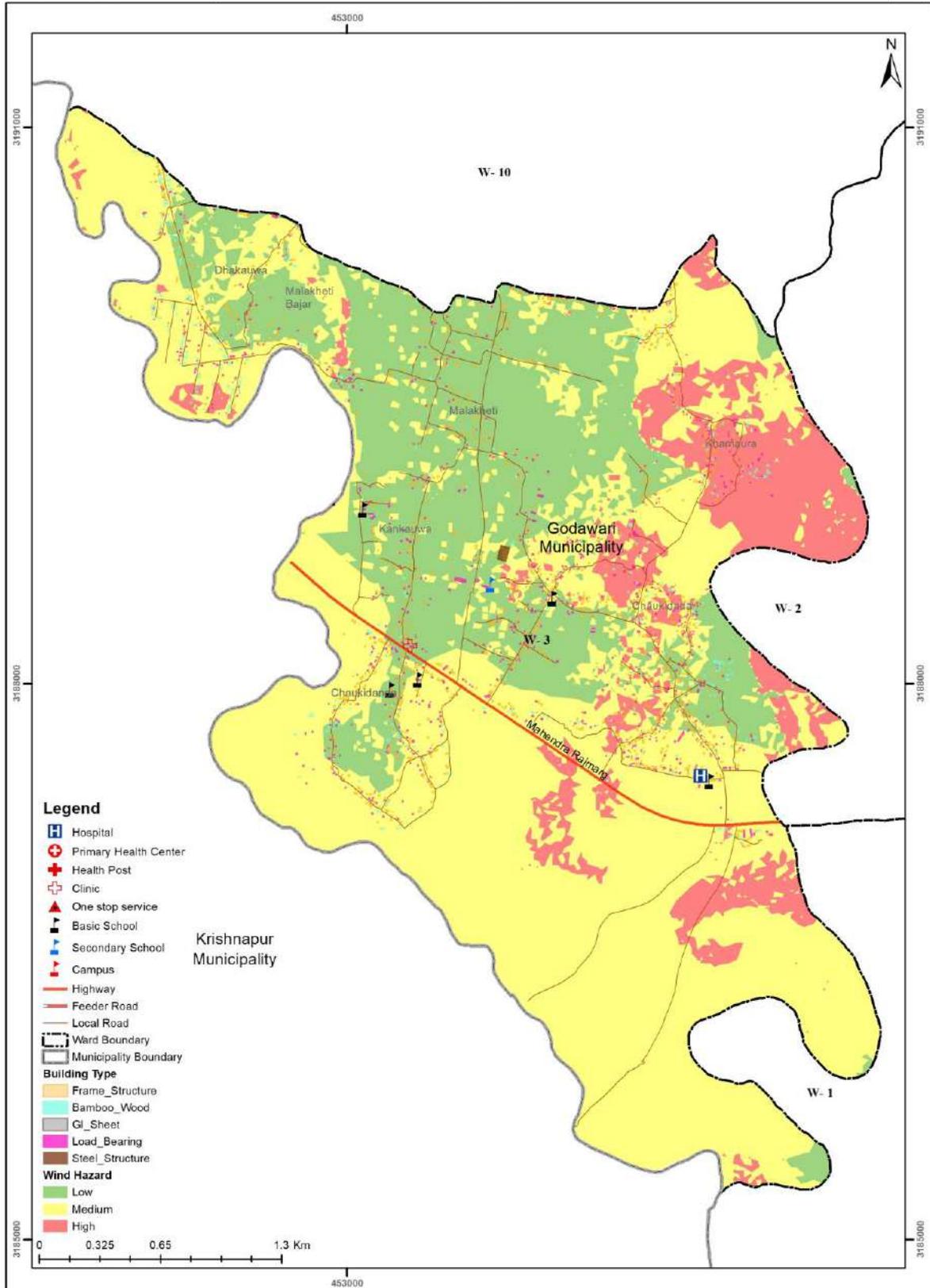


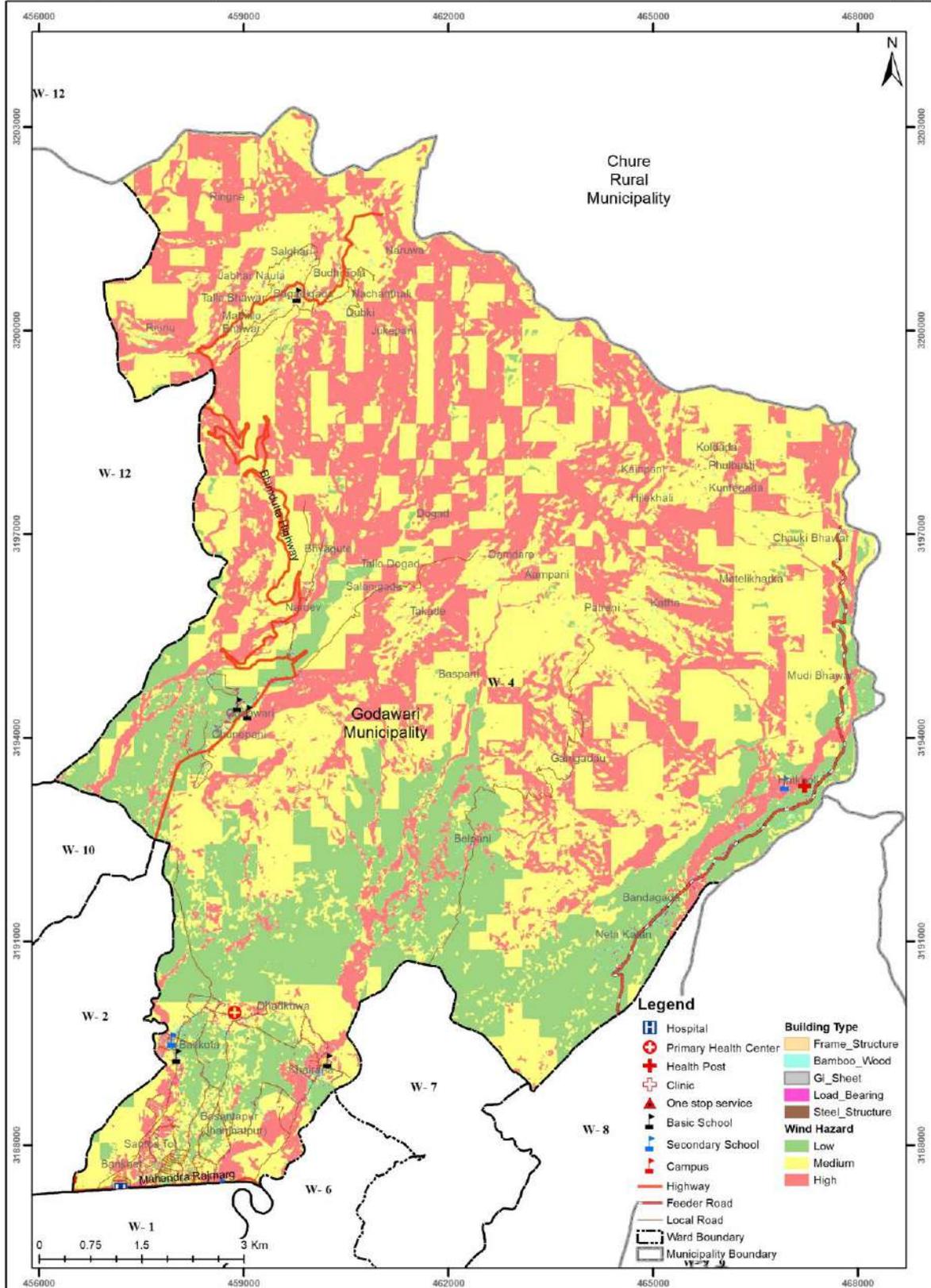


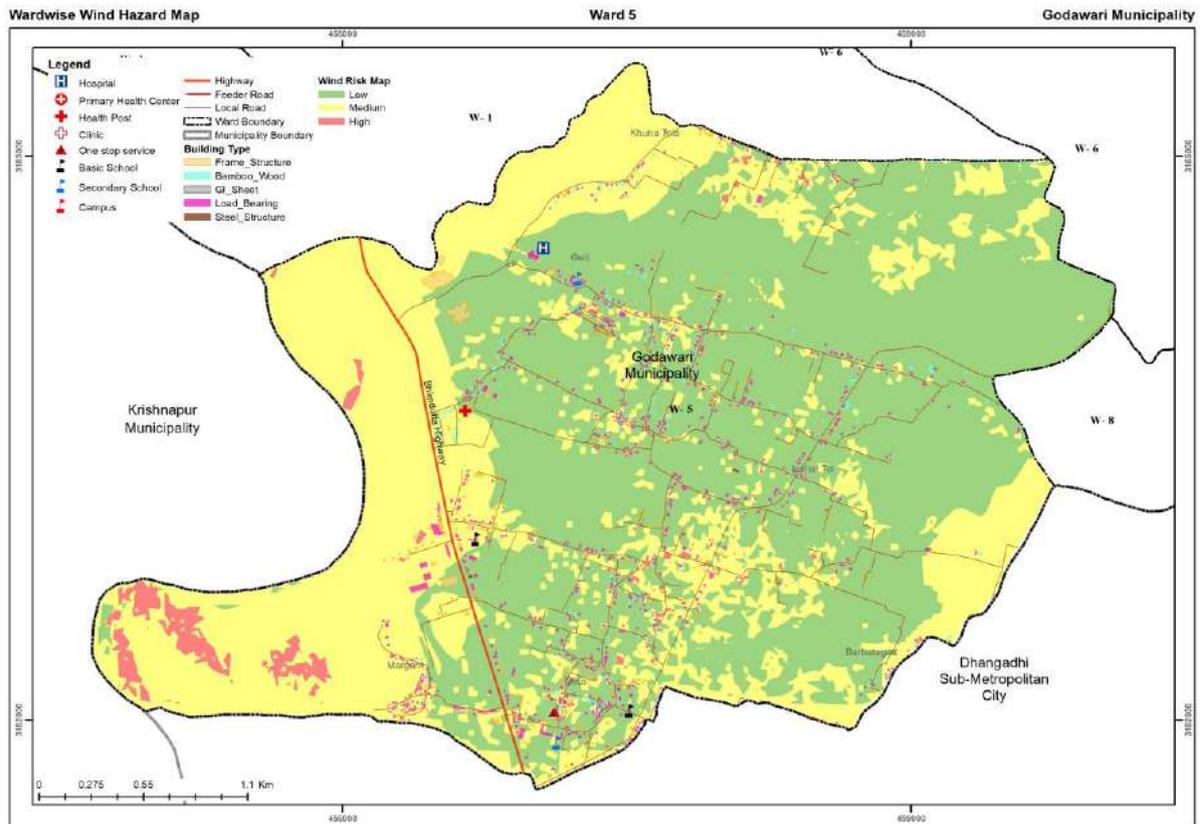
ANNEX XV: WARDWISE WIND HAZARD MAP OF GODAWARI MUNICIPALITY

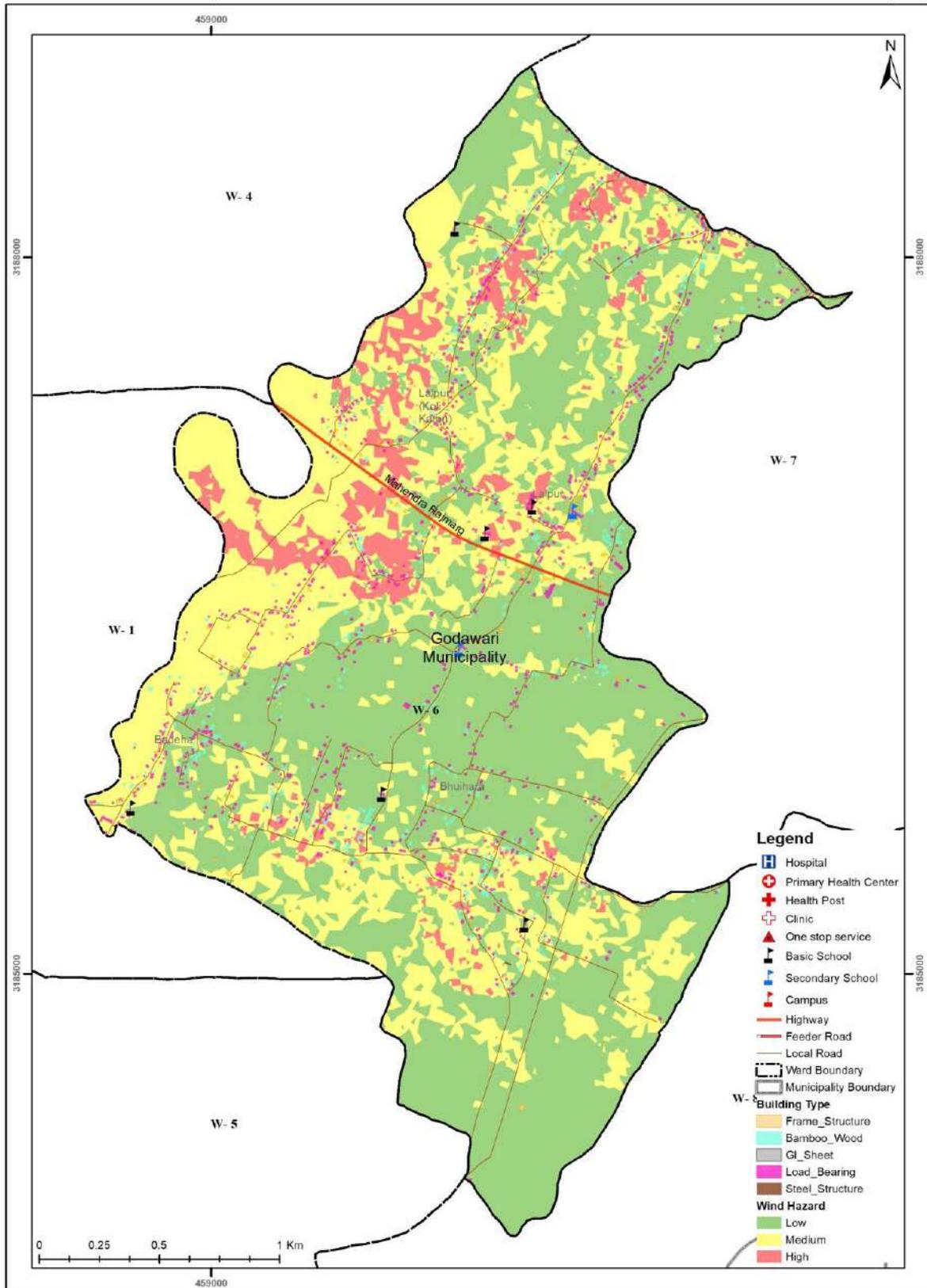


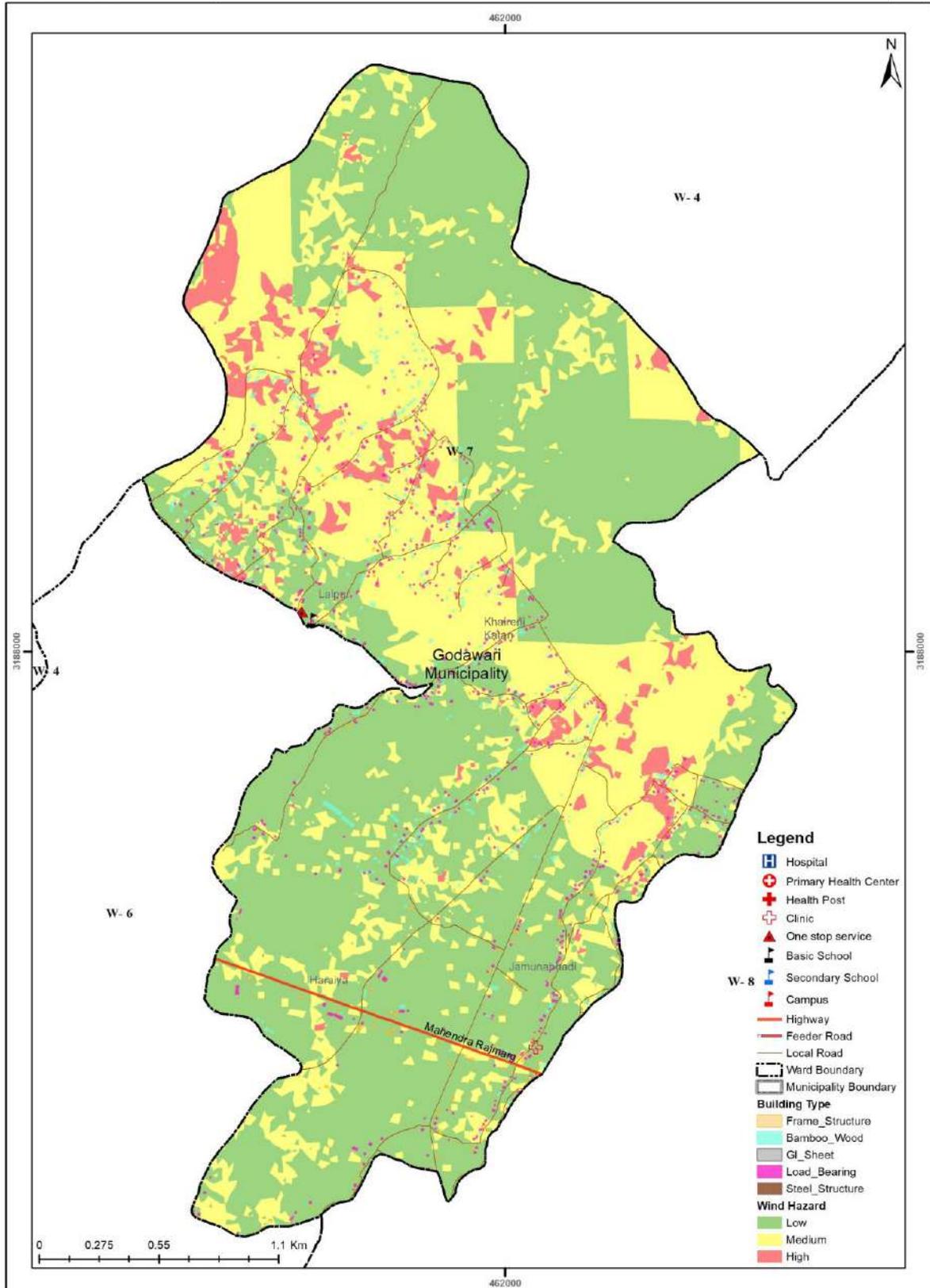


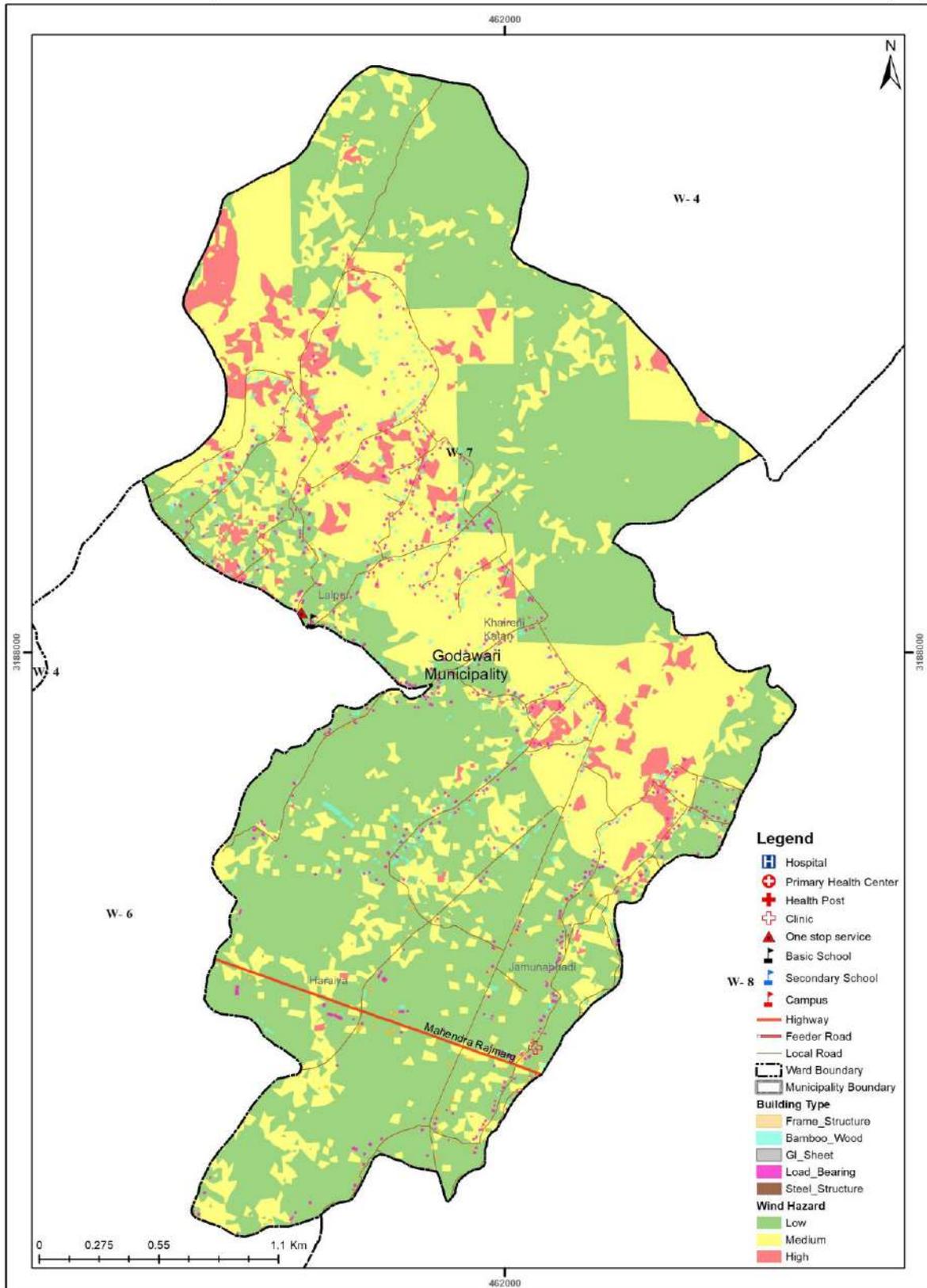


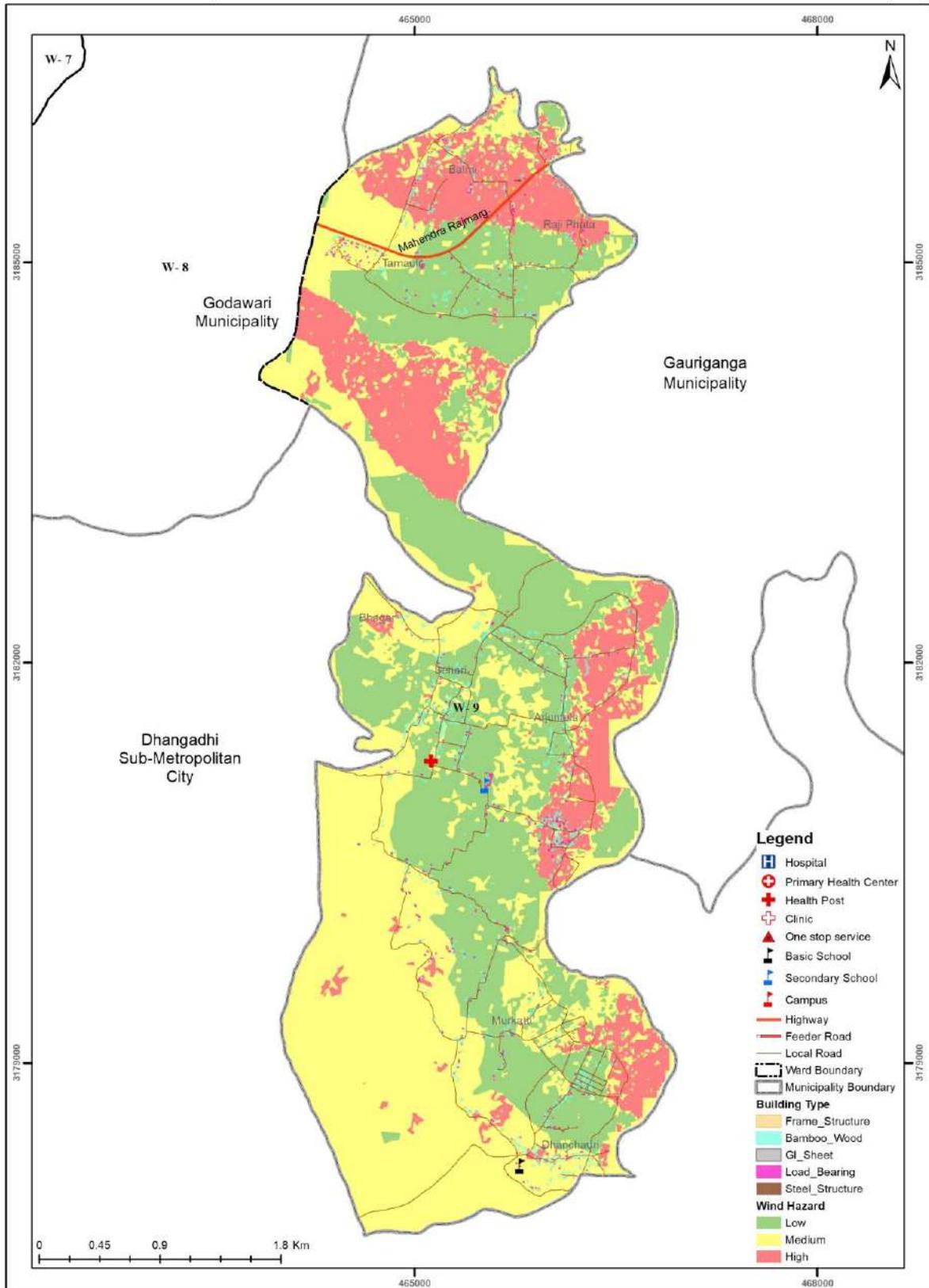


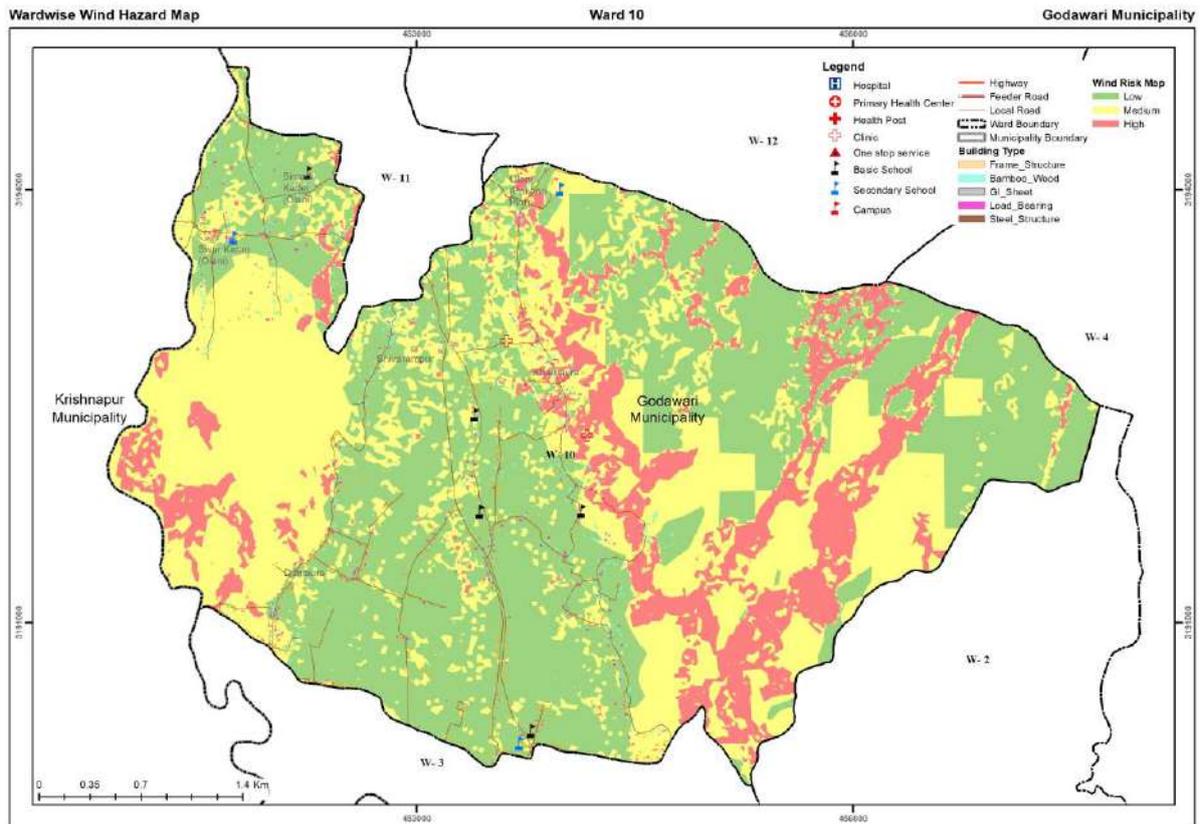


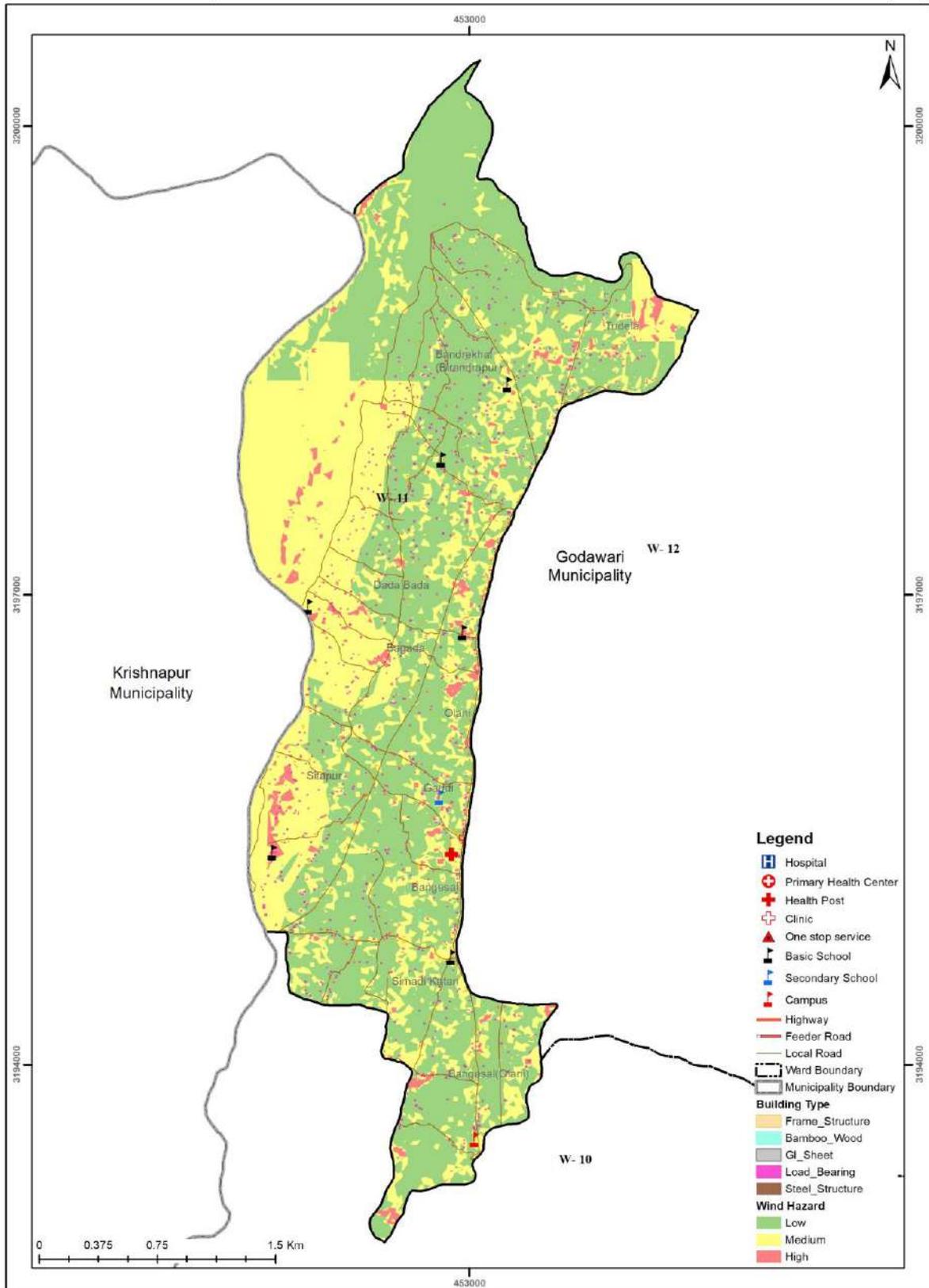


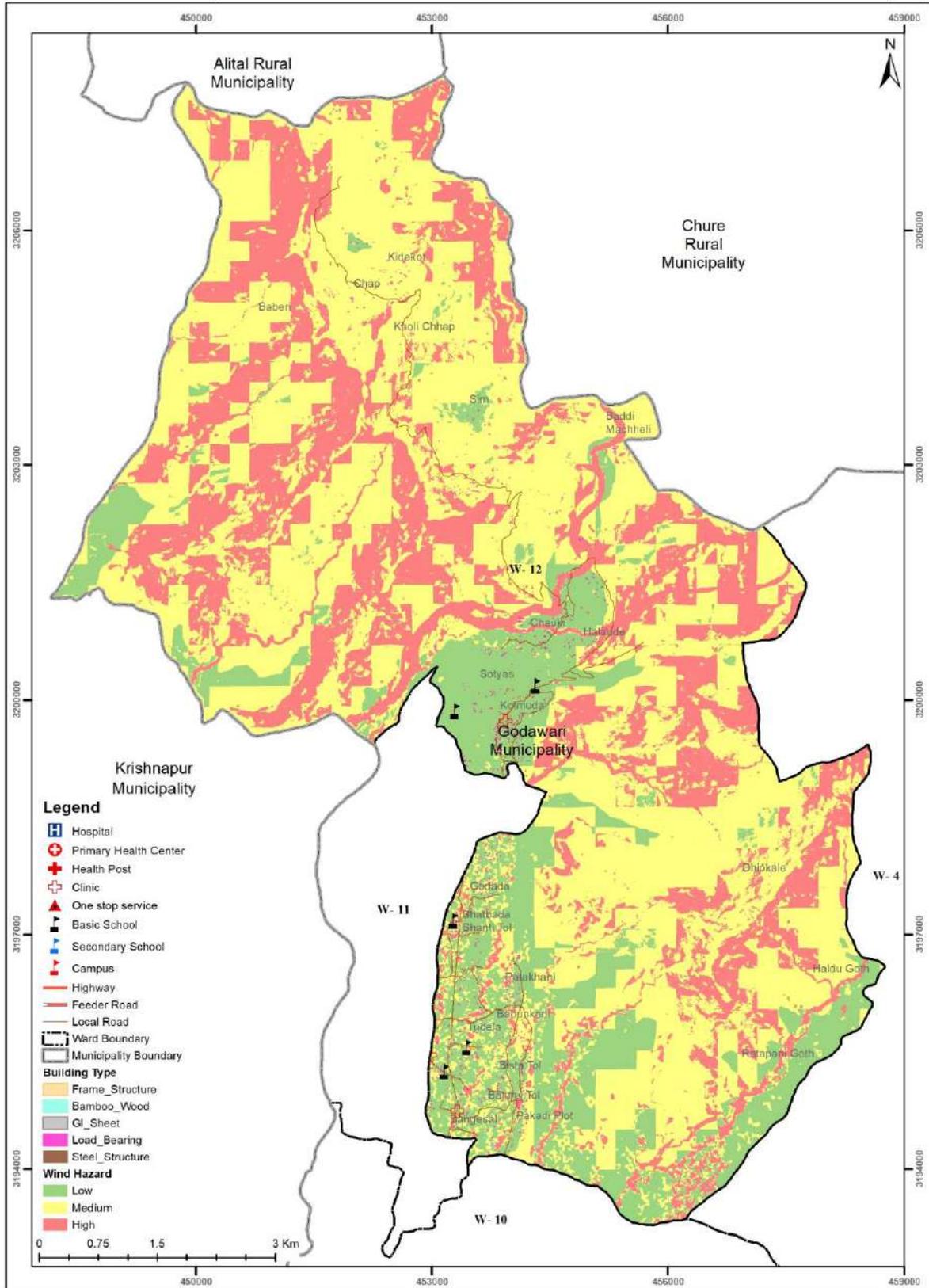




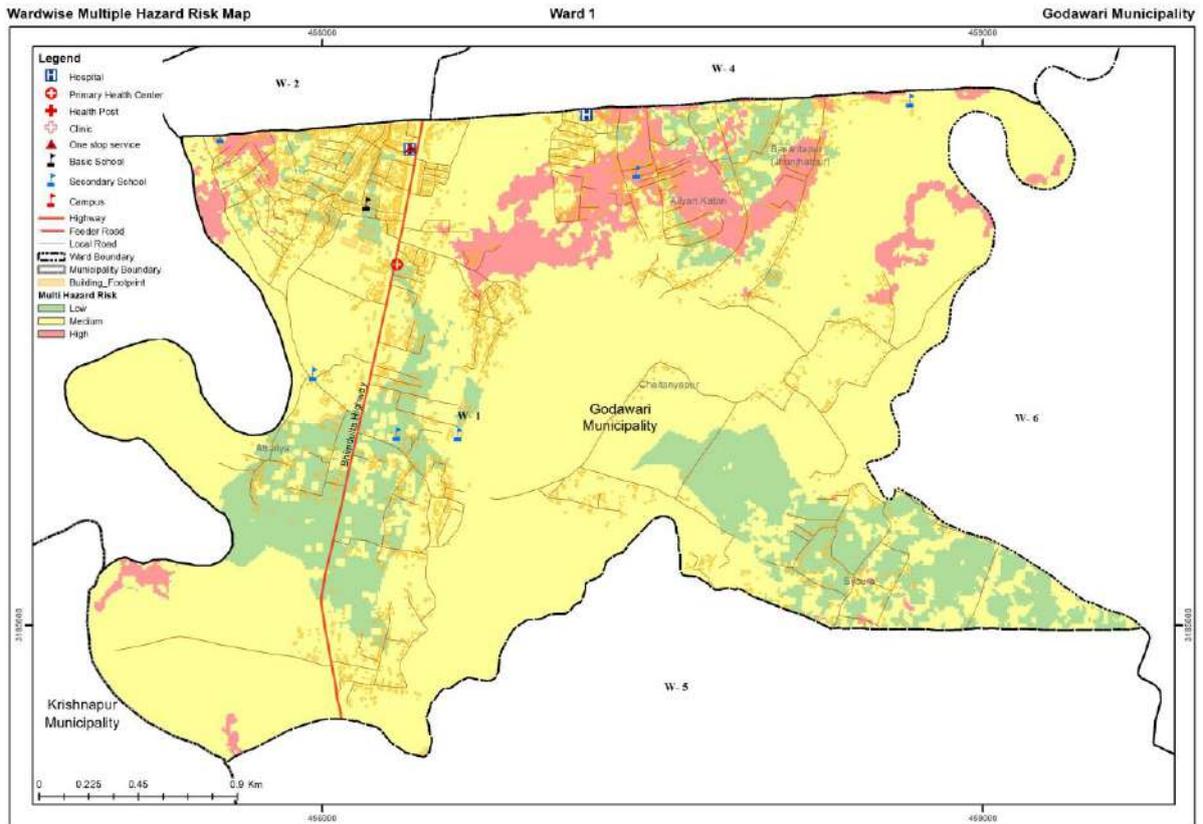


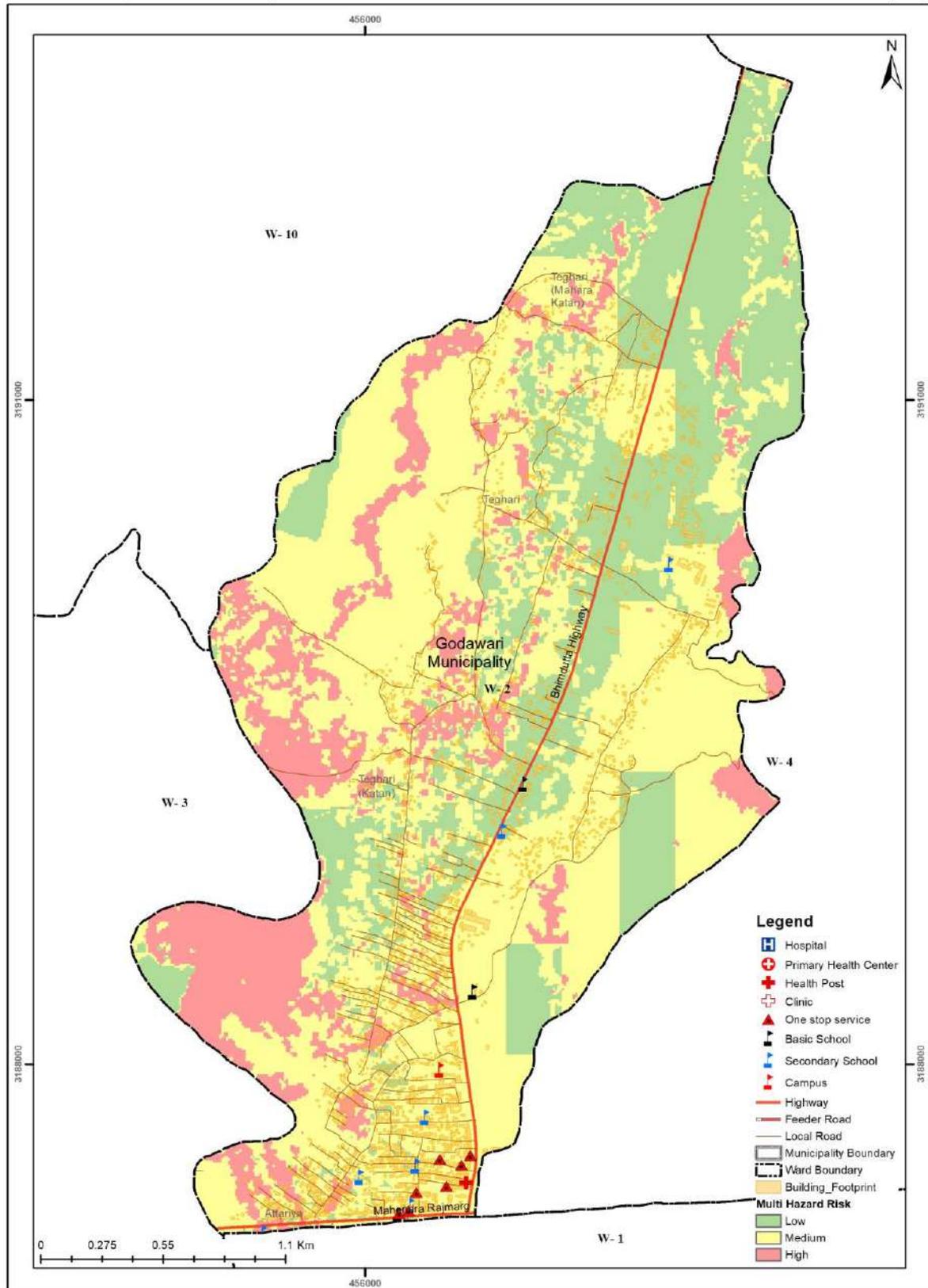


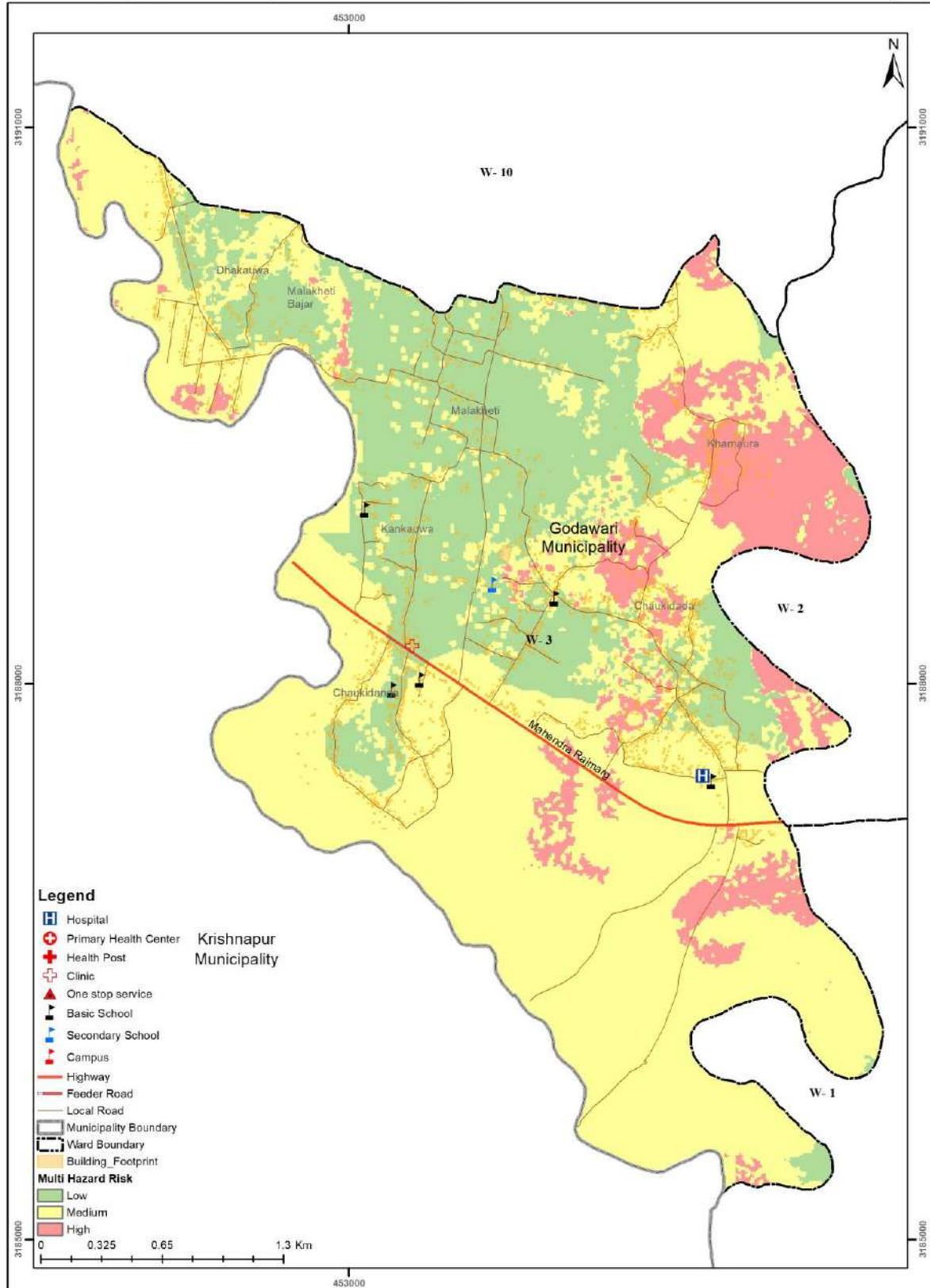


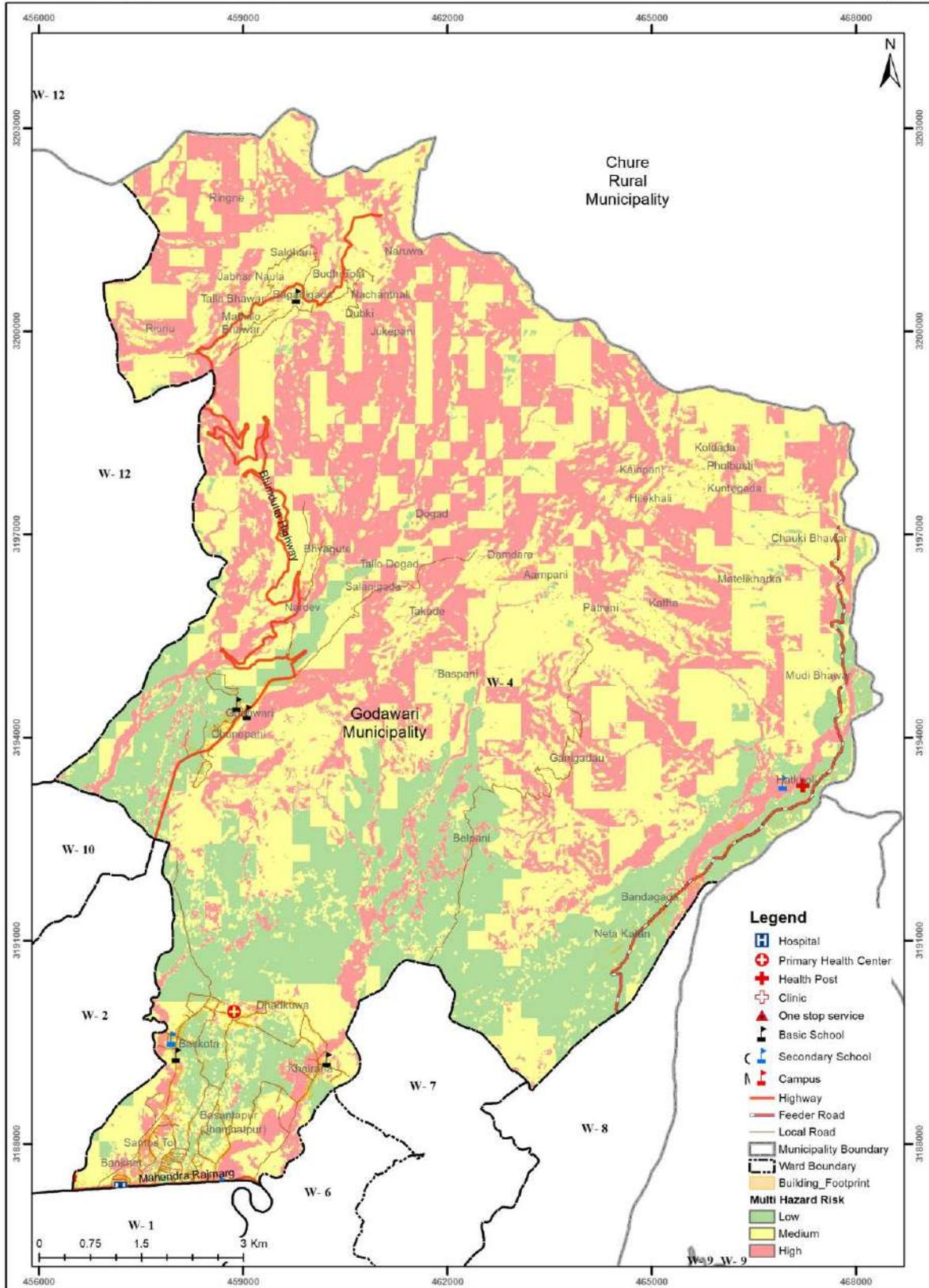


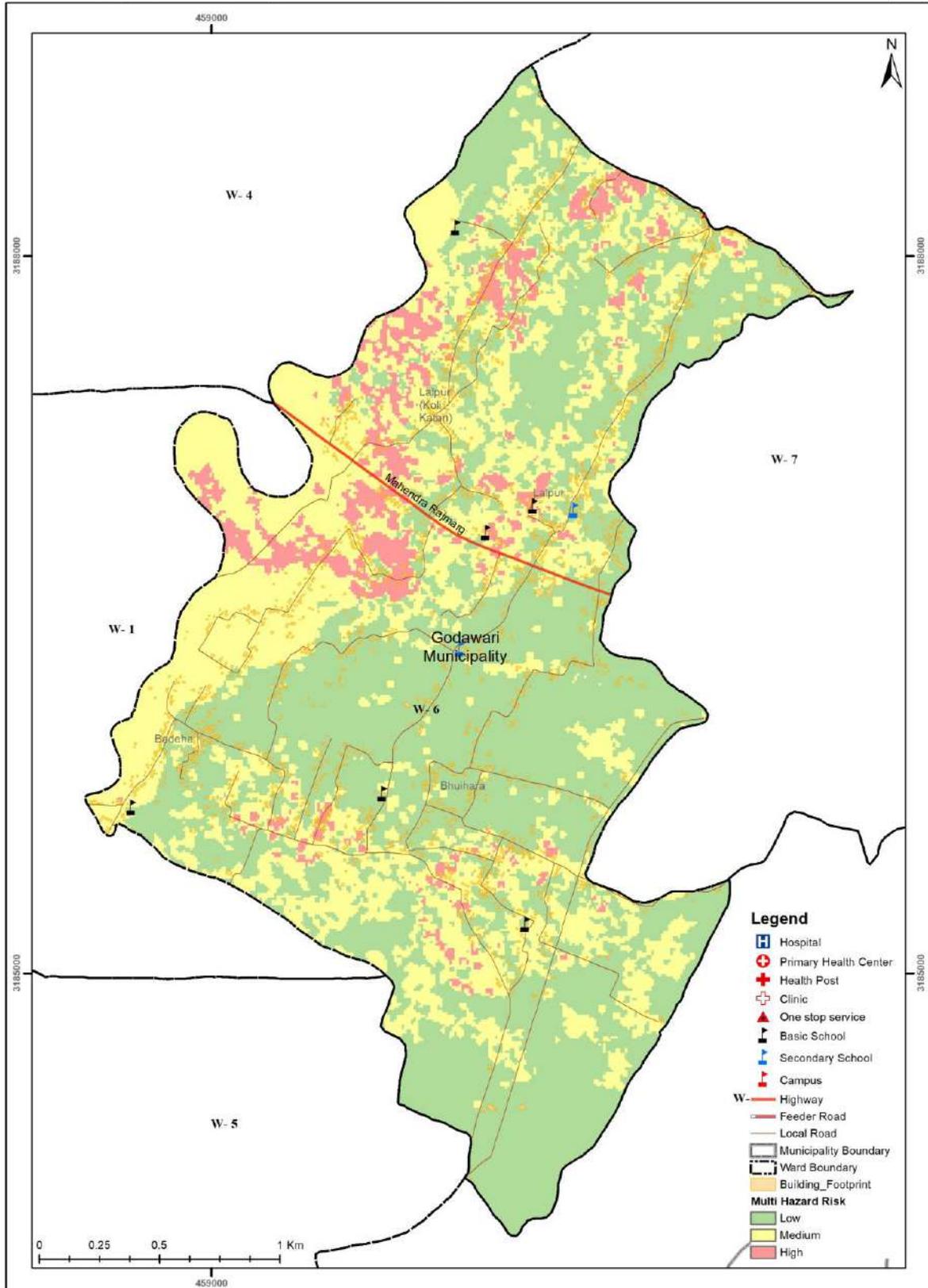
ANNEX XVI: WARDWISE MULTHAZARD MAP OF GODAWARI MUNICIPALITY

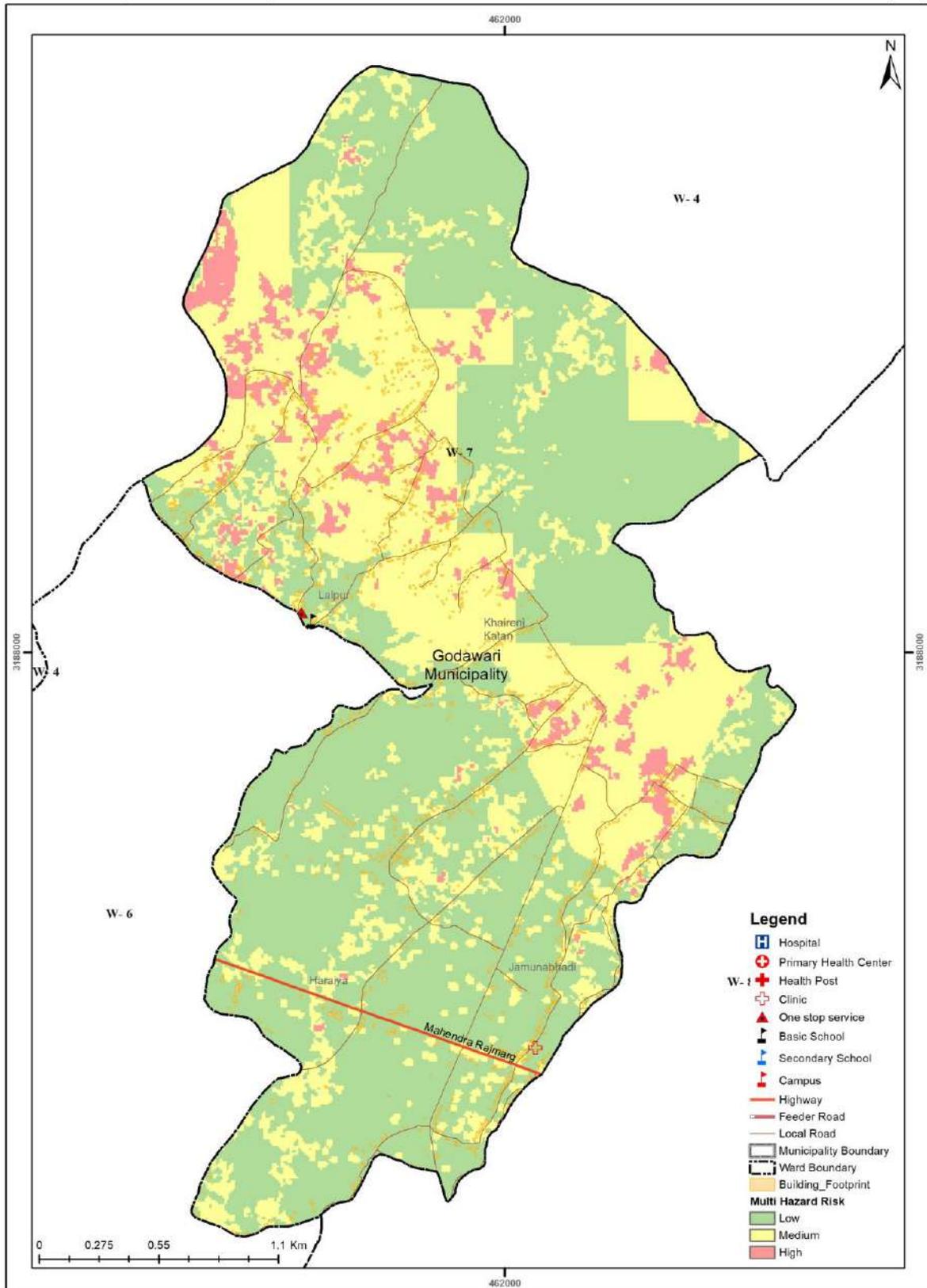


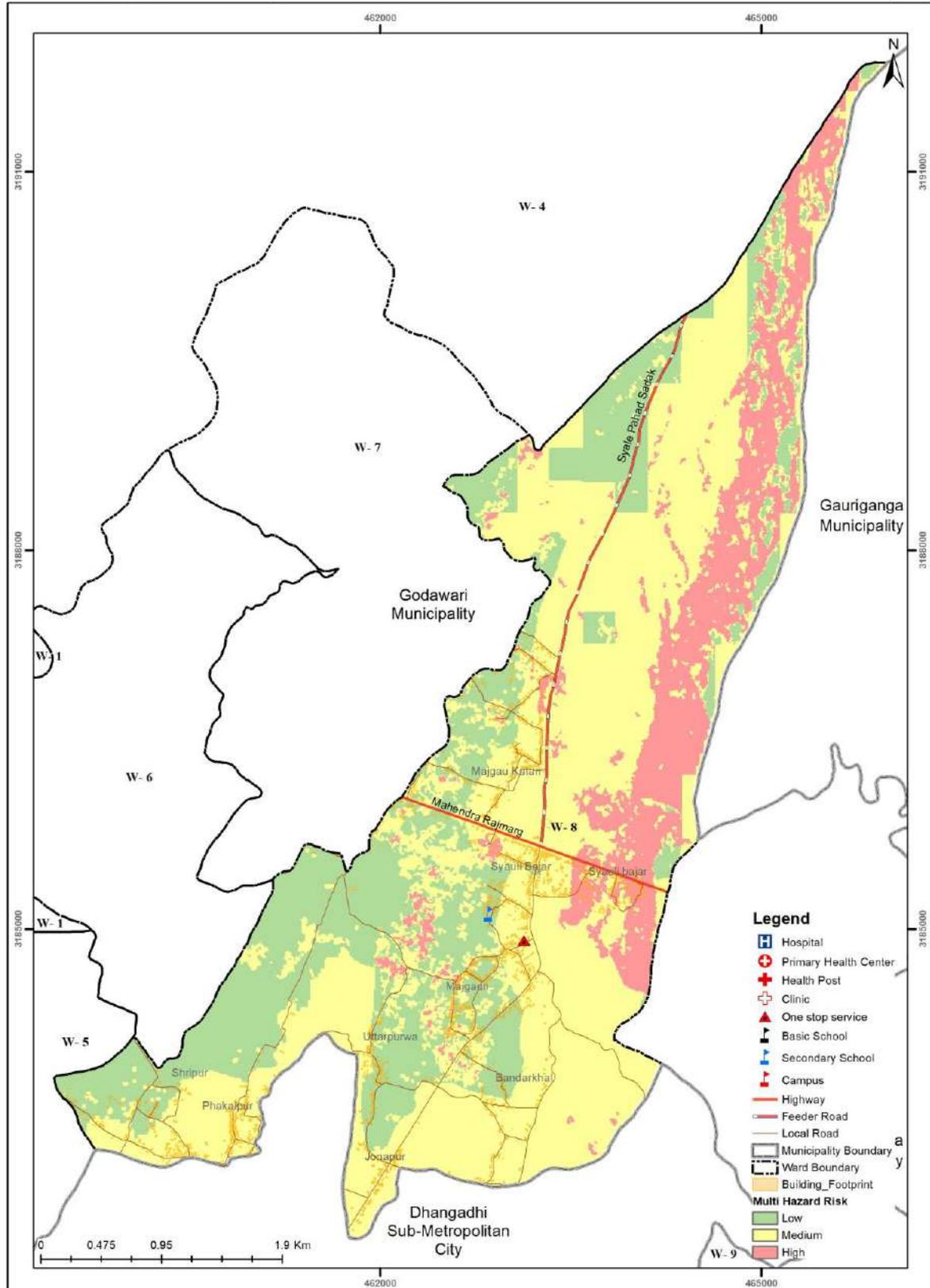


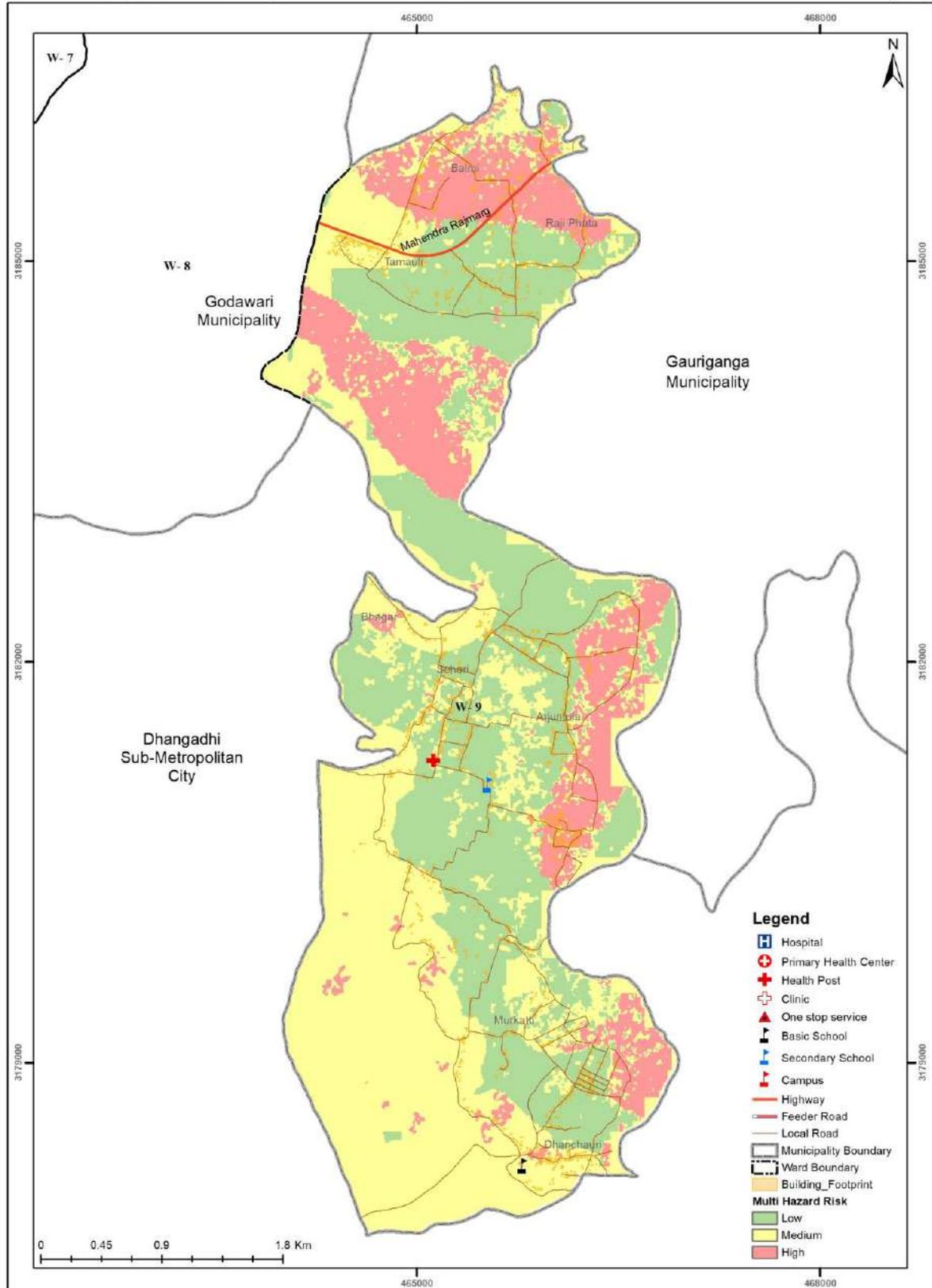


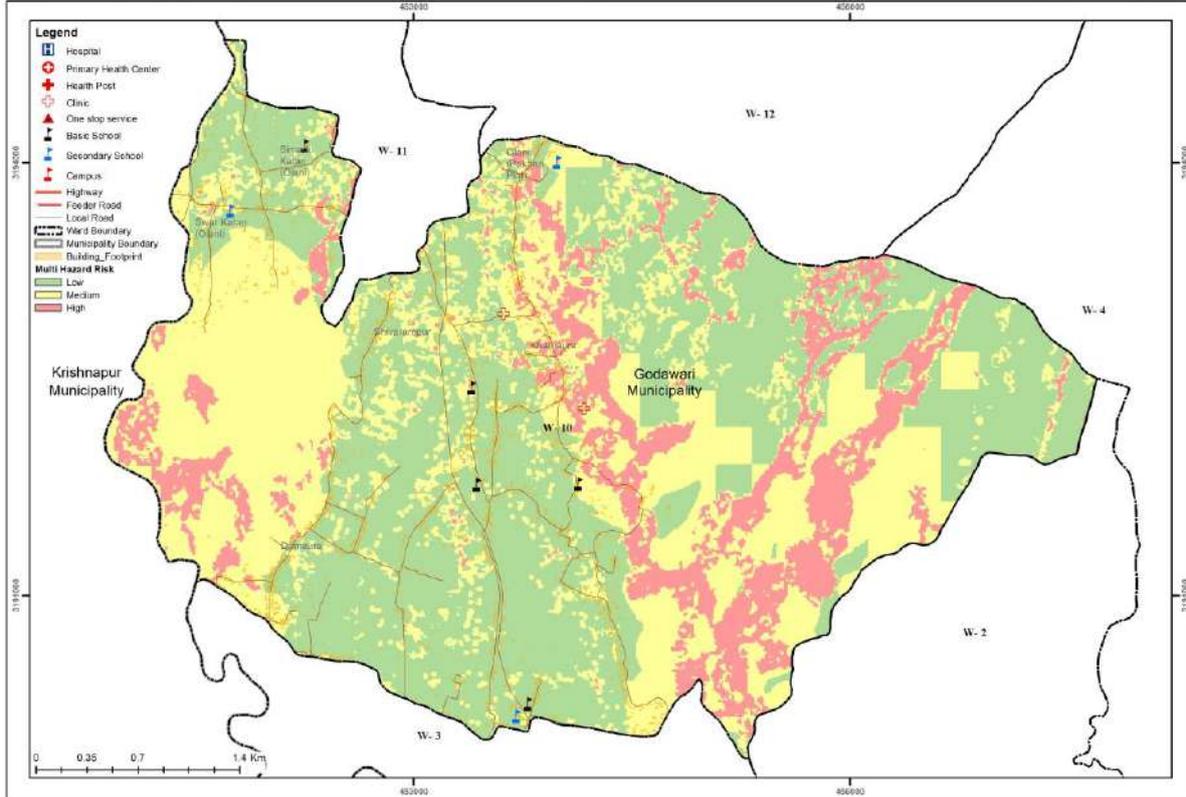


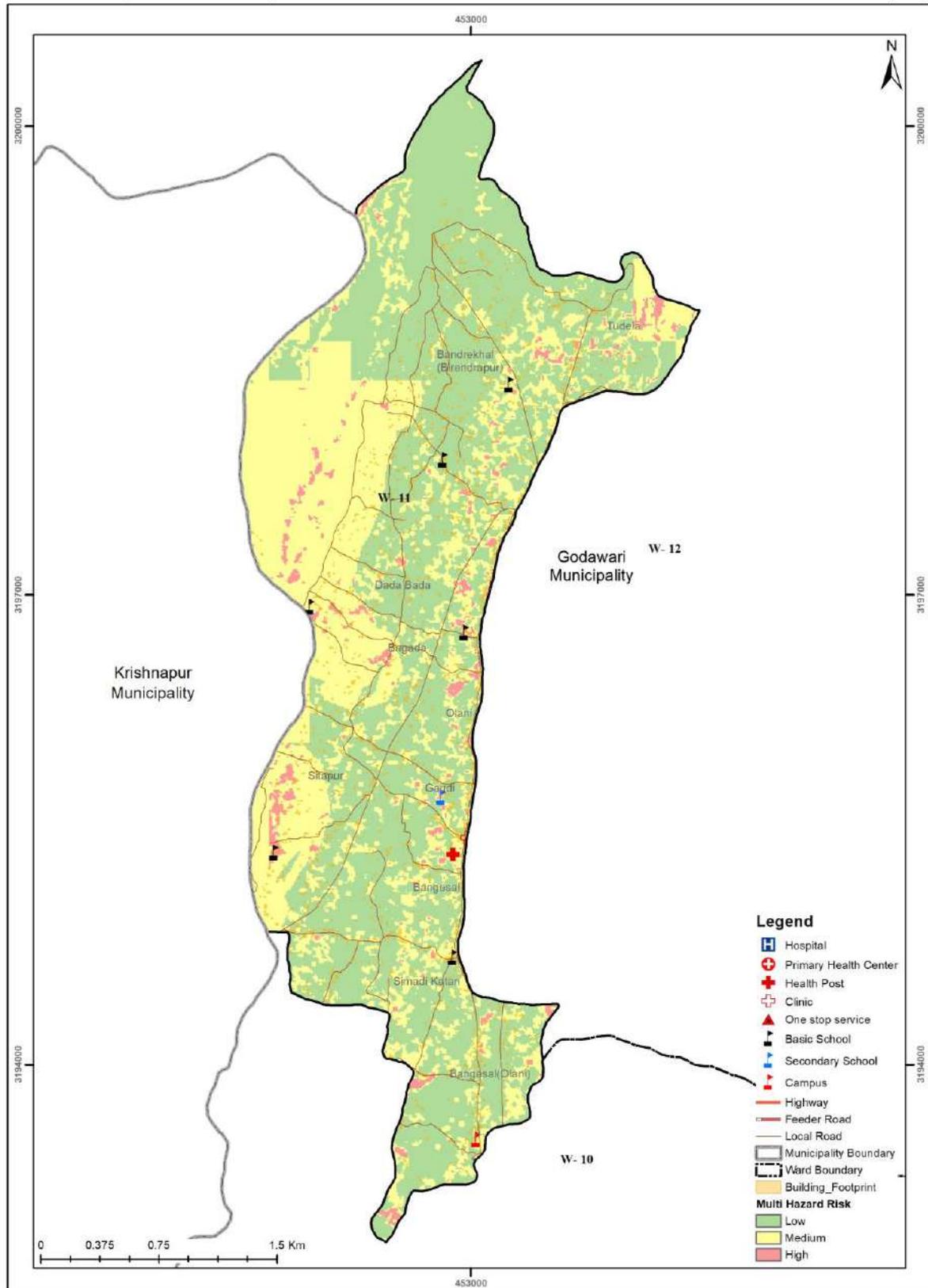


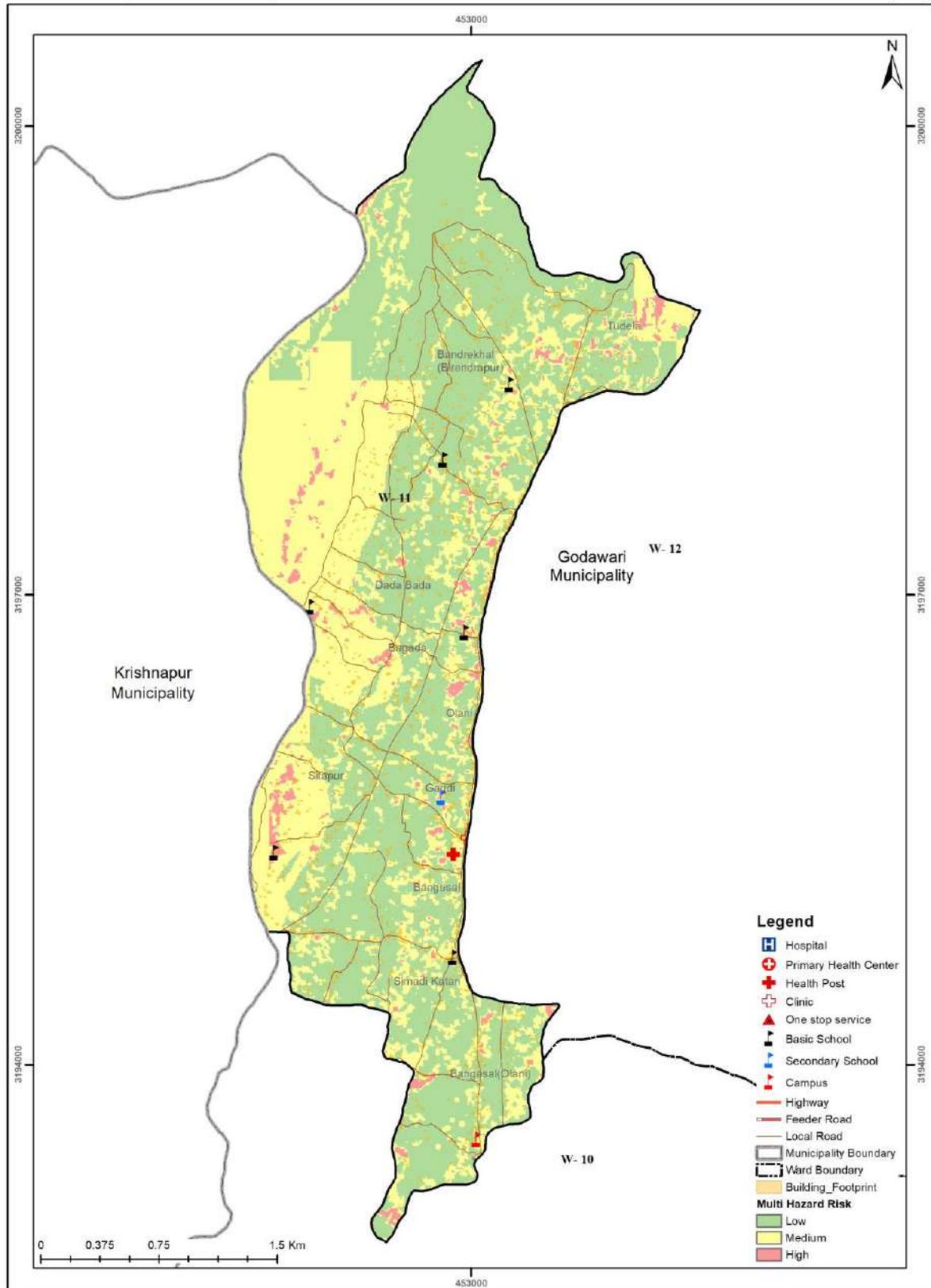






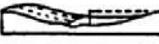
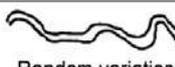






ANNEX XVII: FIELD MANUAL & GEOHAZARD ASSESSMENT THROUGH ENGINEERING GEOLOGICAL /GEOTECHNICAL SURVEY

Table I. Geomorphic factors that affect stream stability (modified after Brice and Blodgett, 1978).

| S.N. | Geomorphic Factors | Descriptions | | | | |
|------|---|---|--|---|---|-------------------|
| 1 | Stream size | Small (<30 m wide) | Medium (30 -150 m) | Wide (>150 m) | | |
| 2 | Flow habit | Ephemeral | Intermittent | Perennial but flashy | Perennial | |
| 3 | Bed material | Silt-clay | Silt | Sand | Gravel | Cobble or boulder |
| 4 | Valley setting |  No valley, alluvial fan |  Low relief valley (<30 m deep) |  Moderate relief (30 - 300 m) |  High relief (>300 m) | |
| 5 | Flood plains |  Little or none (<2X channel width) |  Narrow (2-10 channel width) |  Wide (>10 X channel width) | | |
| 6 | Natural levees |  Little or None |  Mainly on Concave |  Well Developed on both banks | | |
| 7 | Apparent incision |  Not Incised | |  Probably incised | | |
| 8 | Channel boundaries |  Alluvial |  Semi-alluvial |  Non-alluvial | | |
| 9 | Tree cover on banks | <50% of bankline | 50-90% | >90% | | |
| 10 | Sinuosity (Ratio of river length i.e. thalweg to the valley length) |  Straight (Sinuosity 1 - 1.05) |  Sinuous (1.06 -1.25) |  Meandering (1.25 - 2.0) |  Highly meandering (>2) | |
| 11 | Braided stream |  Not braided (<5%) |  Locally braided (5% - 35%) |  Generally braided (>35%) | | |
| 11 | Anabranchcd stream |  Not anabranchcd (<5%) percent |  Locally anabranchcd (5% - 35%) |  Generally anabranchcd (>35%) | | |
| 12 | Variability of width and development of bars |  Equiwidth |  Wider at bends |  Random variation | | |
| | |  Narrow point bar |  Wide point bars |  Irregular point and lateral bars | | |

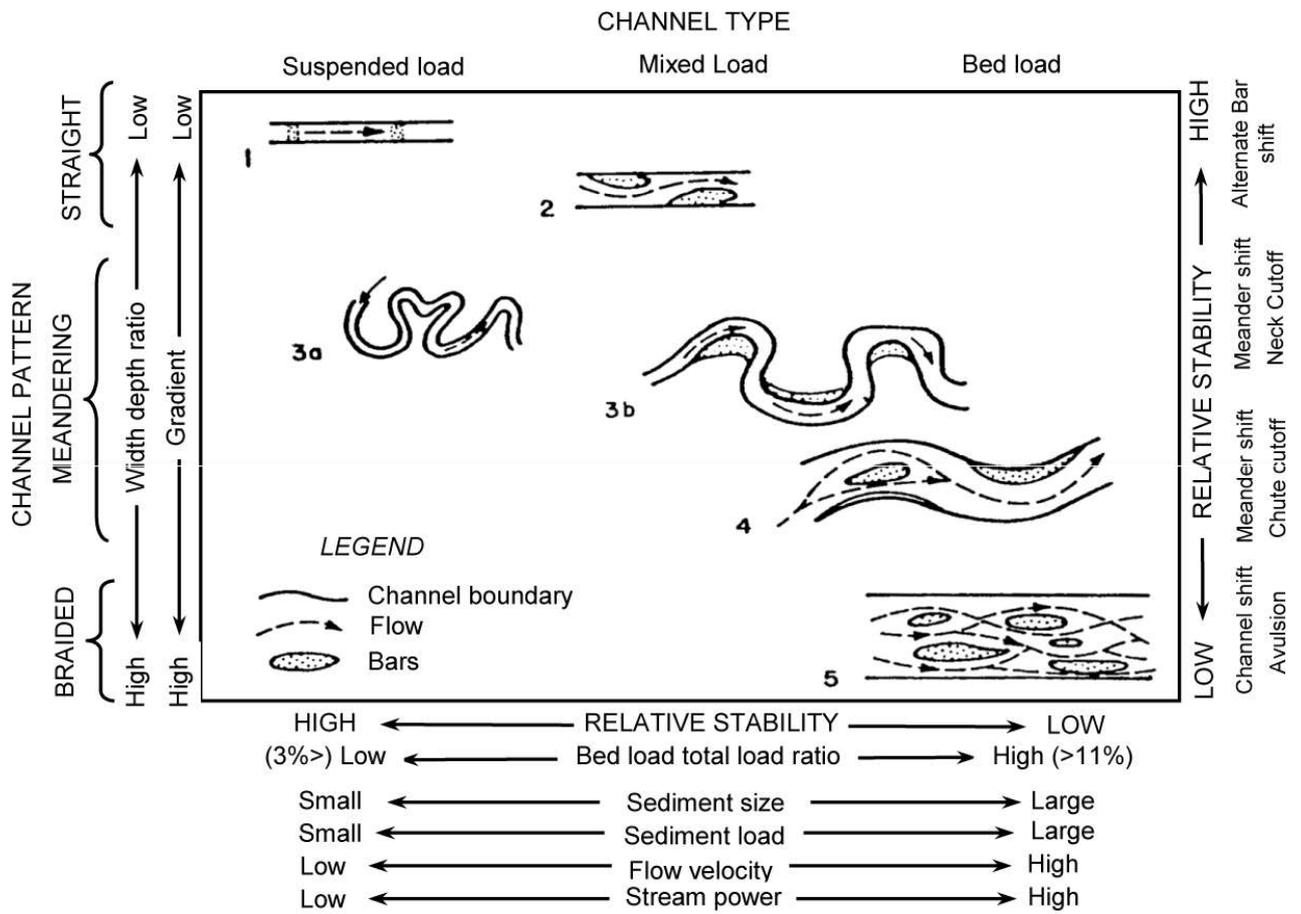


Fig. 1. Channel classification and relative stability as hydraulic factors are varied (modified after Shen et al., 1981).

Mapping of a River for Geomorphological Study

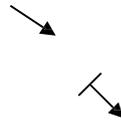
For morphological mapping of a river generally following features are taken in consideration.



- Map the main river terrace levels.
- Map the flood plain and point bars.
- Show the cut banks by the symbol:

- Indicate the rocky areas.
- Show the landslides by using the symbols as given below:

Soil Slide less than 10 m in
length
Rockslide less than 10 m
in length



Soil slide from 10 to 50 m in length



Rockslide from 10 to 50 m in length



Soil slide more than 50 m



Rockslide more than 50 m



- Show the alluvial fans by the symbol:



Show seepage zones by the symbol:



These general symbols are used for map preparation. The user can add or change these symbols as per the site conditions.

Table 2. Classification and Main Parameters of Soils.

| USCS Terms | Geotechnical Name | Common Grain Size Distribution (%) | | | | Liquid & Plasticity Limits. Plasticity Index (%) | | | Unit Weight - Water Content - Porosity | | | Shear Strength Components | | Permeability |
|------------|--|------------------------------------|------|------|--------|--|----------------|----------------|--|-------|-------|---------------------------|--------------------------|--------------------------------------|
| | | Clay | Silt | Sand | Gravel | W _L | W _P | I _P | γ (t/m ³)** | w (%) | n (%) | φ ['] * | c' (t/m ²)** | k (cm/sec) |
| GW | Clean gravel, well graded | 0 | 2 | 26 | 72 | - | - | - | 2.00±0.25 | 5±3 | 30±6 | 40±5 | 0 | 10 ⁻² to 10 ⁺¹ |
| GP | Clean gravel, poorly graded | 0 | 2 | 26 | 72 | - | - | - | 1.90±0.30 | 3±2 | 38±6 | 38±6 | 0 | 10 ⁻² to 10 ⁺¹ |
| GM | Silty gravel, poorly graded | 2 | 8 | 30 | 60 | 17 | 13 | 4 | 2.10±0.25 | 8±5 | 28±8 | 36±4 | 0 | 10 ⁻⁶ to 10 ⁻³ |
| GC | Clayey gravel, little fines | 3 | 9 | 23 | 65 | 25 | 15 | 10 | 2.05±0.20 | 11±6 | 32±8 | 34±4 | 0* | 10 ⁻⁸ to 10 ⁻⁵ |
| GM-ML | Silty gravel, many fines | 4 | 20 | 33 | 43 | 14 | 11 | ..3 | 2.15±0.25 | 14±9 | 30±10 | 35±5 | 0 | 10 ⁻⁶ to 10 ⁻³ |
| GM-GC | Silty to clayey gravel | 6 | 22 | 30 | 42 | 19 | 13 | 6 | 2.15±0.20 | 11±4 | 28±7 | 33±3 | 0.2±0.2* | 10 ⁻⁸ to 10 ⁻⁶ |
| GC-CL | Clayey gravel, many fines | 8 | 23 | 28 | 41 | 26 | 15 | 11 | 2.10±0.20 | 14±6 | 32±7 | 29±4 | 0.3±0.3* | 10 ⁻⁸ to 10 ⁻⁶ |
| GC-CH | Clayey gravel with high plasticity fines | 10 | 23 | 29 | 38 | 57 | 23 | 34 | 1.95±0.20 | 20±10 | 40±10 | 28±4 | 0.4±0.4* | 10 ⁻⁸ to 10 ⁻⁶ |
| SW | Clean sand, well graded | 0 | 2 | 76 | 22 | - | - | - | 1.95±0.20 | 13±10 | 36±10 | 38±5 | 0 | 10 ⁻³ to 10 ⁰ |
| SP | Clean sand, poorly graded | 0 | 2 | 76 | 22 | - | - | - | 1.85±0.25 | 11±9 | 38±10 | 36±6 | 0 | 10 ⁻³ to 10 ⁰ |
| SM | Silty sand with little fines | 2 | 9 | 75 | 14 | 26 | 22 | 4 | 2.00±0.25 | 17±7 | 37±10 | 34±3 | 0 | 10 ⁻⁶ to 10 ⁻³ |
| SC | Clayey sand with little fines | 5 | 7 | 76 | 12 | 25 | 15 | 10 | 1.95±0.20 | 20±10 | 40±10 | 32±4 | 0* | 10 ⁻⁸ to 10 ⁻⁶ |
| SM-ML | Silty sand with many fines | 4 | 28 | 60 | 8 | 15 | 12 | 3 | 2.00±0.20 | 20±9 | 38±9 | 34±3 | 0* | 10 ⁻⁶ to 10 ⁻³ |
| SM-SC | Silty to clayey sand | 9 | 32 | 45 | 14 | 19 | 13 | 6 | 2.10±0.20 | 15±8 | 32±10 | 31±3 | 0.5±0.5* | 10 ⁻⁸ to 10 ⁻⁶ |
| SC-CL | Clayey sand with many fines | 9 | 30 | 43 | 18 | 25 | 15 | 10 | 2.05±0.20 | 19±10 | 36±11 | 28±4 | 0.5±0.5* | 10 ⁻⁸ to 10 ⁻⁶ |
| SC-CH | Clayey sand with high plasticity fines | 12 | 31 | 54 | 3 | 37 | 23 | 14 | 1.85±0.20 | 35±15 | 49±10 | 27±3 | 1.0±1.0* | 10 ⁻⁸ to 10 ⁻⁶ |
| ML | Silt | 6 | 64 | 29 | 1 | 30 | 26 | 4 | 1.90±0.25 | 32±21 | 47±15 | 33±4 | 0* | 10 ⁻⁶ to 10 ⁻³ |
| CL-ML | Silt to clayey silt | 12 | 38 | 26 | 4 | 20 | 14 | 6 | 2.10±0.15 | 19±7 | 35±8 | 30±4 | 1.5±1.0* | 10 ⁻⁸ to 10 ⁻⁵ |
| CL | Clayey silt | 20 | 61 | 16 | 3 | 33 | 17 | 16 | 2.00±0.15 | 25±10 | 41±8 | 27±4 | 2.0±1.0* | 10 ⁻⁸ to 10 ⁻⁶ |
| CH | High plasticity clay | 22 | 59 | 18 | 1 | 64 | 25 | 39 | 1.75±0.15 | 47±24 | 56±9 | 22±4 | 2.5±1.0* | 10 ⁻⁸ to 10 ⁻⁶ |
| OL | Organic clayey silt | 4 | 70 | 25 | 1 | 42 | 29 | 13 | 1.70±0.15 | 48±13 | 57±8 | 25±4 | 1.0±0.5* | 10 ⁻⁶ to 10 ⁻⁴ |
| OH | Organic clay | 12 | 70 | 17 | 1 | 71 | 40 | 31 | 1.55±0.15 | 68±22 | 66±8 | 22±4 | 1.0±0.5* | 10 ⁻⁸ to 10 ⁻⁶ |
| MH | Inorganic silt of high compressibility | 10 | 65 | 25 | 0 | 68 | 38 | 30 | 1.55±0.15 | 73±20 | 67±7 | 24±6 | 0.5±0.5* | 10 ⁻⁶ to 10 ⁻⁴ |

** Multiply tons by 9.806 to obtain kN/m³ for γ and kN/m² for c' * Undrained tests

** Remark: The quantities c and Φ refer to total stresses while c' and φ' refer to *effective stresses*. They depend not only on the type of soil but also on the moisture conditions of testing in the content (and on the field. They should therefore be regarded as empirical constants and not as fundamental soil properties. The term c or c' is usually called the *apparent cohesion*, while φ or φ' is known as the *angle of shearing resistance*. In the case of bridge site geotechnical investigations, due to the major difficulty to carry out detailed tests, c or c' or φ and φ' given on various tables can be considered as constants that can be used without distinction. The same applies to rock c and φ values.

Field Identification Soil

Table 3. Grading and grain roundness of geological soils

| GRADING AND GRAIN ROUNDNESS OF GEOLOGICAL SOILS | | | | |
|---|-------------------|-------------------|-----------------|---------------------------|
| GEOLOGIC SOIL | WELL GRADED | MEDIUM GRADE | POORLY GRADED | GRAIN ROUNDNESS |
| Alluvial terraces | Frequently | Rather rarely | Rarely | Well-rounded - rounded |
| Alluvial fans | Frequently | Rather frequently | Rarely | Well-rounded - rounded |
| Debris flow layers in alluvium | Rather rarely | Frequently | Frequently | Rounded - sub-rounded |
| Glacio-fluviatile | Rather frequently | Frequently | Rather rarely | Rounded - sub-rounded |
| Glacial deposits | Rarely | Rather frequently | Frequently | Sub rounded - sub-angular |
| Colluvium (slope debris) | Extremely rarely | Rarely | Very frequently | Angular |
| Residual soils | Rarely | Rather rarely | Frequently | Sub-angular - Angular |

The grain size of soil is identified in the field as follows:

1. Boulder is larger than the palm size
2. Cobble is approximately the palm size
3. Pebble is about the size obtained by joining the thumb and fore finger
4. Granule (gravel) is about the size of the little fingertip.
5. Sand is smaller than 1/4 inch or sometimes less than 4.75 mm, but it is visible to the unaided eye.
6. Silt is invisible to the unaided eye, it feels soft with hand, but gritty while 'eating'
7. Clay is soft and soapy, no gritty feeling while 'eating'.

The soil can be classified as:

Coarse-grained soil (Boulder, cobble, pebble, and granule); and Fine-grained: sand, silt, and clay.

The other properties of the soil are the following:

- **Shape:** ball-shaped (equant), disk-shaped (tabular), cigar-shaped (prolate)
- **Roundness** (lack of corners and edges): angular, sub-angular, sub-rounded, rounded, well rounded
- **Moisture content:** dry, moist, wet
- **Plasticity** (possible to make 3 mm long ribbon): High, medium, low
- **Grading:** Well graded, Poorly graded
- **Porosity:** ratio of volume of voids to the total volume
- **Permeability:** rate of flow of water through the voids.

Engineering Classification of Soils

The Unified Soil Classification System (USCS) is applied for the classification of all types of soil. **Fig. 2** illustrates a field classification method for the coarse-grained and fine-grained soils. For this purpose, it is necessary to determine the ratio of grains visible to the unaided eye. **Fig. 3** provides the guidelines to estimate the particles visible to the unaided eye. A dull surface indicates silt or clay of low plasticity.

| | | | | | | | | | | | | | |
|------------------------------------|---|---|-------------------------------------|--|---|---|--------------------------------------|--|--------------------------------------|------------------------------------|------------------------------|---------------------------------------|-----------|
| COARSE-GRAINED SOILS | More than half of the material (by weight) is of individual grains visible to the naked eye <input type="radio"/> | No. 200 sieve (e.g. - 0.075 mm) is about the smallest particle visible to naked eye | GRAVEL AND GRAVELLY SOILS | More than half of coarse fraction (by weight) is larger than 6mm size <input type="radio"/> | CLEAN GRAVELS | Wide range in grain size and substantial amounts of all intermediate particle sizes <input type="radio"/> | GW | | | | | | |
| | | | | | Will not leave a dirt on a wet palm <input type="radio"/> | Predominantly one size or a range of sizes with some intermediate sizes missing <input type="radio"/> | GP | | | | | | |
| | | | | | DIRTY GRAVELS | Nonplastic fines or fines with low plasticity (for identification of fines see characteristics of ML below) <input type="radio"/> | GM | | | | | | |
| | | | | | Will leave a dirt stain on a wet palm <input type="radio"/> | Plastic fines (for identification of fines see characteristics of CL or CH below) <input type="radio"/> | GC | | | | | | |
| | | | | | CLEAN SANDS | Wide range in grain size and substantial amounts of all intermediate particle sizes | SW | | | | | | |
| | | | | | Will not leave a dirt on a wet palm <input type="radio"/> | Predominantly one size or a range of sizes with some intermediate sizes missing <input type="radio"/> | SP | | | | | | |
| | | | SANDS AND SANDY SOILS | More than half of coarse fraction (by weight) is smaller than 6mm size <input type="radio"/> | DIRTY SANDS | Nonplastic fines or fines with low plasticity (for identification of fines see characteristics of ML below) <input type="radio"/> | SM | | | | | | |
| | | | | | Will leave a dirt stain on a wet palm <input type="radio"/> | Plastic fines (for identification of fines see characteristics of CL or CH below) <input type="radio"/> | SC | | | | | | |
| | | | | | SILTS AND CLAYS | (High Liquid limit) <input type="radio"/> See identification procedures | Slight <input type="radio"/> | Rapid <input type="radio"/> | Low to None <input type="radio"/> | None <input type="radio"/> | Dull <input type="radio"/> | ML | |
| | | | | | | | | Medium to High <input type="radio"/> | Medium to slow <input type="radio"/> | Medium <input type="radio"/> | Weak <input type="radio"/> | Slight to Shiny <input type="radio"/> | CL |
| | | | | | | | | Pronounced Organic <input type="radio"/> | Slow to None <input type="radio"/> | Low (spongy) <input type="radio"/> | None <input type="radio"/> | Dull to Slight <input type="radio"/> | OL |
| | | | | | | | | Very High <input type="radio"/> | None <input type="radio"/> | High <input type="radio"/> | Strong <input type="radio"/> | Shiny <input type="radio"/> | CH |
| SILTS AND CLAYS | (Low Liquid limit) <input type="radio"/> See identification procedures | Medium <input type="radio"/> | Slow to None <input type="radio"/> | Medium to High <input type="radio"/> | Low to None <input type="radio"/> | Slight <input type="radio"/> | MH | | | | | | |
| | | | High <input type="radio"/> | None <input type="radio"/> | Low to Medium (spongy) <input type="radio"/> | Weak <input type="radio"/> | Dull to Slight <input type="radio"/> | OH | | | | | |
| HIGHLY ORGANIC SOILS | | | | | Readily identified by colour, odor, spongy feel and frequently by fibrous texture <input type="radio"/> | PT | | | | | | | |
| GRAIN SHAPE | | | | | | | | | | | | | |
| Well_Rounded <input type="radio"/> | Rounded <input type="radio"/> | Sub-Rounded <input type="radio"/> | Alluvium <input type="radio"/> | | | | | | | | | | |
| Sub-Angular <input type="radio"/> | Angular <input type="radio"/> | | Colluvium <input type="radio"/> | | | | | | | | | | |
| | | | Residual soil <input type="radio"/> | | | | | | | | | | |

Fig. 2. Field identification method of soils.

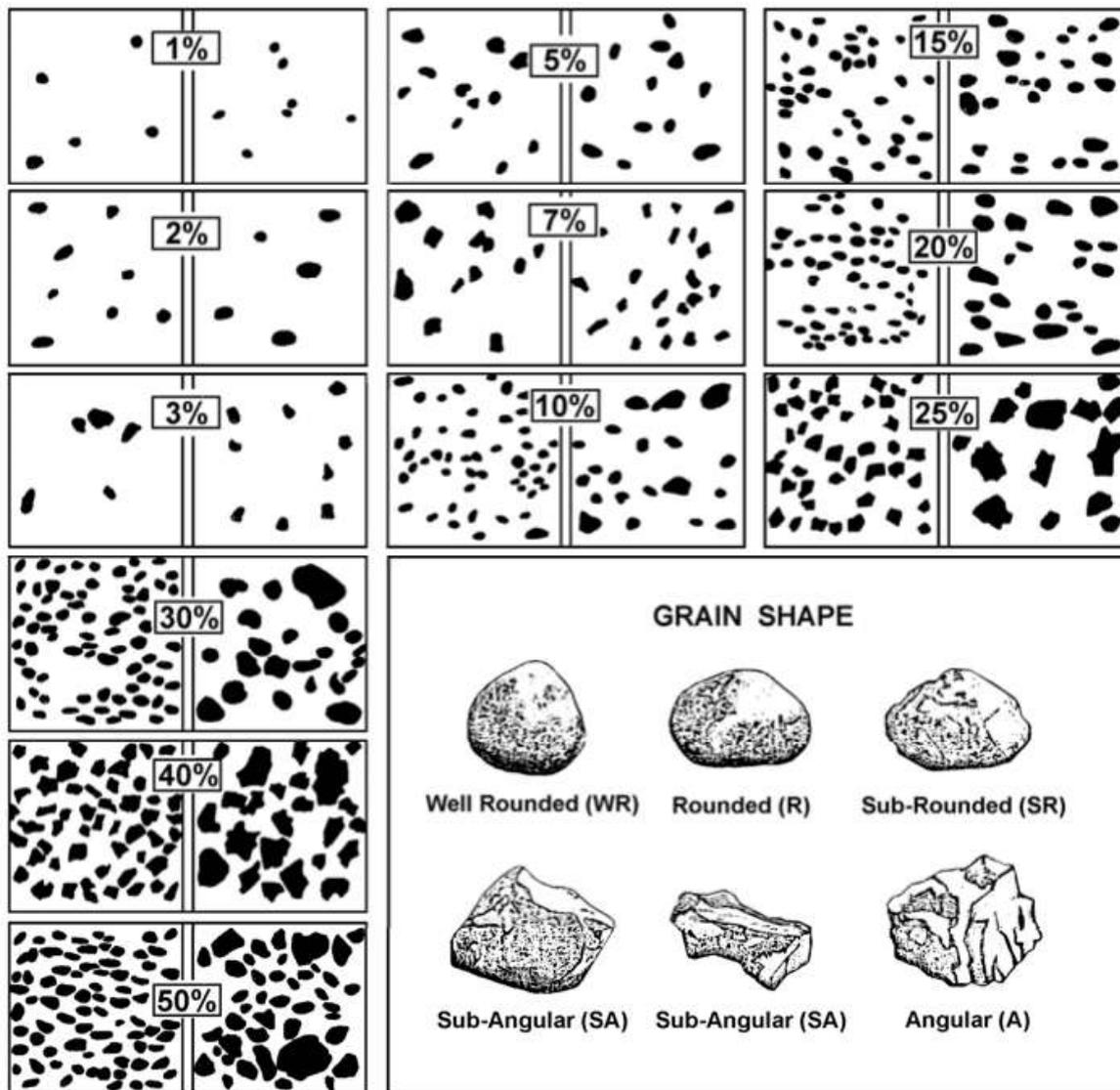


Fig. 3. Ratio of coarse grains and shape of the grains

It is also possible to classify the following grains:

- % of pebbles (4.75 mm - 30 mm), cobbles (30 mm - 300 mm) and boulders (greater than 300 mm); and
- % of gravel (2 mm - 4.75 mm).

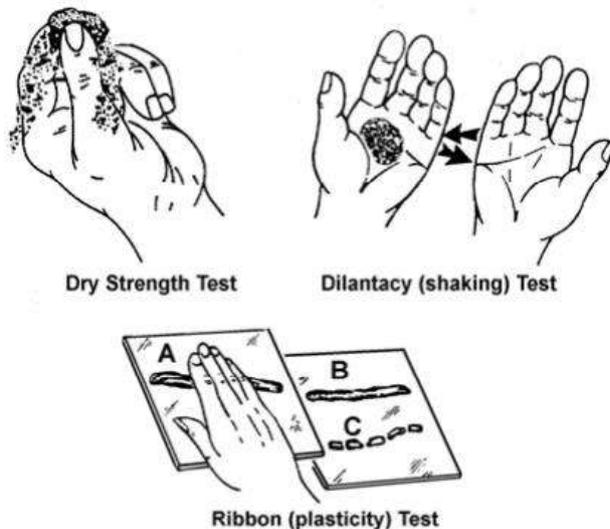
By looking at the soil surface and by using **Fig. 4**, the test permits with some training to roughly estimate the per cent of material below 5-6 mm.

Since the estimate is by eye (a surface is estimated) and not by weight, the test does not replace the classification obtained in sieving the different fractions, but it provides valuable information on the soil class.

It is necessary to go into details of classification of fine soils, since their cohesion, angle of internal friction, and unit weight strongly depend upon the amount of fines. Field tests on the matrix are therefore imperative.

Field tests for estimate of dry strength, plastic limit and plasticity

The procedure is illustrated in **Fig. 4**. This classification of fine material has also to be implemented for classifying the matrix of coarse soils.



Dry Strength or Breaking Test:

The test permits to estimate the cohesiveness of the soil and therefore its clay content.

After removing the particles larger than ~ 1-2 mm a pat of the soil is molded to the consistency of a pat after having added some water. The pat is dried completely by sun, air or if available by oven. Its strength is then tested by breaking and crumbling between the fingers. The dry strength increases with increasing plasticity.

Fig. 3. Field tests for fine soils and matrix.

A **low dry strength** indicates silt, rock flour or silty sand/sandy silt. The sand feels however gritty when powdered. The dry pat can be powdered with slight finger pressure.

A **medium dry strength** indicates low to medium plastic inorganic clay. Considerable finger pressure is required to powder the sample.

A **high dry strength** indicates highly plastic, inorganic clay. The dried sample can be broken but cannot be turned into powder form by finger pressure.

Remark: Cohesion or high dry strength may be due to the presence of cementing material such as calcium carbonate or iron oxide.

Dilatancy or Shaking Test

Like the dry strength test, this test aids to have a view on the plasticity of the material.

After removing the coarse particles, a slightly moist pat of material is placed in the open palm of one hand and shaken horizontally by striking vigorously against the other hand several times (Fig 7.3). A positive reaction consists of the appearance of water on the surface of the pat that becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens, and finally it cracks or crumbles.

A *rapid reaction* indicates a lack of plasticity such as in the case of a typical silt or very fine sand. A *slow reaction* indicates a *slightly plastic* silt or silty clay. *No reaction* indicates clay or organic material.

Ribbon Test

This test permits to have a view on the plastic limit.

A slightly moist pat of material, from which coarse grains have been removed, is rolled to obtain a thread on a board (**Fig. 4**). Whenever the thread *does not break* into pieces the material is *above the plastic limit* (**Fig. 4**). The *plastic limit* is reached when the thread breaks (**Fig. 4**). The longer is the thread is without breaking, the higher is the plastic limit.

Shine Test

A slightly moist sample of soil is cut by a knife blade. A *shiny surface* indicates *highly plastic clay*.

Field test for estimating ϕ and γ of fine non-cohesive soils and soil matrix

After the completion of the field test and obtaining the Unified Soil type, it is necessary to estimate its angle of internal friction ϕ and unit weight γ (dry, wet, and saturated).

For this purpose, it is necessary to have an estimate of relative density of the soil or the matrix (in case of coarse soil). **Table 4** gives the values of relative density of soils.

Table 4. Relative density estimate by penetration test.

| TERM | RELATIVE | PENETRATION FIELD TEST |
|---------------------|----------|---|
| Very loose to loose | 0 -50% | Easily penetrated with ½ in. or 10 mm reinforcing rod push by hand |
| Moderately dense | 50-70% | Easily penetrated with ½ in. or 10 mm reinforcing rod driven with 5 lb hammer |
| Dense | 70-90% | Penetrated a foot with ½ in. or 10 mm reinforcing rod driven with 5 lb hammer |
| Very dense | 90-100% | Penetrated a few inches with ½ in. or 10 mm reinforcing rod driven with 5 lb hammer |

After the completion of the relative density test, **Fig. 5** is used for estimating the values of ϕ and γ .

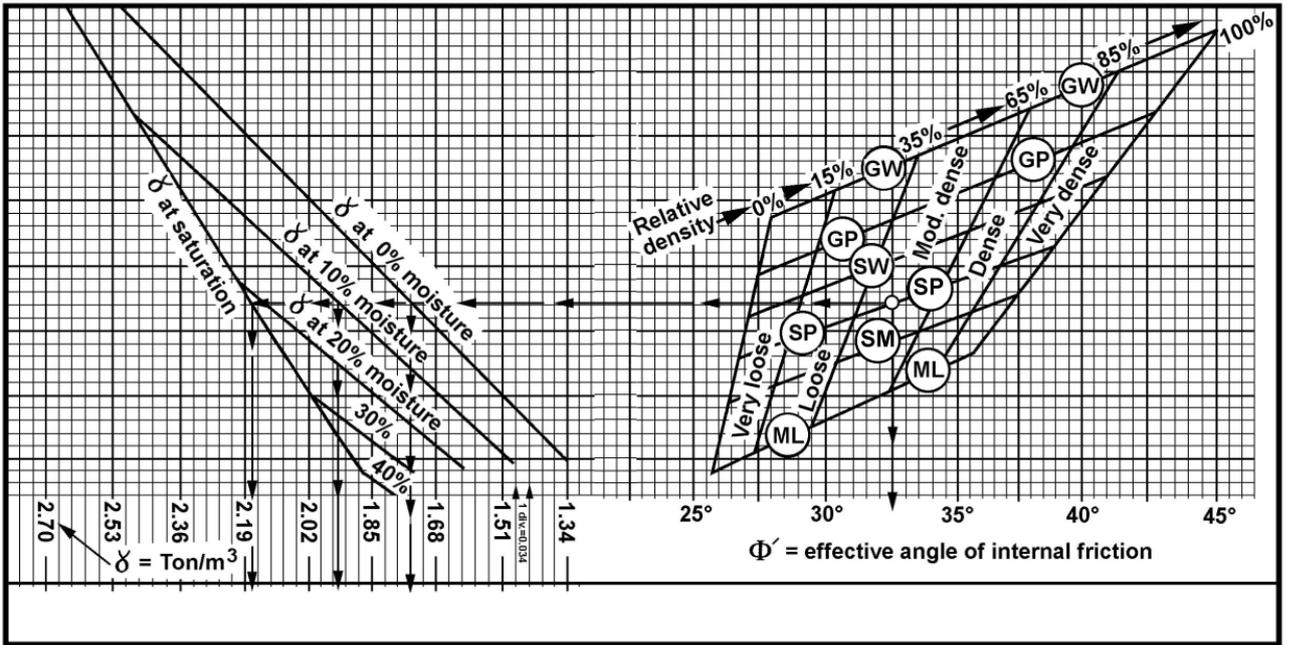


Fig. 5. Plots of ϕ and γ according to soil classification and relative density.

Field Identification of Soil

Location:
reading:

Altitude:

GPS

Mountain Slope Classification:

Draw a sketch profile of the region and classify the mountain slope.

Sketch of the Soil Slope:

Sketch the soil slope, show dimensions, and the north direction. Also color as per the color of the soil.

Classification of soil according to Unified Soil Classification (USCS):

Use charts of Unified Soil Classification.

Measurement of Relative Density:

Use table for relative density. For testing the soil you need a ½ inch rod (about 1 foot long) and a hammer.

Determination of friction angle ϕ and unit weight γ :

From the chart find out the values for:

Dry unit weight, γ

t/m³ =

Saturated unit weight,

γ_{sat} , t/m³ =

Measurement of In-situ Infiltration Test:

The theory of Green & Ampt (1911) describes the process of infiltration. The theory is derived from Darcy's Law, formulated as:

$$f = K (H_w + D - H_f) / D$$

Where, (**Fig. 6**): f refers to the infiltration capacity [L/T], K to the near-saturated hydraulic conductivity [L/T], H_w is the thickness of the water layer [L], D refers to the depth of the wetting front [L] and H_f refers to the pressure head at the wetting front [L].

The field infiltration test will be carried for the determination of permeability/hydraulic conductivity as per site condition and as per requirement (**Fig. 7**). In the case the in-situ test is not applicable, the standard empirical equation will be incorporated for the determination of hydraulic conductivity.

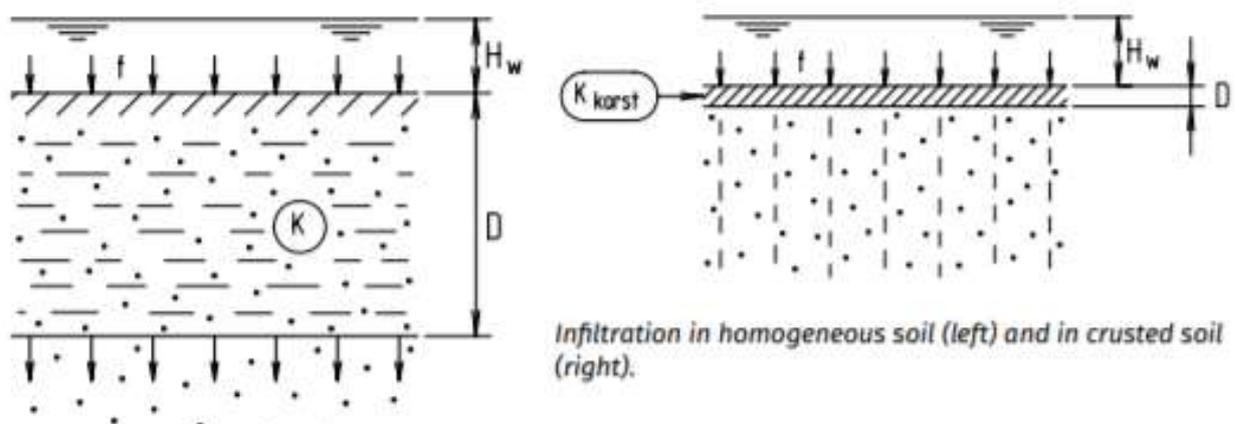


Fig. 6. Sketch illustrating process of infiltration.

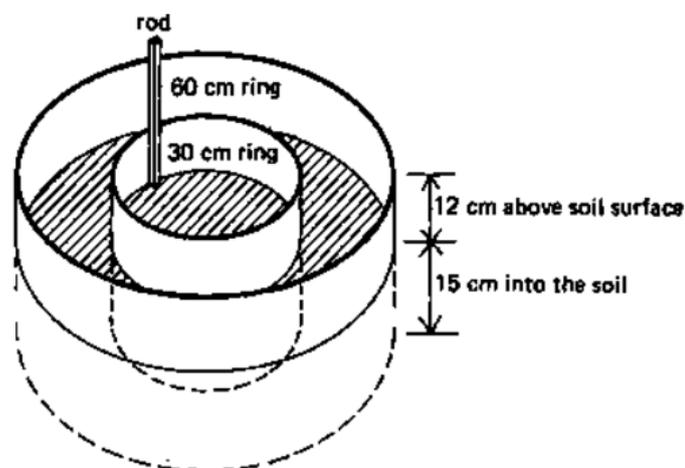


Fig. 7. Sketch of in-situ infiltration equipment.

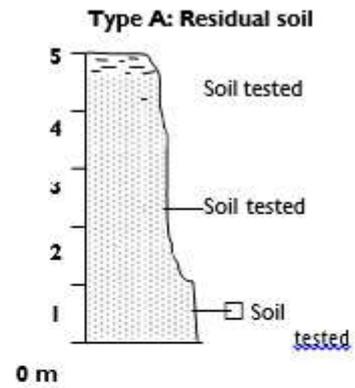
Soil Depth:

Less than 1 meter

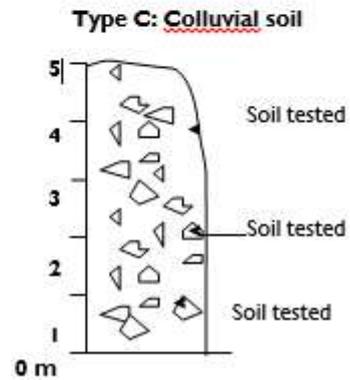
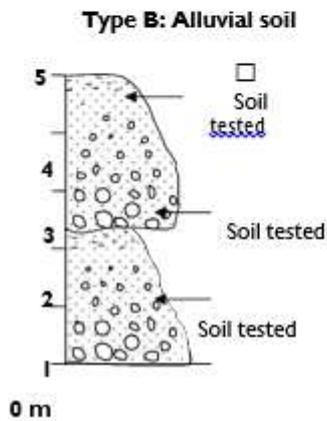
From 1 to 3 meters

From 3 to 6 meters

More than 6 meters



Sketch of the soil column:



Hydrological conditions:

Make an assessment (during the dry season) whether the area is:

- Dry
- Moist
- Saturated with water

Signs of instability

- a. Cracks
- b. Gully erosion
- c. Soil erosion
- d. Rill erosion
- e. Uphill tilted slopes
- f. Drunken trees

Comments on the soil slope:

Weathering and alteration

Both chemical as well as physical weathering influences on rock strength and elastic properties. The mechanical weathering causes mechanical disintegration, whereas chemical weathering responsible for chemical decomposition including solution. Mechanical weathering results in the opening of joints, the opening of grain boundaries, and the cleavage of individual mineral grains within rock. Chemical weathering leads ultimately to chemical changes in the original minerals, often to form clay minerals; some minerals such as quartz, resist this action and survive unchanged. Initial stages of chemical weathering result in discoloration of the intact rock surface.

Alteration comprises those changes in the chemical or mineralogical composition of a rock produced by the action of hydrothermal fluids (fluid from great depth rich with active chemicals). Some examples of alteration are kaolinization or chloritization. The weathering grades proposed by the Geological Society Engineering Group Working Party in 1977 are now taken as worldwide accepted representative weathering grade classification (**Table 5**).

Table 5. Intact Rock Weathering Classification.

| INTACT ROCK WEATHERING CLASSIFICATION | | | | |
|---------------------------------------|--|-------------------------|---------------------|--------------------|
| WEATHERING GRADE | DESCRIPTION | DESCRIPTIVE TERMINOLOGY | DECOMPOSED ROCK (%) | RECOMMENDED SYMBOL |
| 1a | No sign of weathering, rigs under hammer impact | Fresh rock | none | FR |
| 1b | Discoloration on major surfaces, rigs under hammer impact | Faintly weathered | none | WF |
| 2 | Discoloration of all discontinuity surfaces or throughout rock. | Slightly weathered | <10 | WS |
| 3 | Up to 50% of rock material decomposed and/or disintegrated to soil. Rock can be a continuous mass, or core stones. | Moderately weathered | 10-50 | WM |
| 4 | More than 50% of rock material decomposed or disintegrated to soil. Rock mass is discontinuous. | Highly weathered | 50-90 | WH |
| 5 | All rock material decomposed and/or disintegrated to soil. Original mass structure still largely preserved. | Completely weathered | >90 | WC |
| 6 | All rock material converted to soil. Mass structure and texture destroyed completely. | Residual soil | 100 | RS |

Soil slope study

- Examine available maps, which includes for example topographical, land use and vegetation cover maps, all including the surroundings.
- Identify the first sharp break in slope above and below the site or at least a minimum 500 m upslope and down slope of the site whichever is applicable.
- Maps on a scale of 1:5000 or nearest equivalent and the following features should be identified:
 - ✓ Drainage lines (permanent, intermittent and dry valleys)
 - ✓ Erosion features such as rills, gullies, badlands, mass movement, bank erosion etc.)
 - ✓ Areas of sedimentation, including streams
 - ✓ Man-made features such as settlement, tracks, roads etc.
 - ✓ Water users and intake points downstream
 - ✓ Type of vegetation cover
 - ✓ Soil type and depth.

Slope susceptible to failure

- Slopes that are too steep with the weathered material are subject to periodic failure.
- Instability may be associated with moderate to steeply sloping terrain which has been disturbed by man.
- Natural slopes that have been stable for years may suddenly fail because of construction activities on hill slope, which may bring about:
 - ✓ Changes in the slope topography
 - ✓ Changes in ground water conditions
 - ✓ Loss of cohesive strength of soil
 - ✓ Stress changes in the soil underlying the slope
 - ✓ Acceleration of the rate of weathering of rock

Forecasting of potential landslides according to rock fractures

The factors with highest probability of leading to large debris or rock- slides (slumps expected) can be summarized by the presence of

- A structural slope between 45° and 55° (other inclines should nevertheless not be excluded).
- More than 3 - 4 geologic planes. The planes are open.
- Several structural wedges, arranged in a fan. At least one central or centro - lateral wedge is needed for a slide to occur. If the total of central and centro - lateral wedges is greater than the total of lateral and very lateral wedges, the slide will tend to be narrow and long. If the inverse is true, the slide will be broader.
- Rocks of clay origin closely inter-bedded with carbonate rocks and with or without detrital rocks (sandstones, quartzite and conglomerates).
- Rocks of clay origin or of clay and detrital origin closely inter-bedded.
- Subsidiary minerals such as pyrite or graphite as well as chlorite and sericite.
- springs or seepages
- A concave topography, as a more or less pronounced comb.

On the other hand, stable rocky slopes can be recognized by the combined presence of:

- A structural slope having not more than 2-3 geologic planes. The planes are “closed”, without fillings or coatings.
- No structural wedges, or exclusively lateral and very lateral wedges, or one

- centro-lateral or lateral wedge.
- Unweathered or slightly weathered rock, including quartzite, massive limestone, dolomite and marble, as well as gneiss, phyllite and schist.
- An area free of water and unconnected with rivulets, springs or seepages.
- Convex topography, humps, crests or ridges.
- There are of course a great variety of intermediate conditions existing between these two extremes. The above rules are immediately applicable for surveys of zones of limited extension such as bridge sites and any constructions of limited size.

Sub-surface water movement

When water percolates into the soil, it enters the voids and starts to fill them up. As a result, pore water pressure starts to rise. Pore water pressure is the pressure acting on soil grains by water held in the pores. Pore water pressure can be positive or negative. It is negative when the voids are only partially filled with water. This state is also known as soil suction. Pore water pressure becomes neutral just before the point at which the voids become completely filled with water. Pore water pressure becomes positive at the point when all the air has been expelled from the voids and the water phase in the soil-water mix becomes continuous. At that point, the water phase becomes a column and hydrostatic pressure, equivalent to the height of the column, is exerted within the pores. The pressure is transferred to the soil grains. **Fig. 8** below illustrates piping effect of water on different types of slopes.

If the hydrostatic pressure is sufficiently high it will force the grains apart and the mixture will start to behave as a liquid. Hydrostatic pressure developed near the soil surface, as when the upper layer becomes saturated during heavy rain, causes the soil to flow.

When pore water pressure becomes positive along the walls of a fissure underground, a 'pipe' develops. A pipe is an enlarged fissure that forms underground in fine-grained, non-cohesive soil, especially silty or fine sandy soils. Enlargement of the fissure takes place when water, flowing along the fissure or into the fissure from the side walls, detaches particles of soil and carries them away in suspension. Pipes that have not broken through to the surface can still sometimes be detected by the presence of an elongated hollow of subsided ground pointing down the slope. The trench may be above the head of a gully and in the same alignment as the gully, indicating that water is moving into the gully head as ground water through a pipe.

If water travels downwards to the bottom of the soil profile it commonly becomes halted in its path by the impermeable surface of the rock beneath. It then migrates downhill along the interface until it emerges as a spring at a point where the soil becomes shallower or the rock outcrops at the surface. Pore water pressure may become positive at the base of the soil profile, resulting in a deep translational landslide (the commonest deep type) or circular failure.

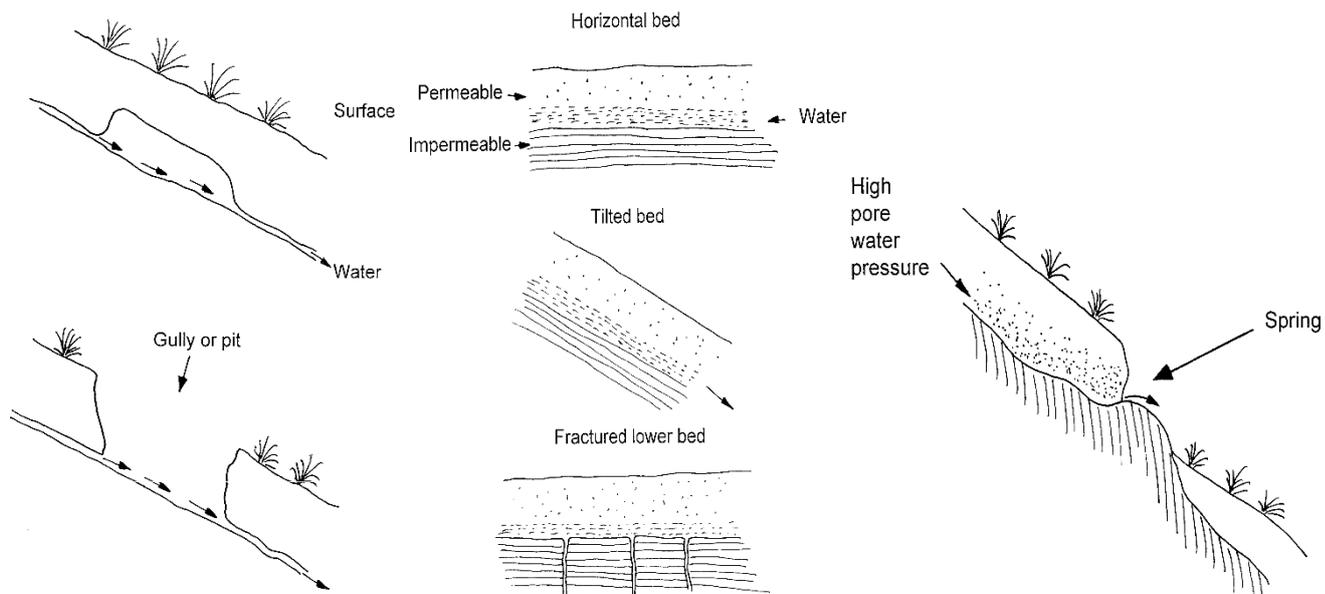


Fig. 8. General slope hydrology, formation of pipe (left) and water reaching to impermeable layer (right).

ANNEX XVIII PHOTOGRAPHS REPRESENTING OVERALL FIELD ACTIVITIES



Establishment of ground control point



Building typology



Orientation with fields enumerators at Godawari office



Group Photographs with field enumerators at Godawari office after training with covid-19 safety protocols



Field Coordinator verified the building fppt print survry with field engineer



Water filled up at the same level (10 cm) in both rings at the site.



Checking in-situ natural moisture content at the site



Soil infiltration test