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Fire Hazard and Risk Analysis in the Country for Revamping the Fire Services in the Country

Final Report – State Wise Risk Assessment, Infrastructure and Institutional Assessment of Phase II States (Dadra and Nagar Haveli, Daman and Diu, Goa, Gujarat, Karnataka, Madhya Pradesh)

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Submitted by

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Executive Summary

Fire service is one of the most important emergency response services in the country, which comes under the 12th schedule of the constitution dealing with Municipal functions. At present, fire prevention and fire fighting services are organized by the concerned States and Union Territories (UTs), and Urban Local Bodies (ULBs). Directorate of National Disaster Response Force and Civil Defence (NDRF&CD, Fire Cell), Ministry of Home Affairs (MHA) render technical advice to the States, UTs, and central ministries on fire protection, prevention, and legislation. Fire services in Maharashtra, Haryana, Gujarat, Chhattisgarh, Madhya Pradesh (excluding Indore), and Punjab are under the respective Municipal Corporations. In the remaining States, it is under the respective Home Department.

The growth of fire-services in the country has been on an ad-hoc basis, without much scientific analysis of existing risks in different parts of the country. Varying risk scenarios need different types of equipment. The risk varies with geographical location such as hilly-area, coastal-area, desert–area, and with residential (high-rise, medium, and low rise-buildings), industrial, commercial area or a combination of these. Moreover, lack of knowledge management for future planning and institutional capacity and funds are also seen as a few of the major challenges in addressing improvements in fire and emergency services in the country. As per a recent analysis by the Standing Fire and Advisory Council (SFAC), the overall deficiency in the country in terms of number of Fire Stations is 97.54%, in terms of fire fighting and rescue vehicles is 80.04% and in terms of fire personnel is 96.28%, respectively, which is quite alarming (NDMA Guideline, 2012, CR SFAC, 2011). In consideration of this and the increasing fire risks from various hazards, the Directorate of NDRF&CD, Fire Cell, MHA planned a study called "**Fire Hazard and Risk Analysis in the Country for Revamping the Fire Services in the Country**", to identify existing gaps in terms of availability and requirement of Fire Stations, capacity-building, trained man-power and fire-fighting, rescue, and other specialized equipment.

The **broad objectives** of the study are:

- To carry out GIS thematic map based Fire Hazard and Risk analysis though overlaying hazards and quantified risk, and classify the districts as base units into appropriate risk categories such as very high, high, medium, or low.
- To prepare a detailed Investment and Financing Plan for next 10 years for up-gradation, expansion and modernization of Fire Services, based on existing situation analysis and risk based actual requirements.
- To develop an open-source GIS based software called as a Fire Decision Support System (FDSS) containing administrative boundaries, quantified risk GIS layers and with capability of estimation of financial implications for desired capacity development.
- To prepare an Institutional Assessment and Capacity Building Plan, based on field-data collection, enquiry, spatial analysis and understanding of the availability and gaps in the fire service infrastructure.

Role of Fire Services

The primary role of fire services has been to attend to fire incidents. Besides firefighting, fire department also attends to other emergencies such as building collapse, road traffic accidents, human and animal rescue etc., and other special service calls. Some fire services also attend medical emergencies for transportation of casualties through ambulances maintained by them. Similarly, some States, like Delhi, have separate flood department with rescue boats and trained divers. The Fire Services maintain skeletal facilities to act as *'first*

responders' and wait until assistance from the flood department arrives. It is therefore, considered appropriate that the specialized facilities for such jobs is maintained and operated by the concerned department.

As indicated in the National Disaster Management Authority (NDMA) guidelines, Fire Service is one of the Emergency Support Functions (ESF). Based on DM Act 2005, various States have also formulated State Disaster Management Authorities (SDMA's) and District Disaster Management Authorities (DDMA's) both of which consider Fire Service as an ESF. It is, therefore, evident that the role of Fire Services has become multi-dimensional that includes not only attending fire incident calls but also various other emergencies. Accordingly, fire services in the jurisdiction of the respective Fire Station are required to be prepared with suitable types of equipment to deal with various emergencies.

The role of fire services also includes effective fire prevention, creating awareness on fire safety, and enforcing the inbuilt fire protection arrangements for various types of occupancies in line with National Building Code (NBC) part – IV. However, some of the States/Municipal Fire Services are unable to enforce the fire safety provisions due to a lack of appropriate directives from the authorities controlling the function of fire services. Majority of the Fire Services do not adhere to NBC and have created their own fire-safety building bye-laws, e.g., Mumbai Fire Brigade. It may be noted that in-built fire safety arrangements and escape facilities are much more important than having a fire service within the premises without the above facilities. It is, therefore, necessary to enforce the fire-safety provisions through appropriate directives to all the States/UTs by the Ministry of Home Affairs (MHA) directly or through DG, NDRF & CD office.

In addition to the regular fire services, various other organizations/ industries, such as Ports, Airports, Defence, Power, Oil and Gas, Steel, Heavy Engineering, Fertilizers, Chemicals etc. have their own fire service set-ups (including their own captive resources), in order to provide fire protection to their facilities and some of them at times provide support to local fire services on request. All of them have their rules and regulations concerning fire safety. For example, Oil India Safety Directorate (OISD) norms for Oil and Gas Industries, International Civil Aviation Organization (ICAO) norms for Airports, Tariff Advisory Committee (TAC) regulations- now discontinued, for industries etc. and Electricity Rules for power sector.

Safety of highly hazardous processing and storage industries requires 100 percent round the clock built-in and functional fire protection arrangements with trained fire fighters as well as onsite and off-site disaster management plans. Fire services are not expected to create the infrastructure to independently tackle such emergencies within the industry, as it may be not be possible to do so. However, they are expected to support any on-site and off-site fire fighting to protect surrounding populations and handle such incidents during transportation through the civil areas. Moreover, local fire services should have mutual-aid schemes with all the industries in their jurisdiction and must be aware of the various arrangements available with them in order to provide efficient support, in case of an emergency.

Phased Approach

In order to conduct this study for India, a vast country covering all the States and Union Territories (UTs), it was decided to conduct this study in a phased manner. In the initial phase, the pilot study comprises of 6 States and UTs (Jammu & Kashmir, Rajasthan, Maharashtra, Delhi, Andaman & Nicobar Island, and Puducherry), and in subsequent phases (Phase-I to Phase-IV), rest of States/UTs have been taken up as detailed in Section 2.3.

Field Surveys for Fire Infrastructure Data

To collect and collate the information on Fire Infrastructure of all the States/ UTs, RMSI team developed two detailed forms "Headquarter Data Collection Form" and individual "Fire Station Field-Survey Form". RMSI team field-surveyed all the Fire Stations in pilot States/UTs for collecting detailed fire Infrastructure information. The detailed information collected includes address of Fire Station, name of Fire Station in-charge, emergency contact numbers, communication between Fire Station control room, public and headquarter control room; Fire Station building including staff accommodation and barracks; fire fighting vehicles and specialized equipment; fire personnel, their duty pattern and pay-scales; water availability and water sources for fire vehicles, fire-risk in the jurisdiction of Fire Station and its geographical coordinates (latitude, longitude -by using a Global Positioning System, GPS) etc. etc. All this information for each and every Fire Station has been digitally converted and is available through Fire Decision Support System (FDSS), which can generate a Fire Station report at the click of a button.

GIS based Fire Hazard and Risk Analysis

In general, fire risk is defined as the combination of hazard potential, exposure, and vulnerability:

Risk = F (**H**azard potential x **E**xposure x **V**ulnerability)

The occurrence of fire incidents that constitute a threat for the population and exposed infrastructure of a certain region is associated with economic and human losses, always as a function of the exposure conditions and the vulnerability of the exposed assets in that particular region. Different natural hazards such as seismic (earthquake), climatic, and wind are considered in risk analysis. Additionally hill zone are also considered in risk analysis due to increased fire risk from wooden houses and heating provisions in cold areas.

For estimating exposure and its vulnerability, detailed urban agglomerate classification maps generated from high-resolution satellite images have been used. With the help of remote sensing techniques applied on high-resolution satellite imageries, various types of urban agglomeration areas have been demarcated. These include urban, semi-urban, building blocks, and industrial and rural villages' built-up areas of different densities (high medium, low). For exposure vulnerability, 4 different layers such as population density, residential built-up areas, high-rise building block density, and industrial areas have been developed individually at district level. For assessing fire risk, both absolute built-up areas in sq km as well as built-up areas percent (ratio of built-up areas to the total area) are considered as important parameters. It is obvious that industrial areas in districts have much lower percentages than residential built-up areas. However, presence of industrial areas in a district has a significant influence in assessing fire risk. Hence, industrial areas in absolute terms (sq km) have been considered in risk ranking.

In order to assess the impact of each exposure vulnerability type, a vulnerability score/ ranking has been assigned to each layer at their base unit. The vulnerability score represents the level of vulnerability (very high to negligible) of a specific type of exposure in response to the occurrences of small and medium fire incidents. The natural break in value distribution has been considered for defining the ranking class.

After developing ranking of individual units of hazard and exposure vulnerability, GIS layers have been overlaid on top of each other and a spatial analysis has been performed for integration in GIS environment. For combining hazard and risk, Weighted Factor Analysis (WFA) in GIS environment has been performed. Weighted ranking scores have been used in the integration analysis and quantified risk distribution for each district. Values of weighted factor depend upon the importance of a particular hazard/ vulnerability class in risk analysis. For integration of hazards, equal weights have been assigned to wind, seismic and climatic hazards, while double weights have been given to hill zoning. This is because, in hilly terrain,

wooden houses and heating provisions in buildings increase the chances of fire-incidences, and thus have been given higher weightage.

After obtaining integrated individual weighted score for hazard and exposure vulnerability, fire risk categories have been obtained in quantitative terms by further integration of hazard and exposure vulnerability. It is obvious that in the occurrence of the number of fire incidents in a given district, exposure vulnerability has more importance than the prevailing hazard. Hence, in quantified integration, double weights have been assigned to exposure vulnerability. The quantified numeric values of district risk scores are again grouped into four descriptive categories of district level risk ranking (very high, high, medium, and low).

As per project scope of work, countrywide district level fire hazard and risk analysis has been carried out. However, it is obvious that the fire risk is not uniformly distributed throughout the districts in both urban and rural areas. Considering the above fact, RMSI has performed GIS based risk analysis, based on distribution of population agglomeration by defining built-up areas into different risk categories, such as high-density urban, low-density urban, sub-urban, and village. Moreover, distinct demarcated industrial areas have also been considered in the analysis.

Review of International and National Norms

To estimate the gaps from the existing position in terms of number of Fire Stations and their appropriate location, the RMSI team followed scientific and innovative GIS based response time network analysis approach involving various norms and regulations. Various international and national norms on response time have been reviewed. Response time is defined as "*en route time (in minutes) taken by the fire fighting vehicle from the Fire Station to the fire emergency scene.*" Different counties follow different norms on response time such as:

Germany: response time in urban areas varies from 8 to 15 minutes

Japan: response time varies from 5 to 10 minutes, depending upon the location of the building

USA: response time varies from (3-4) to 8 minutes

United Kingdom: response time varies from 5 to 8 minutes

India: SFAC norms recommended response time for first fire tender is 3, 5, and 7 minutes respectively depending on risk category A, B, and C in urban area and 20 minutes in rural area. The norms also defined one Fire Station in an area of 10 sq km in urban area; and 50 sq km in rural area.

To investigate the practicability of SFAC norms, RMSI team carried out a number of simulations using GIS based network analysis. With these simulations, RMSI demonstrated that two SFAC norms (response time and area-based) are not in synchronization with each other, and recommended revised response time based norms for positioning a Fire Station, as response area will vary from place to place depending upon the road network.

- ***Depending upon the risk category, the recommended response time for first fire tender is 5 to 7 minutes in urban areas and 20 minutes in rural areas***

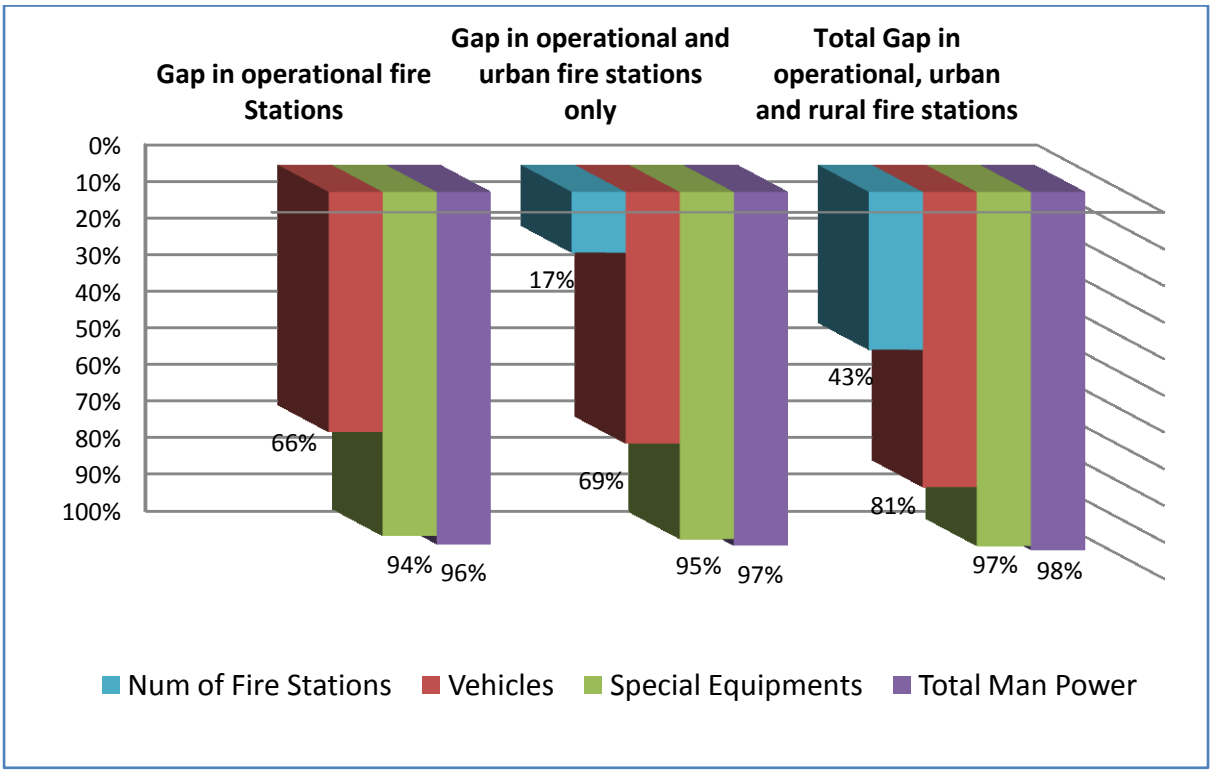
Summary of Findings for Madhya Pradesh State

Presently, Madhya Pradesh Fire Services (MPFS) has 292 operational Fire Stations. The Fire Service in the State is operated under the Urban Administration and Development Department (UADD). A few Fire Stations in the State are also being operated under the Police Fire Service. Currently, MPFS do not have a State Fire Service Training Centre and fireman are being trained for a 6 months duration at a private institute (All India Insitute of Local Self Government).

Based on detailed demarcated built-up areas and GIS based network analysis (response time analysis), ideal jurisdiction boundaries have been demarcated for all operational Fire Stations excluding areas served by other agencies, such as airport, military cantonment, thermal power plants etc. The remaining areas, not covered under ideal jurisdiction of operational Fire Stations, are also divided for ideal jurisdictions of new proposed Fire Stations. The requirements for fire fighting and rescue vehicles and specialized equipment are based on ideal served population, population density, and built-up areas within ideal jurisdiction boundary.

Fire Station Gap Analysis

As per detailed GIS based analysis, the Madhya Pradesh Fire Services would require additional 58 Fire Stations in urban areas and 163 Fire Stations in rural areas. Hence this study finds an overall gap of 43% in terms of number of Fire Stations in Madhya Pradesh State (for details, please refer to section 24.3.1).



Firefighting and Rescue Vehicles and Specialized Equipment Gap Analysis

For estimating the gap in fire fighting and rescue vehicles and specialized equipment in operational as well proposed Fire Stations both in urban and rural areas, the RMSI team modified the SFAC norms with expert opinions. These modifications also helped in optimization of resources and are detailed in section 24.3.2. This study finds an overall gap of 81% in the firefighting and rescue vehicles and about 97% in specialized equipment for both operational and new Fire Stations in urban and rural areas.

Fire Personnel Gap Analysis

For estimating the gap in fire personnel in operational as well new proposed Fire Stations both in urban and rural areas, the RMSI team used Administrative Reform Department (ARD, Delhi) norms based on duty pattern (double-shift) prevalent in Delhi as ARD has already optimized the fire manpower requirement in comparison to what has been suggested in SFAC norms. The current duty pattern for firefighters in the State is varying from 8 hours (3-shifts), to 12 hrs (2-shifts) to 24 hours, and RMSI team estimated for manpower requirement for double shift duty pattern (for details, please refer to section 24.3.3). Thus, in Madhya Pradesh State, this study finds an overall gap of 98% in fire personnel considering double shift duty pattern.

Fire Prevention Wing

In addition to fire fighting staff, there is an urgent need for fire prevention wing for inspection, awareness generation, and training for schools, colleges, hospitals, shopping malls, cinema halls, high-rise buildings, industries, govt. offices, public buildings etc. need further strengthening, so that recurrence of the fire incidences similar to that at the Advance Medical Research Institute (AMRI), Kolkata, in terms of their magnitude and frequency can be reduced. Accordingly, to support Director Urban Administration and Development Department, Madhya Pradesh Fire Services, additional officers at the levels of Director (Technical), Joint Director (Technical), Deputy Director (Technical), Chief Fire Officers (CFOs), Dy. Chief Fire Officers (Dy-CFOs), Divisional Fire Officers (DFOs), and Assistant Divisional Fire Officers (ADFOs) have been recommended (for details, please refer to section 24.2.2).

Fire Station, District and State Level Report Generation

The detailed report of operational Fire Stations, district and State levels for fire infrastructure and gap analysis is also available through the Fire Decision Support System (FDSS), which can generate reports for each Operational Fire Station, district, and State level at the click of a button.

Roadmap for Investment and Financial Plan for Next 10 Years

The other tasks include the development of Investment and Financial plan, Institutional Assessment & Capacity Building Plan along with a Fire Decision Support System (FDSS). As detailed in section 24.5, the detailed investment and financial plan at district level includes estimation of capital cost for infrastructure cost, fire fighting and rescue vehicles, and specialized fire and communication equipment. The recurring expenditure cost includes fire personnel cost depending upon pay-scales at various levels; staff uniform cost, and personal protective equipment (PPE); annual vehicle and specialized equipment maintenance cost, petrol, diesel, and lubricant (PDL); building maintenance; office and training expenses etc. The detailed roadmap and investment plan (section 24.5) for the next 10-years includes both capital and recurring expenditures. RMSI analysis estimates a total investment of about **Rs 28,484 Crores** (Table 24-36) spread over a period of 10 years for Madhya Pradesh Fire Services including inflationary factors and after filling the gaps for both operational and proposed urban and rural Fire Stations.

Prioritization of New Fire Stations

The prioritization of new Fire Stations in Madhya Pradesh for both rural and urban areas has been detailed in section 24.6. Accordingly, separate priority ranking for both urban and rural areas are given in Table 24-38 and Table 24-39, respectively.

Avenues for Fund Generation

Madhya Pradesh Fire Services (MPFS) can generate new avenues for funds from the following:

- Introduction of Fire Tax (1% of existing property tax)
- Capitation fee for scrutiny of building plans.

Capacity Building and Training Facilities

The study finds that there is a substantial gap for Capacity Building and Training among the fire personnel within the Madhya Pradesh State. The detailed Capacity building and training need assessment for various levels have been discussed in section 24.8. Additionally, RMSI team is making a separate report of Capacity Building and Training Infrastructure for all States/UTs in the country.

Limitations of the Study

Limitations of study are given in section 24.9.

Recommendations

The report concludes with the recommendation for the Madhya Pradesh Fire Service and is detailed in section 24.10. In short, Madhya Pradesh Fire Service can be revamped in next 10 years to desired level provided sufficient funds and trained resources are made available.

Report Structure

This report for the Phase IV States/UTs is divided in two parts:

Part A: This part comprises of chapters 1-6, which are common for all the 35 States/UTs Fire Services for which this study is conducted.

- Chapter 1 provides brief details of project background, role of fire services, objective and scope of study
- Chapter 2 outlines the methodology adopted and data development
- Chapter 3 provides details on GIS based fire hazard and risk analysis
- Chapter 4 provides a brief overview of field-survey of individual Fire Station and headquarter data collection and approach for stakeholder analysis
- Chapter 5 briefly explains the Development of Fire Decision Support System (FDSS)
- Chapter 6 examines international and national norms

Part B: This part comprises of Chapters 19-24, which are specific to the State/UT being discussed.

- Chapter 19 provides detailed analysis for the Dadra and Nagar Haveli UT
- Chapter 20 provides detailed analysis for the Daman and Diu UT
- Chapter 21 provides detailed analysis for the Goa State
- Chapter 22 provides detailed analysis for the Gujarat State
- Chapter 23 provides detailed analysis for the Karnataka State
- Chapter 24 provides detailed analysis for the Madhya Pradesh State

For Part-B, this report consists of Chapter 24, which is for Madhya Pradesh State.

PART - A

1 Introduction

1.1 Background

Fire service is one of the most important emergency response services. In India, Fire services come under the 12th Schedule of the constitution dealing with Municipal functions. At present, fire prevention and fire fighting services are organized by the concerned States and Union Territories (UTs), and Urban Local Bodies (ULBs). Ministry of Home Affairs (MHA) renders technical advice to the States, UTs, and central ministries on fire protection, prevention, and legislation. Fire services in Maharashtra, Haryana, Gujarat, Chhattisgarh, Madhya Pradesh excluding Indore, and Punjab are under the respective Municipal Corporations. In remaining States, it is under the Home Department (Figure 1-1).

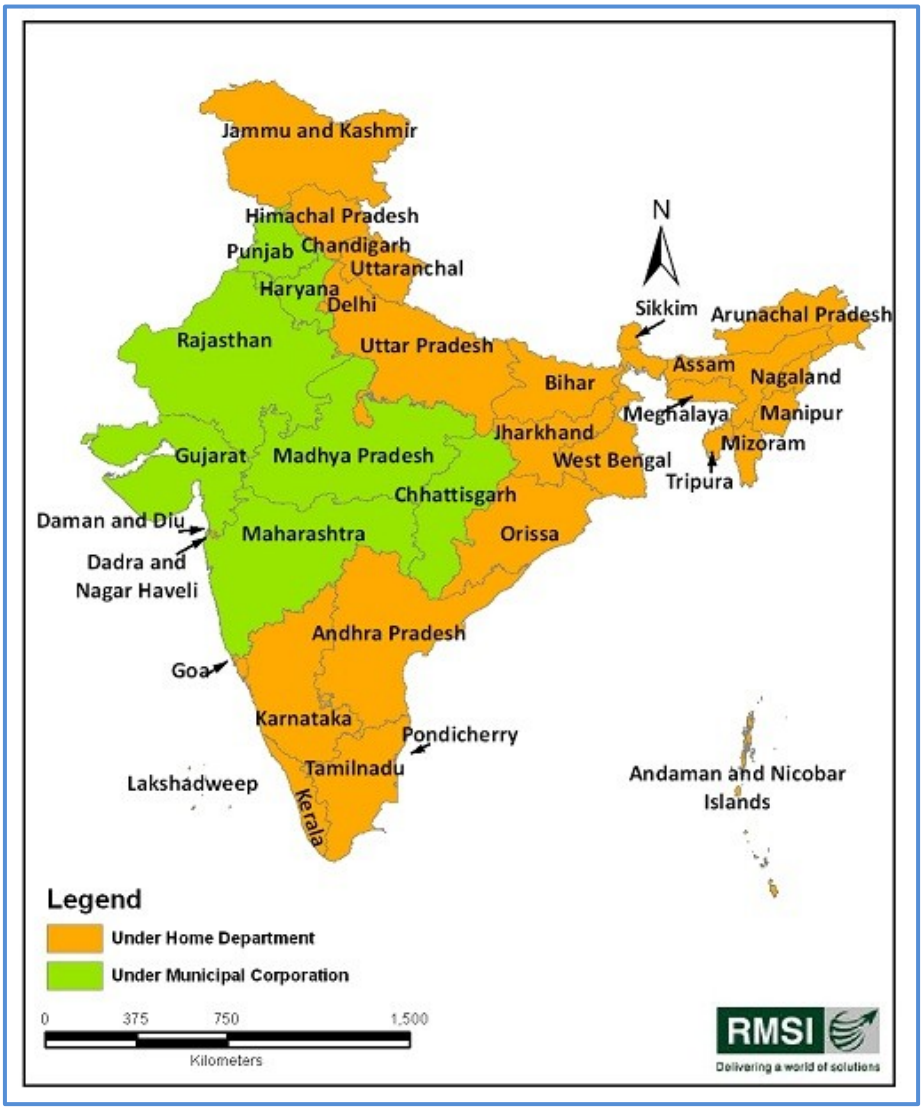


Figure 1-1: Distribution of fire services by various States/UTs by administrative organization

1.2 Role of Fire Services

As far as the role of fire services is concerned, the primary job of fire services has been to attend to fire incidents. However, they also attend to other emergencies like rescue from

building collapse, road traffic accidents, human and animal rescue etc., and other special service calls. Some fire services also attend medical emergencies for transportation of casualties through ambulances maintained by them. Similarly, some States have separate flood department with rescue boats and trained divers, like Delhi. The Fire Services maintain skeleton facility to act as 'first responder' and wait until assistance from flood department is reached. It is therefore, considered appropriate that the specialized facilities for such job is maintained and operated by the concerned department.

As indicated in the National Disaster Management Authority (NDMA) guidelines, Fire Services is one of the Emergency Support Functions (ESF). Based on DM Act 2005, various States have also formulated State Disaster Management Authorities (SDMA's) and District Disaster Management Authorities (DDMA's) both of which consider Fire Service as an ESF. It is therefore evident that the role of Fire Service is multi-dimensional that includes attending various emergencies. Accordingly, fire services are required to be prepared with suitable types of equipment to deal with various emergencies arising in the jurisdiction of the respective Fire Station.

The role of fire services also includes effective fire prevention, creating awareness on fire safety, and enforcing the inbuilt fire protection arrangements for various types of occupancies in line with National Building Code (NBC) part – IV. However, some of the States/Municipal Fire Services are unable to enforce the fire safety provisions due to a lack of appropriate directives from the authorities controlling the function of fire services. Some of the Fire Services do not adhere to NBC and have created their own fire-safety building byelaws, e.g., Mumbai Fire Brigade. It may be noted that in-built fire safety arrangements and escape facilities are much more important than having a fire service within the premises without the above facilities. It is, therefore, necessary to enforce the fire-safety provisions through appropriate directives to all the States/UTs by the Ministry of Home Affairs (MHA) directly or through DG, NDRF & CD office.

In addition to the regular fire services, various other organizations/ industries, such as Ports, Airports, Defence, Power, Oil and Gas, Steel, Heavy Engineering, Fertilizers, Chemicals etc. have their own fire service set-ups (including their own captive resources), in order to provide fire protection to their facilities and some of them at times provide support to local fire services on request. All of them have their rules and regulations concerning fire safety. For example, Oil India Safety Directorate (OISD) norms for Oil and Gas Industries, International Civil Aviation Organization (ICAO) norms for Airports, Tariff Advisory Committee (TAC) regulations- now discontinued, for industries etc. and Electricity Rules for power sector.

Safety of highly hazardous processing and storage industries requires 100 percent round the clock built-in and functional fire protection arrangements with trained fire fighter as well as onsite and off-site disaster management plans. Fire services are not expected to create the infrastructure to tackle such industrial emergencies independently, as it may be not be possible to do so. However, they are expected to support any on-site and off-site fire fighting to protect surrounding populations and handle such incidents during transportation through the civil areas. Moreover, local fire services should have mutual-aid schemes with all the industries in their jurisdiction and must be aware of the various arrangements available with them in order to provide efficient support, in case of an emergency.

The growth of fire-services in the country has been on an ad-hoc basis, without much scientific analysis of existing risks in different parts of the country. Varying risk scenarios need different types of equipment depending upon the risk and geographical location such as hilly-area, coastal-area, desert–area, and residential (high-rise, medium, and low rise-buildings), industrial, commercial area or a combination of these. Moreover, lack of knowledge management for future planning and institutional capacity and funds are also seen as major challenges in addressing improvements in fire and emergency services in the

country. As per a recent analysis by the Standing Fire and Advisory Council (SFAC), the overall deficiency in the country in number of Fire Stations is 97.54%, in fire fighting & rescue vehicles 80.04% and in fire personnel is 96.28%, respectively, which is quite alarming (NDMA Guideline, 2012, CR SFAC, 2011).

In consideration of this and the increasing risks from various hazards, such as Fire Following an Earthquake (FFEQ), and the rapid pace of urbanization and industrialization in the country, the Directorate of National Disaster Response Force and Civil Defence (NDRF&CD, Fire Cell), MHA felt the need for a comprehensive study to identify existing gaps in terms of availability and requirement of Fire Stations, capacity-building, in terms of trained man-power and fire-fighting, rescue, and other specialized equipment. This comprehensive study **aims at preparing a perspective plan for the next 10 years for revamping the fire services in the country**.

1.3 Objective of the study

The broader objective of this study is to prepare a Capital Investment and Institutional Strengthening plan for accelerated development of fire services in the country.

1.4 Scope of the study

The study area for this assignment is the entire country under the Directorate of NDRF & Civil Defence (Fire). The scope of the assignment will include, inter alia, the following activities:

1. **Fire Hazard & Risk Analysis:** Carry out a GIS (Open Source) based fire hazard and risk analysis and identify the gaps in fire services in terms of fire fighting vehicles, specialized equipment, and trained fire personnel.
2. **Investment and Financing Plan:** Assess the status, availability and distribution of the fire service infrastructure under the Directorate of NDRF & Civil Defence (Fire Cell) by conducting field investigations and interviews. It is expected to conduct an investigation to assess the gaps and needs for future planning and upgradation/ modernization of the fire service infrastructure in the country in a quantified approach. As part of the Investment and Financing Plan, it is also expected to estimate the Capital and O&M Investment plan for the next 10 years and the investment priorities.
3. **Institutional assessment and capacity building plan:** Based on field-data collection, enquiry, spatial analysis and understanding on the availability and gaps in the fire service infrastructure, and prepare an institutional assessment and capacity-building plan for the department. Institutional Assessment and Capacity Building Plan will include but will not be limited to understanding the policies, regulations, strategies and programs of the department; existing legal and institutional mechanisms, issues and constraints of effective management; and training needs and capacity of the department's resources. Based on a comprehensive understanding of the mentioned variables, it is expected to prepare a consolidated national report and key recommendations for the Directorate of NDRF & CD (Fire Cell). It is also expected to explore the possibility of funding sources and provide recommendations for improvements to ensure appropriate financing mechanisms for capital expenditure, and for operation and maintenance.

2 Technical Details on Methodology and Data Development

2.1 Understanding of the Scope of Work

The primary objective of this comprehensive study on "Fire Hazard and Risk Analysis in the Country" is to prepare a capital investment and institutional strengthening plan for accelerated Development of Fire Services in the country. To achieve this objective of the study, the Directorate of NDRF & CD has defined the broad scope of the work as:

1. Risk and Hazard Analysis
    - Identifications of gaps in the existing fire services
2. Investment and Financial Plan
3. Institutional Assessment and Capacity Building Plan
    - Including survey of NFSC Nagpur and regional fire training Centers

As part of the Risk and Hazard Analysis, it is expected to carry out a GIS based hazard, risk analysis at base unit (district) level, and identify the gaps in the existing fire services. Risk assessment of forest fire is not included under the present scope of work. The infrastructures of forest department, privately owned fire safety infrastructure, infrastructures in restricted areas like military cantonments and airbases, and ammunition depots; nuclear facilities such as nuclear power plants, nuclear research reactors, heavy water plants; and mines, ports, airports, and oil exploration and oil refineries are excluded from the study. While assessing the infrastructure for the Investment and Financing Plan, RMSI has focused specifically on the States/ UTs Fire Services. ***However, it may please be noted that RMSI team is also making efforts to get details of areas served by other agencies as well, so that requirement of establishing Fire Stations in these areas does not become part of the Gap analyses.***

As part of the 'Investment and Financing Plan', it is expected to assess the status, availability and distribution of the fire service infrastructure under the jurisdiction of Director General (NDRF & Civil Defence) through conducting field investigations and interviews. It is also expected to conduct an investigation to assess the gaps and needs for future planning, up gradation/ modernization of the fire service infrastructure in the country through a quantified approach. As part of the Investment and Financing Plan, it is also expected to estimate the Capital and O&M Investment plan for the next 10 years and the investment priorities. Based on the field data collection, enquiry, spatial analysis and understanding on the availability and gaps in the fire service infrastructure, it is expected to prepare an institutional assessment and capacity-building plan for the department. Institutional Assessment and Capacity Building Plan will include but not limited be to understanding the polices, regulations, strategies and programs of the department; existing legal and institutional mechanisms, issues and constrains of effective management; training needs and capacity of the department's resources. Based on a comprehensive understanding of the mentioned variables, it is expected to prepare a consolidated National Report and key recommendations for the Director General (NDRF & Civil Defence) for all the Fire Stations under jurisdiction of the Directorate of NDRF & CD. Moreover, the possibility of funding sources will also be explored, and recommendations are made for improvements to ensure good financing mechanisms for capital expenditure and operation and maintenance.

2.2 Study Area

The study area for this assignment is the entire fire service area of the country under the Directorate of NDRF & Civil Defence (Fire Cell). RMSI has carried out physical survey of all the Fire Stations under the Directorate of NDRF & CD (Fire Cell) (Figure 2-1) across the country.

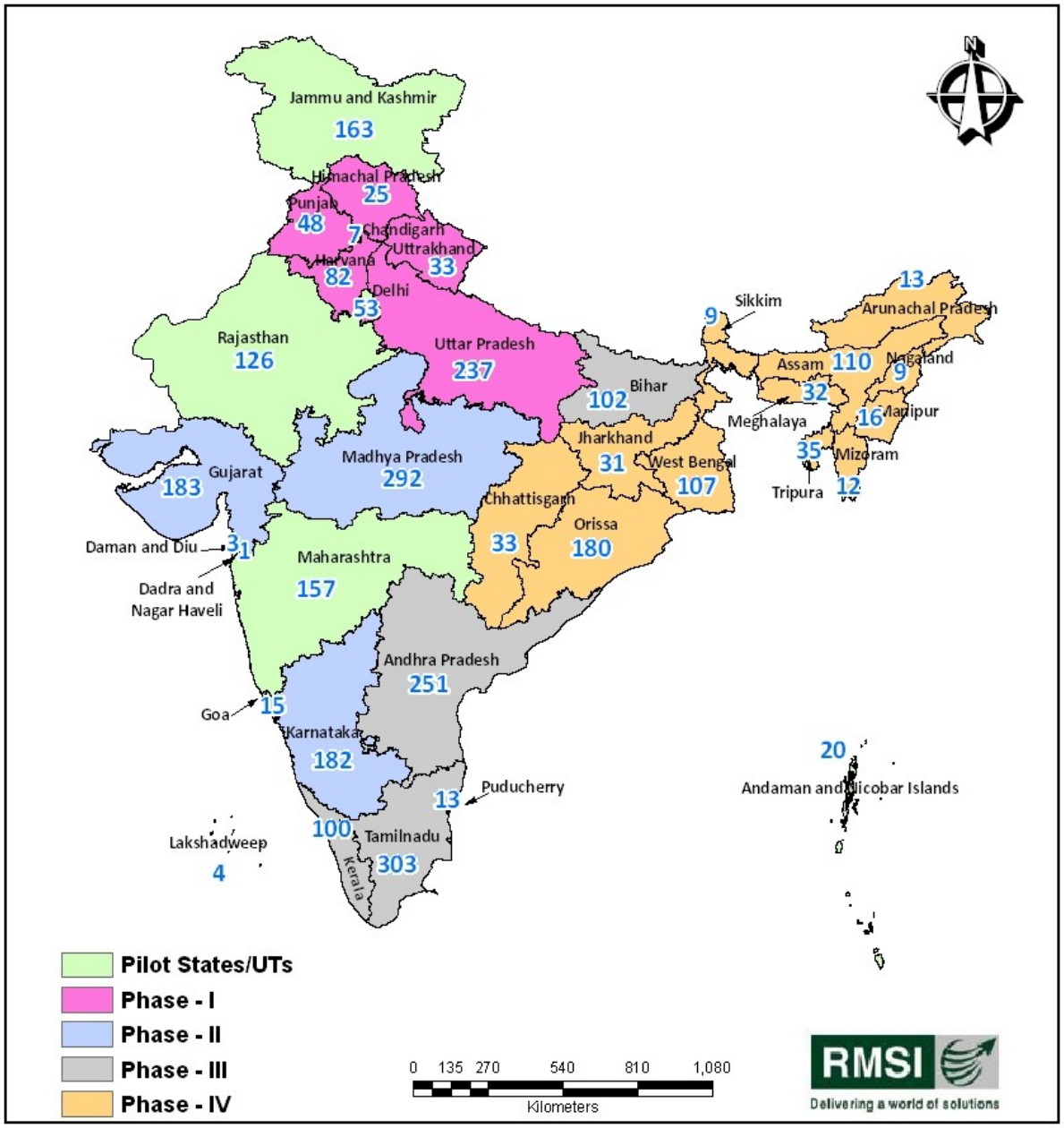


Figure 2-1 : State/UT wise distribution of fire service stations in India

2.3 Phased Approach

As India is a vast country and in order to conduct this study for all the States and Union Territories (UTs), it was decided to conduct this study in a phased manner (Table 2-1).

The initial phase pilot study comprises of six States and UTs - Jammu & Kashmir, Rajasthan, Puducherry, Maharashtra, Andaman & Nicobar Island, and Delhi and other States/UTs have been taken up in subsequent Phases (Phase I to Phase IV). The Fire-Infrastructure of all States/ UTs has been Field–Surveyed by RMSI team and fire hazard and risk analyses have been carried out. The other tasks include development of Investment and financing plan, Institutional assessment & capacity building plan along with a prototype Fire Decision Support System (FDSS). The outcomes of pilot study were submitted to the Expert Group of the project for their review and approval and detailed discussions were held with senior Fire Officials, MHA and respective State/UT representatives. The approved report is used as a template for conducting the study for the remaining States/ UTs in the phased manner indicated in Table 2-1.

It may be noted that there could be region specific modifications and variations in the requirements of different kinds and types of fire fighting equipment depending upon the risk category of the district (base unit) of Fire Station, its geographical location such as coastal-area, hilly-area and desert–area. Phase wise list of States/UTs also includes corresponding number of districts (Census, 2011), number of Talukas/ Mandals/ Tehsils (Census, 2001), and number of Fire Stations (Table 2-1).

Table 2-1: Phase wise distribution of various States/UTs in the Country

States	No of Districts (Census 2011)	No of Talukas/ Tehsils/ Mandals (Census 2001)	No of Fire Stations
Pilot Phase			
NCT of Delhi	9	27	53
Maharashtra	35	355	157
Puducherry	4	15	13
Andaman & Nicobar Islands	3	7	20
Rajasthan	33	241	126
Jammu & Kashmir	22	59	163
Phase I			
Chandigarh	1	1	7
Haryana	21	67	82
Punjab	20	72	48
Himachal Pradesh	12	109	25
Uttarakhand	13	49	33
Uttar Pradesh	71	300	237
Phase II			
Madhya Pradesh	50	259	292
Gujarat	26	227	183
Daman & Diu	2	2	3

States	No of Districts (Census 2011)	No of Talukas/ Tehsils/ Mandals (Census 2001)	No of Fire Stations
Dadra & Nagar Haveli	1	1	1
Karnataka	30	175	182
Goa	2	11	15
Phase III			
Kerala	14	63	100
Lakshadweep	1	4	4
Tamil Nadu	32	202	303
Andhra Pradesh	23	1110	251
Bihar	38	533	102
Phase IV			
West Bengal	19	343	107
Assam	27	145	110
Manipur	9	38	16
Meghalaya	7	32	32
Mizoram	8	25	12
Sikkim	4	9	9
Tripura	4	38	35
Nagaland	11	93	9
Arunachal Pradesh	16	149	13
Orissa	30	398	180
Chhattisgarh	18	97	33
Jharkhand	24	210	31
Total	**640**	**5,466**	**2,987**

3 GIS based Fire Hazard and Risk Analysis

Based on RMSI's vast experience of executing large projects at State and country levels, RMSI team has adopted the following approach (detailed below) to carry out this assignment. This approach has also been presented and discussed in a series of meetings with the officials of the Directorate of NDRF & CD, MHA, Government of India.

The risk of fire in urban areas has increased over the years and the rising cost of fire losses would seem to indicate that they are increasing at a greater rate than the measures devised to control them. Cities are growing in size and complexity day by day; therefore, they need to be managed more efficiently.

Geographic Information System (GIS) is an important and efficient tool that can be used by local administrations to minimize natural disasters (Recep Nisanci, 2010). Although there are many formal definitions of GIS, for practical purposes GIS can be defined as a computer-based system to aid in the collection, maintenance, storage, analysis, output and distribution of spatial data information (Bolstad, 2005). Thus, GIS technologies have been used in fire analysis related to the optimum location of Fire Stations. For example, Habibi et al. (2008), has made spatial analysis of urban Fire Stations in Tehran, using an analytical hierarchy process and GIS. Yang et al. (2004) also carried out studies concerning the selection of Fire Station locations using GIS.

Unlike a flat paper map, a GIS-generated map can represent many layers of different information. This representation provides a unique way of thinking about geographic space. By linking map databases, GIS enables users to visualize, manipulate, analyze and display spatial data. GIS technology based approach is cost-effective and provides accurate solutions in an expanding range of applications. RMSI team is adopting following approach for fire risk analysis of Indian States.

3.1 GIS Data Compilations

GIS Map based fire hazard and risk analysis is one of the main tasks of this assignment. In order to undertake hazard and risk analysis, various GIS layers and other associated thematic maps have been created for each of the pilot States/UTs that form the basis for risk ranking of base units (districts). The following is a list of selected GIS layers as base administrative layers and other dependant layers that have been used in GIS based fire risk analyses.

1. State administrative boundary layers
2. District administrative boundary layers
3. Rail network
4. Major (highways) and main road networks
5. Minor roads/ street road networks
6. Locations of cities, and major towns with their names
7. State level Land use land cover maps
8. Demarcation of residential, commercial and industrial built-up areas
9. Census population data (2011)
10. Geographical locations (latitude, longitude) of operational Fire Stations
11. Other collateral data such as information from city development plans (if available), and demarcation of fire-station jurisdictional areas.

These data layers and their attribute data have been expanded according to needs analyses. The needs analyses include query information for the data needed for generating risk maps and effective fire fighting planning.

After taking into account all requirements and data types, RMSI team has generated various GIS data layers for further GIS spatial analyses. District boundaries were considered as the base unit for analysis in assessing fire services infrastructure gaps, risk quantifications, and risk classifications.

GIS maps for administrative boundary layers such as State, and district are based on published Census 2011 data. **Currently, Census 2011 has published only district level demographic data.** In comparison to previous census (Census 2001), several new districts have been created. These new districts have been considered in the analysis.

Classified land use and land cover data is the backbone in fire hazard and risk analysis. Latest vintage satellite images have been used to capture the various features such as road networks, forest areas and habitat/settlement areas (Figure 3-1). The various land use land cover classes were extracted from latest vintage satellite images at 25m resolution for the selected States and UTs, and at higher resolution for major cities. The extraction is based on a semi-automated classification approach to distinguish the classes based on their reflectance values in the source satellite imagery. Data quality and data validation checks have been carried out for each stage of data generation.

For LULC classification, remote sensing satellite images were geo-referenced and classified to generate different LULC layers such as vegetation, built-up area, water bodies, and streets, based on their spectral reflectance i.e. DN (Digital Number) values. In this process, through a semi-automated process, these DN values of satellite images are classified into respective LULC classes to generate the clutter data. These clutter data layers are further subdivided into their respective sub-classes and merged together to give preliminary clutter data. The output clutter goes through standard validation processes and quality checks to produce high quality final clutters. Table 3-1 shows a list of classified LULC data at 25-meter resolution. Figure 3-1 displays delineated LULC classes for different parts of western Maharashtra (districts– Mumbai, Mumbai sub-urban, Thane, Pune and Raigarh). Figure 3-2 shows an enlarged view of classified urban agglomerate of Pune city areas.

Table 3-1: Cluster class morphology in land use maps

ID	Class Name	Description
0	**Unclassified**	Edge of the database
1	**Urban High Density**	Areas within urban perimeters, Inner city, very little/negligible vegetation. Closely packed buildings indicative of high density with only major streets and roads being visible. Absence of large open spaces.
2	**Urban Medium Density**	Medium density of buildings, vegetations are less but higher than the dense urban, major pedestrian zones being partially visible and streets and roads visible. Comparatively more open spaces exist within this region
3	**Urban Low Density**	Low density of buildings, vegetations / open area are higher than the medium urban, major pedestrian zones being partially visible and streets and roads visible. Comparatively more open spaces than medium density exist within this region
4	**Suburban High Density**	Suburban areas surrounding big cities (Outer parts of the city) with loosely packed built up and little vegetation.
5	**Suburban Low Density**	Sparse Suburban areas in outskirt of big cities (Outer parts of the city) with loosely packed built up and little vegetation.
6	**Building Blocks**	Systematic groups of buildings, parallel or not, that may be separated by large open spaces.

ID	Class Name	Description
7	**Villages**	Unsystematic small pockets /clusters of buildings, within large agriculture / open spaces
8	**Industrial**	**Industrial:** Factories, Warehouse, Garages, Shipyards, Mostly situated outside the main cities.
9	**Commercial Areas**	**Commercial:** Central Mall, Office Complexes with large building footprints, Central Business districts, Commercial buildings within the city (like petrol pumps, gas filling stations etc.) etc. will be classified as commercial areas
10	**Forest**	All kinds of dense forest in rural areas, over hills/ mountains, Natural Parks with high tree density.
11	**Low Dense Vegetation**	Low density of trees, low vegetation, bushes, scrubs with low tree density.
12	**Agriculture/Fellow**	All kinds of agriculture/fellow cultivated areas, croplands, farmlands etc.
13	**Water**	Inland permanent water bodies. This class will consist of lakes & dams.
14	**Open**	No buildings, no vegetation e.g. desert, beach, and open lands mostly barren.
15	**Quasi Open**	Areas with some obstruction like scattered trees or bushes with some mixed built-up, open, agricultural fallow lands etc
16	**Airport**	Airstrip and terminal buildings
17	**River/Canal**	Linear water features like streams and rivers.
18	**Seasonal Water Body**	Seasonal water body
19	**Sea**	Sea

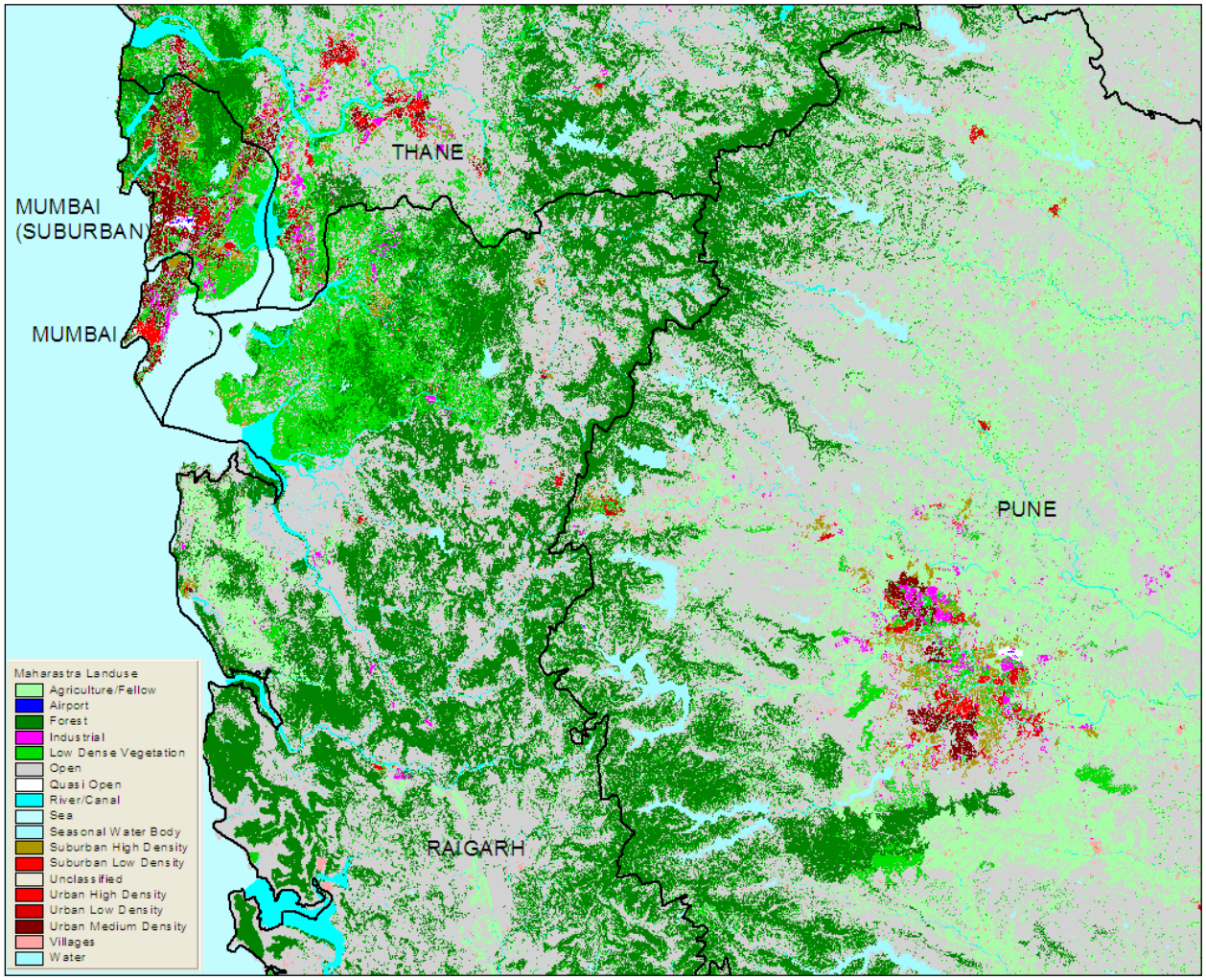


Figure 3-1 : An example of a Land use classification at 25m pixel. The example shows parts of Western Maharashtra (districts – Mumbai, Mumbai sub-urban, Thane, Pune, and Raigarh)

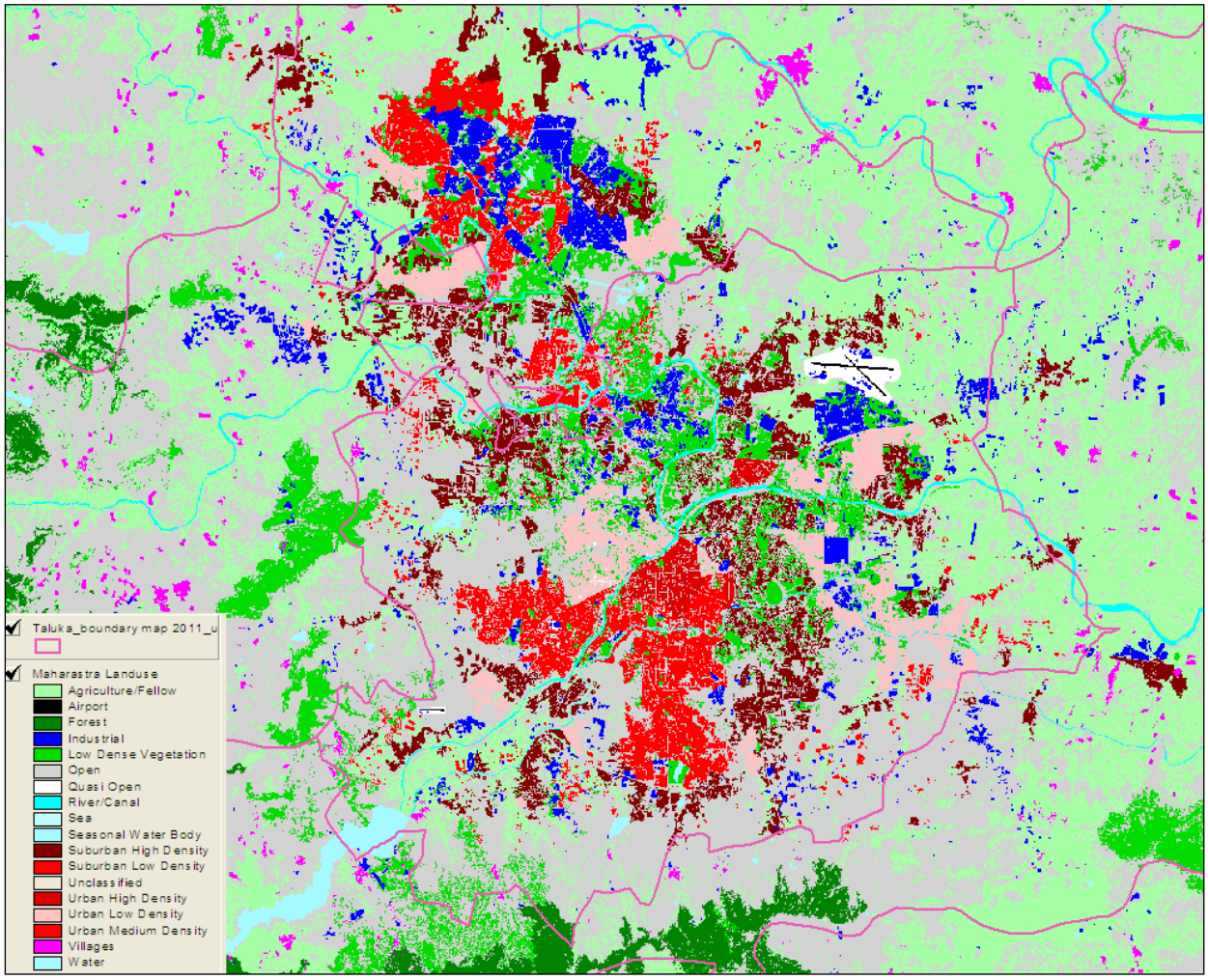


Figure 3-2 : Example of an enlarged view of classified. The example shows urban agglomeration classification in Pune city areas

For major city areas, classifications that are even more detailed have been created with a high-resolution data layer as shown in Figure 3-3. For major cities / towns, besides the other classified units, such as highways and main roads, minor roads/streets and localities, have been captured. After the field survey of individual Fire Stations, GPS locations of all Fire Stations have been displayed for gap analysis.

3.2 GIS - Overlay Analysis

The basic way to create or identify spatial relationships among various GIS layers is through the process of spatial overlay. Overlay is a GIS operation in which layers with a common, registered map base are joined on the basis of their occupation of space. (Keith C. Clarke, 1997). Spatial overlay is accomplished by joining and viewing together separate data sets that share all or part of the same area. The result of this combination is a new data set that identifies the spatial relationships.

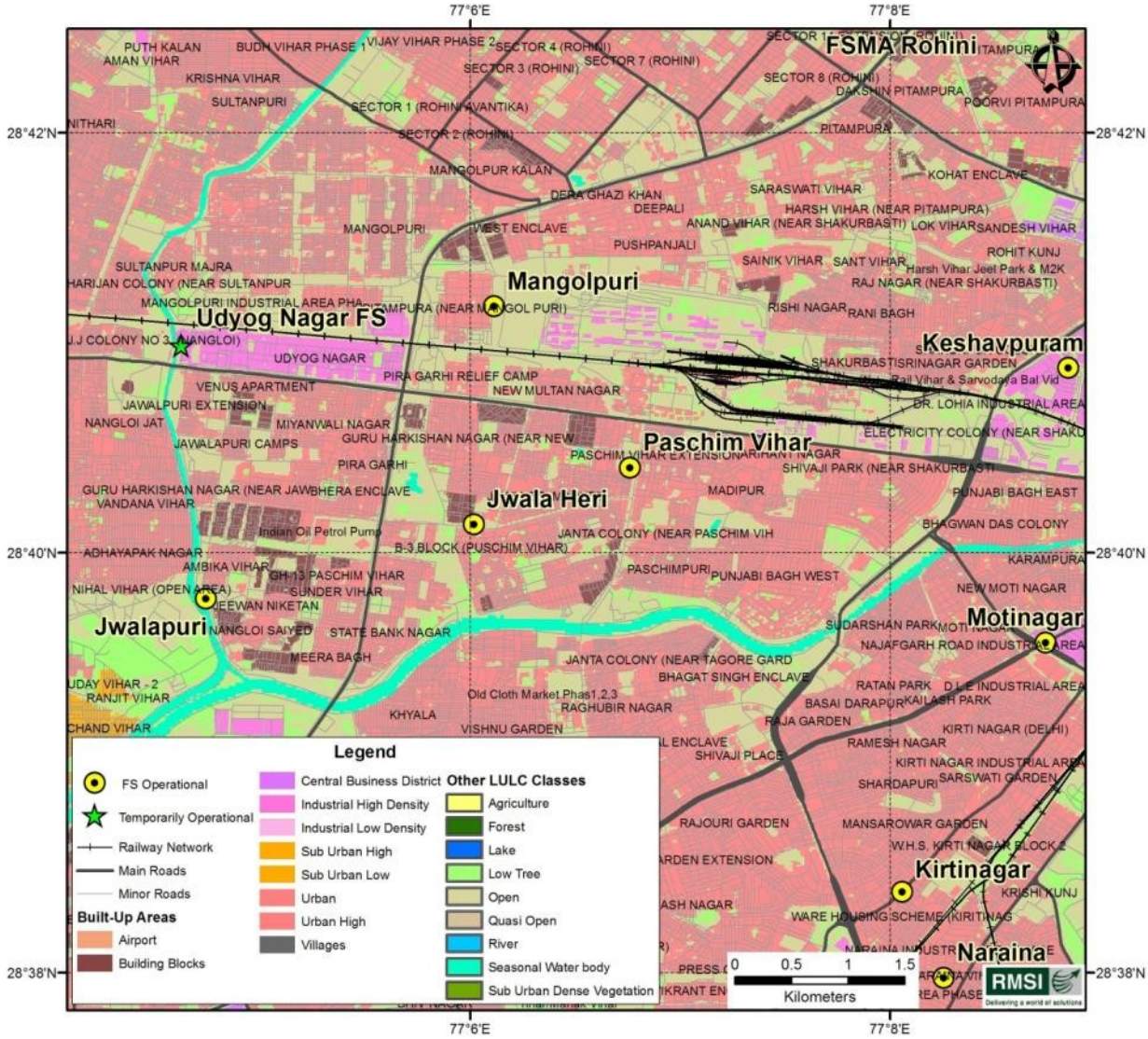


Figure 3-3 : An example of a detailed classified urban agglomerate area. The example shows parts of Delhi with overlay of GPS locations of Fire Stations

Overlay analysis is a common, widely used method of analyzing and evaluating geospatial data. Overlay analysis utilizes map layers in GIS to discover relationships across the layers. Overlay analysis is used to investigate geographic patterns and to determine locations that meet specific criteria. Spatial overlay is illustrated and highlighted in Figure 3-4. Various data layers, such as Land Use Land Cover (LULC), composite hazard, demographic exposure, road network, administrative boundary and Fire Station locations have been used through overlay analysis by combining diverse data sets for hazard analysis and Fire Station gap analysis.

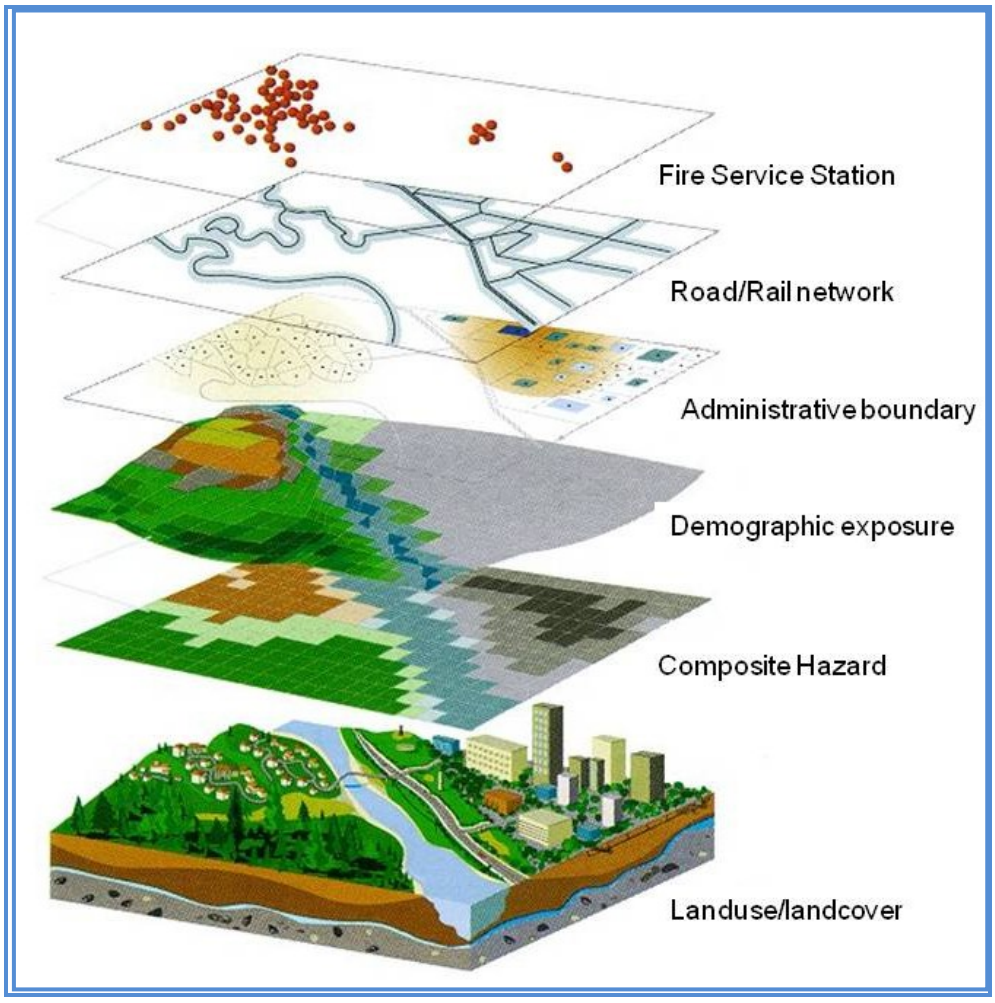


Figure 3-4 : Overlay analysis for Fire Risk Assessment

3.3 Fire Hazard and Risk Analysis

The first-turnout of fire vehicles normally originates from the Fire Station under whose jurisdiction the fire-call has been received. Sometimes, calls go to a centralized control room, from where they are directed to the concerned Fire Station. To provide an effective response, Fire Station infrastructure in the form of fire fighting and rescue vehicles, specialized equipment and manpower should also take into consideration of fire risks in addition to road conditions and population distribution. Thus, hazard and risk analysis of the base unit (district) should be on a scientific basis.

In general, fire risk is defined as the combination of hazard potential, exposure, and vulnerability:

Risk = F (**H**azard potential x **E**xposure x **V**ulnerability)

The occurrence of fire incidents that constitute a threat for the population and the exposed infrastructure of a certain region is associated with economic and human losses, always as a function of the exposure conditions and the vulnerability of the exposed assets in that particular region. In the present scope, fire risk can be defined as associated with the number of small and medium fire incidents and their locations.

3.4 Hazard Ranking

Earthquake (Seismic zones)

Besides loss of life, property damage, building collapses, and loss of basic amenities such as bridge and road damage, earthquakes can also induce small to large fires. Hence, earthquake zoning is an important parameter for fire risk analysis.

Based on occurrence of earthquakes of different intensities, the Seismic Zoning Map of India (IS 1893, 2001; BMTPC, 2006; NBC 2005) divides the country into 4 seismic zones as shown in Figure 3-5. Seismic Zone V is the highest risk zone where earthquakes having intensity of IX+ on Modified Mercalli Intensity (MMI) scale can take place. Earthquakes of intensities between VIII to IX can be experienced in seismic Zone IV, whereas earthquakes can occur between VI and VIII intensity in seismic Zone III.

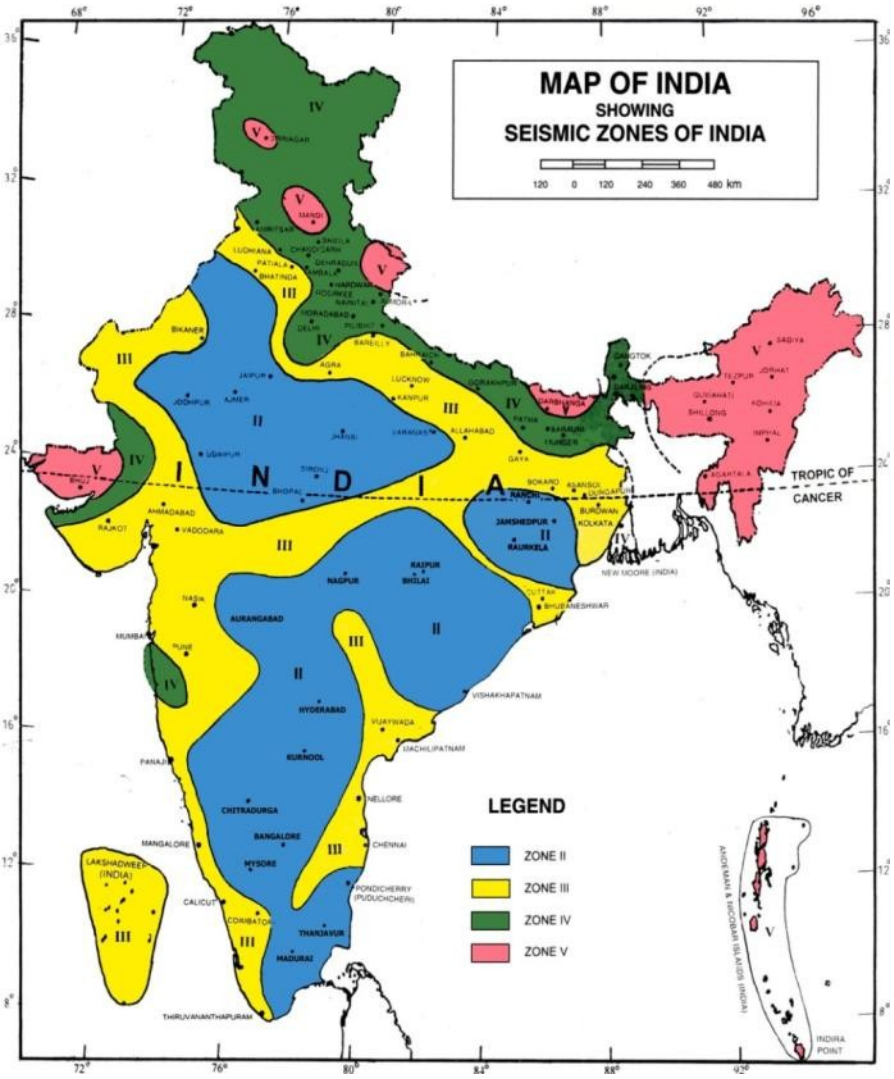


Figure 3-5 : Seismic zones of India

With GIS overlay analysis, district areas falling within each seismic zone have been computed. In order to compare seismic risk among various districts, district level ranking of seismic zones has been assigned, based on the scheme shown in Table 3-2. District level seismic ranking for pilot States/UTs is shown in Table 3-3.

Wind Zones

Prevailing wind speed is one of the important parameters in assessing fire risk in the area. Wind speed has a noticeable influence on fire spread. The wind zone map illustrates the areas vulnerable to high wind speeds (Figure 3-6). There are six basic wind speeds considered for zoning, namely:

- 55m/s (198 km/hr) Very High Damage Risk Zone-A
- 50m/s (180 km/hr) Very High Damage Risk Zone-B
- 47m/s (169.2 km/hr) High Damage Risk Zone
- 44m/s (158.4 km/hr) Moderate Damage Risk Zone-A
- 39m/s (140.4 km/hr) Moderate Damage Risk Zone-B
- 33m/s (118.8 km/hr) Low Damage Risk Zone

The coastal areas are subjected to severe windstorms and cyclonic storms. A full-grown cyclone is 150 to 1,000 km across and 10 to 15 km high. Macro-level wind speed zones of India have been formulated and published in IS 875 (Part-3) – 1987. It is known that in certain events, the wind gusts could appreciably exceed the given basic wind speeds. For assessing vulnerability and fire risk to buildings, above macro-level zonings have been considered. Based on wind speed, risk ranking has been assigned to each wind zone following the schema described in Table 3-2. District wise estimated wind risk from GIS overlay analysis is shown in Table 3-3.

Table 3-2: Risk ranking schema for earthquake, wind and climatic zones

Wind Zone	Ranking
Very High Damage Risk Zone - A (Vb=55m/s)	4
Very High Damage Risk Zone - B (Vb=50m/s)	3.5
High Damage Risk Zone (Vb=47m/s)	3
Moderate damage Risk Zone - A (Vb=44m/s)	2
Moderate damage Risk Zone - B (Vb=39m/s)	1.5
Low Damage Risk Zone (Vb=33m/s)	1
Importance Factors/ Weightage	**20%**

Seismic Zone	Ranking
ZONE V	4
ZONE IV	3
ZONE III	2
ZONE II	1
20%	

Climatic Zones	Ranking
Hot and Dry	3
Composite, Temperate	2
Warm and Humid	1
Cold Climate	1
20%	

Hill Zoning	Ranking
Cold climate	5
Other climates	1
Importance Factors/ Weightage	**40%**

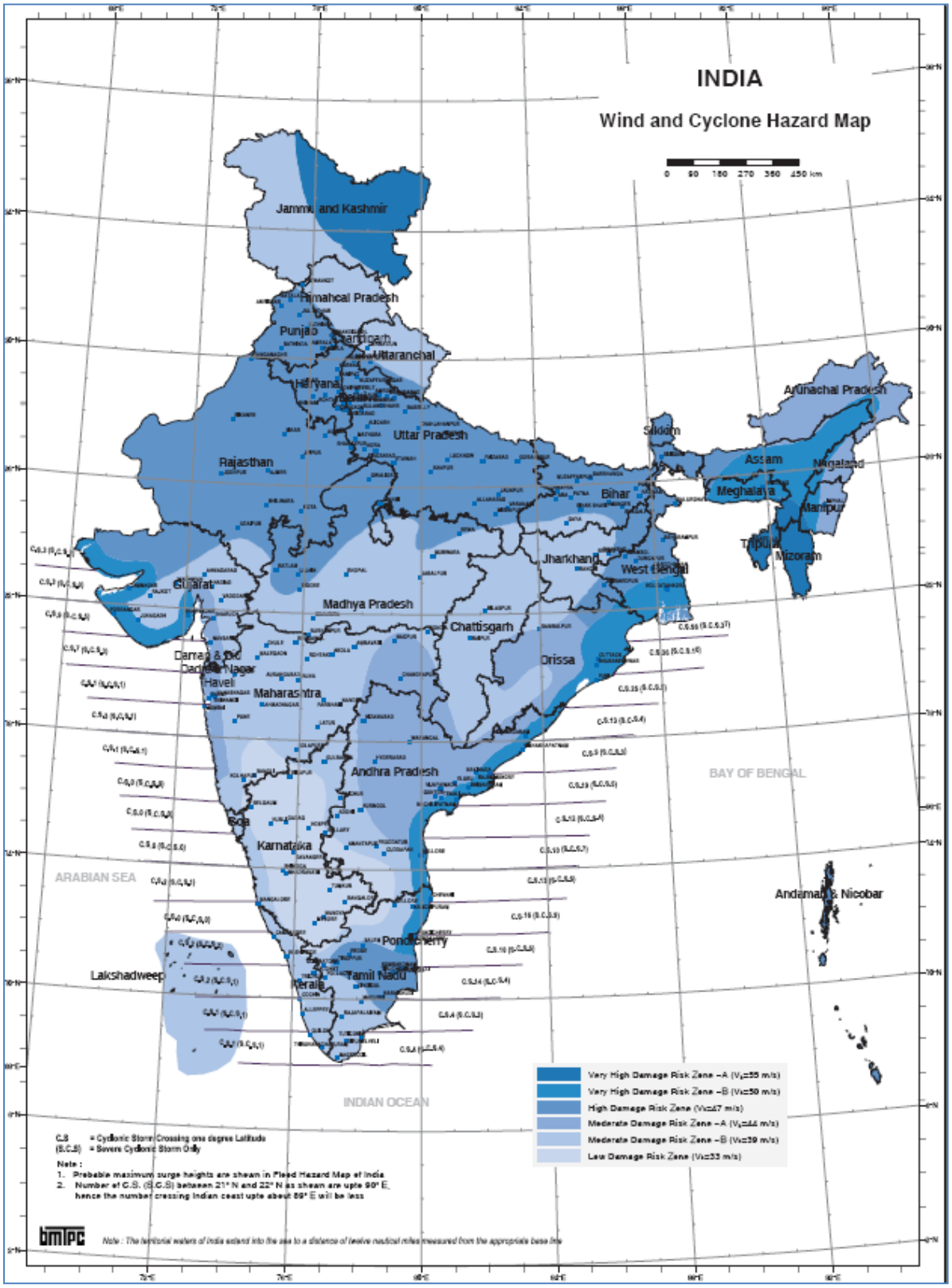


Figure 3-6 : Wind zone map of India (BMTPC, 2006)

Climatic Zones

Regions having similar characteristic features of climate are grouped under one climatic zone. According to a recent code of the Bureau of Indian Standards, the country has been divided into the following five major climatic zones:

- Hot & Dry (mean monthly temperature >30 and relative humidity <55%);
- Warm & Humid (mean monthly temperature >25-30 and relative humidity >55-75%);
- Temperate (mean monthly temperature 25-30 and relative humidity <75%);
- Cold (mean monthly temperature <25 and relative humidity – can be any values);
- Composite (This applies when six months or more do not fall within any of the other categories meaning sharing characteristics of two or more of the above categories in a year).

Map of climatic zones is shown in Figure 3-7. The hot and dry zone lies in the western and the central parts of India; Jaisalmer, Jodhpur and Sholapur are some of the towns that experience this type of climate. In this zone, solar radiation and movement of hot winds are higher. The warm and humid zone covers the coastal parts of the country, such as Mumbai, Chennai and Kolkata. Pune and Bangalore are examples of non-coastal cities that fall the under moderate climatic zone. Generally, the Himalayan region experiences cold type of climate. The composite zone covers the northern Indo-Gangetic plains, such as New Delhi, Kanpur, and Allahabad.

With GIS overlay analysis, district overlap areas falling within each climatic zone have been computed. In order to compare impact of being a district in a climatic zone, district level ranking has been assigned based on the scheme shown in Table 3-2. District level climatic zone ranking for pilot States/ UT is shown in Table 3-3.

Hilly Areas and Building Class Zones

Extreme cold climate, rugged topography and use of flammable material in building construction (such as wood) and the use of heating provisions in houses during cold weather is an important factor for causing fire incidents in that region. To capture such elements in fire risk hazard, Hilly Areas and Building Class Zones have been created. This class is directly linked to the cold climate zone. All hilly districts, (such as all districts of Jammu & Kashmir in the Pilot study) fall under this category. In such districts, a ranking of five has been assigned. Importance of this zone in terms of occurrence of number of fire incidents is quite high. Hence, while integrating, a double weightage of 40% has been assigned to this layer.

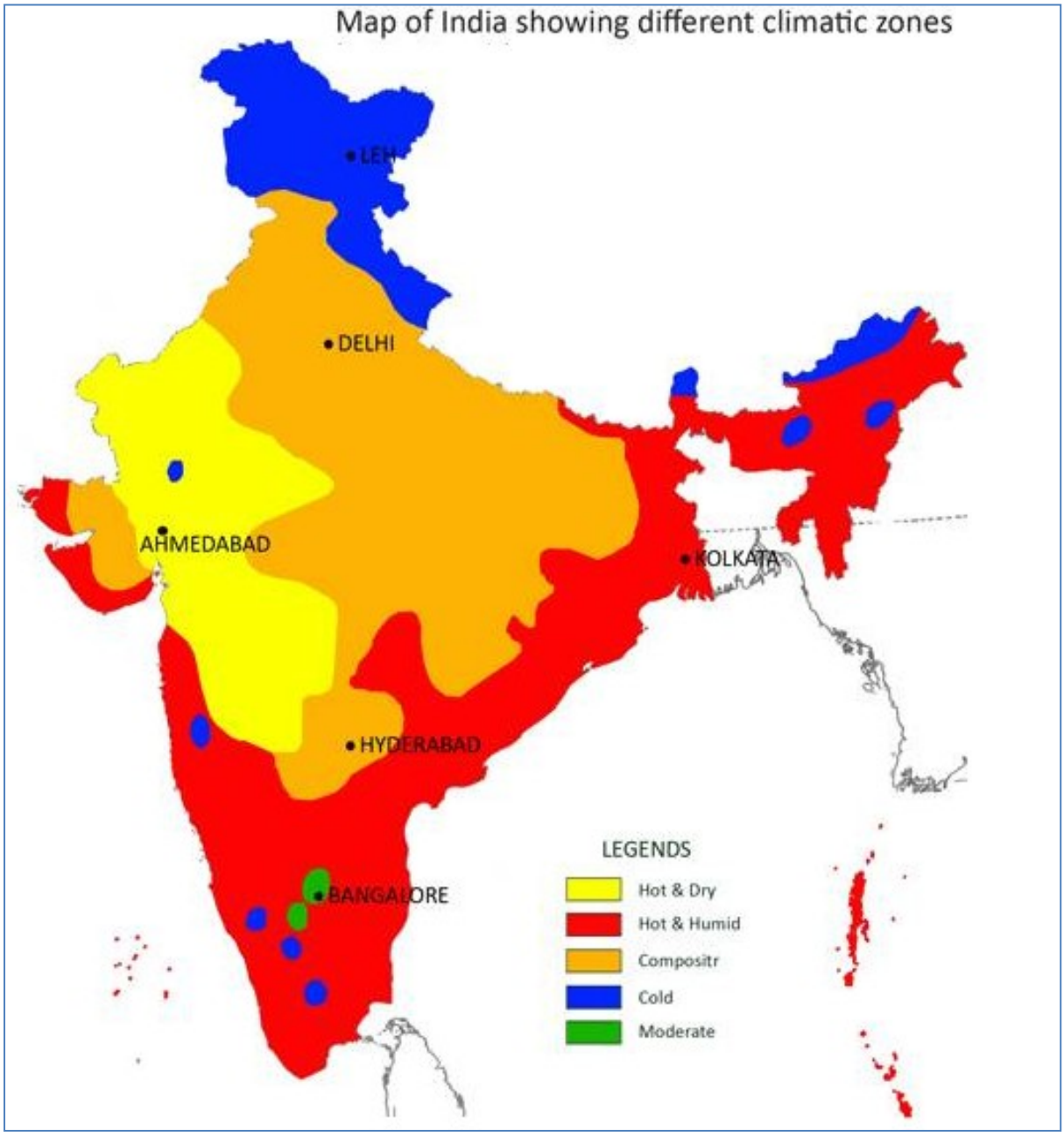


Figure 3-7 : Climatic Zones of India

Table 3-3: District level ranking for individual (earthquake, wind and climatic) hazard and integrated hazards for all States of Phase II

Importance Factor			20%	20%	20%	40%	Integrated Hazard Zoning
State	District	Geographical Area (Sq km)	Wind Zoning	Seismic Zoning	Climate Zoning	Hill Zoning	
Madhya Pradesh							
	Alirajpur	3,334	1.5	2.0	3.0	2.0	2.1
	Anuppur	3,810	1.5	1.3	2.0	2.0	1.8
	Ashoknagar	4,743	2.4	1.0	2.2	2.0	1.9
	Balaghat	9,310	1.5	1.0	2.0	2.0	1.7
	Barwani	5,426	1.5	2.0	3.0	2.0	2.1
	Betul	10,074	1.5	2.0	2.1	2.0	1.9
	Bhind	4,478	3.0	1.0	2.0	2.0	2.0
	Bhopal	2,770	1.5	1.0	2.0	2.0	1.7
	Burhanpur	3,231	1.5	2.0	3.0	2.0	2.1
	Chhatarpur	8,717	2.1	1.0	2.0	2.0	1.8
	Chhindwara	11,855	1.5	1.6	2.0	2.0	1.8
	Damoh	7,337	1.5	1.2	2.0	2.0	1.7
	Datia	2,682	3.0	1.0	2.0	2.0	2.0
	Dewas	7,012	1.7	1.5	2.0	2.0	1.8
	Dhar	8,152	1.9	1.5	2.6	1.5	1.8
	Dindori	5,802	1.5	1.2	2.0	2.0	1.7
	East Nimar	7,477	1.5	2.0	2.7	1.5	1.8
	Guna	6,386	2.9	1.0	2.8	1.5	1.9
	Gwalior	4,572	3.0	1.0	2.0	2.0	2.0
	Harda	3,338	1.5	2.0	2.0	2.0	1.9
	Hoshangabad	6,698	1.5	2.0	2.0	2.0	1.9
	Indore	3,908	2.2	1.1	2.0	2.0	1.9
	Jabalpur	5,127	1.5	2.0	2.0	2.0	1.9
	Jhabua	3,442	1.7	1.4	3.0	2.0	2.0
	Katni	5,106	1.5	1.4	2.0	2.0	1.8
	Mandla	7,566	1.5	1.2	2.0	2.0	1.7
	Mandsaur	5,551	3.0	1.0	3.0	2.0	2.2
	Morena	4,994	3.0	1.0	2.0	2.0	2.0
	Narsimhapur	5,155	1.5	2.0	2.0	2.0	1.9
	Neemuch	4,306	3.0	1.0	3.0	2.0	2.2
	Panna	7,126	2.8	1.0	2.0	2.0	2.0
	Raisen	8,494	1.5	1.4	2.0	2.0	1.8
	Rajgarh	6,169	2.7	1.0	2.2	2.0	2.0
	Ratlam	4,859	2.7	1.0	2.9	1.5	1.9
	Rewa	6,363	2.7	1.0	2.0	2.0	1.9
	Sagar	10,301	1.5	1.1	2.0	2.0	1.7
	Satna	7,598	2.6	1.0	2.0	2.0	1.9
	Sehore	6,573	1.5	1.4	2.0	2.0	1.8

Importance Factor			20%	20%	20%	40%	Integrated Hazard Zoning
State	District	Geographical Area (Sq km)	Wind Zoning	Seismic Zoning	Climate Zoning	Hill Zoning	
	Seoni	8,807	1.5	1.2	2.0	2.0	1.7
	Shahdol	5,738	1.5	1.8	2.0	2.0	1.9
	Shajapur	6,195	2.6	1.0	2.2	2.0	2.0
	Sheopur	6,610	3.0	1.0	2.0	2.0	2.0
	Shivpuri	10,306	3.0	1.0	2.0	2.0	2.0
	Sidhi	4,830	1.5	1.5	2.0	2.0	1.8
	Singrauli	5,822	1.5	1.9	2.0	2.0	1.9
	Tikamgarh	5,052	2.1	1.0	2.0	2.0	1.8
	Ujjain	6,097	3.0	1.0	2.1	2.0	2.0
	Umaria	4,606	1.5	2.0	2.0	2.0	1.9
	Vidisha	7,312	1.5	1.0	2.0	2.0	1.7
	West Nimar	8,017	1.5	2.0	2.8	1.5	1.9
Gujarat							
	Ahmadabad	8,108	2.1	2.1	2.9	1.5	2.0
	Amreli	7,056	2.3	2.0	1.5	2.0	2.0
	Anand	3,205	1.9	2.0	3.0	2.0	2.2
	Banas Kantha	10,753	3.0	2.8	3.0	2.0	2.6
	Bharuch	6,477	1.9	2.0	3.0	2.0	2.2
	Bhavnagar	9,758	2.9	2.0	1.5	2.0	2.1
	Dohad	3,657	1.5	2.0	3.0	2.0	2.1
	Gandhinagar	1,652	1.5	2.0	3.0	2.0	2.1
	Jamnagar	10,868	3.3	2.7	1.2	1.5	2.0
	Junagadh	8,865	3.2	2.0	1.0	1.5	1.9
	Kachchh	41,580	3.2	4.0	1.7	2.0	2.6
	Kheda	3,955	1.6	2.0	3.0	2.0	2.1
	Mahesana	4,396	2.1	2.2	3.0	2.0	2.3
	Narmada	2,817	1.5	2.0	3.0	2.0	2.1
	Navsari	2,205	2.0	2.0	3.0	2.0	2.2
	Panch Mahals	5,727	1.5	2.0	3.0	2.0	2.1
	Patan	5,793	3.0	3.2	2.9	1.5	2.4
	Porbandar	2,328	3.5	2.0	1.0	1.0	1.7
	Rajkot	11,259	2.2	2.4	1.8	2.0	2.1
	Sabar Kantha	7,400	1.7	2.0	3.0	2.0	2.1
	Surat	4,336	1.9	2.0	3.0	2.0	2.2
	Surendranagar	10,431	1.9	2.4	2.3	2.0	2.1
	Tapi	3,140	1.5	2.0	3.0	2.0	2.1
	The Dangs	1,762	1.5	2.0	3.0	2.0	2.1
	Vadodara	7,549	1.5	2.0	3.0	2.0	2.1
	Valsad	2,950	2.0	2.0	2.1	2.0	2.0
Daman & Diu							
	Daman	63	2.0	2.0	1.0	1.0	1.4

Importance Factor			20%	20%	20%	40%	Integrated Hazard Zoning
State	District	Geographical Area (Sq km)	Wind Zoning	Seismic Zoning	Climate Zoning	Hill Zoning	
	Diu	28	3.4	3.0	1.0	1.0	1.9
Dadra & Nagar Haveli							
	Dadra & Nagar Haveli	490	2	2	1	1	1.4
Karnataka							
	Bagalkot	6,550	1.0	1.0	1.0	1.0	1.0
	Bangalore	2,199	1.0	1.0	1.4	1.5	1.3
	Bangalore Rural	2,301	1.0	1.0	1.9	2.0	1.6
	Belgaum	13,427	1.0	1.4	1.0	1.0	1.1
	Bellary	8,464	1.1	1.0	1.0	1.0	1.0
	Bidar	5,446	1.5	1.0	2.2	2.0	1.7
	Bijapur (K)	10,492	1.1	1.1	1.3	1.5	1.3
	Chamarajanagar	5,651	1.1	1.1	1.0	4.5	2.4
	Chikkaballapura	4,250	1.0	1.0	1.7	2.0	1.5
	Chikmagalur	7,200	1.0	1.1	1.0	1.0	1.0
	Chitradurga	8,437	1.0	1.0	1.0	1.0	1.0
	Dakshina Kannada	4,861	1.3	1.9	1.0	1.0	1.2
	Davanagere	5,922	1.0	1.0	1.0	1.0	1.0
	Dharwad	4,256	1.0	1.0	1.0	1.0	1.0
	Gadag	4,655	1.0	1.0	1.0	1.0	1.0
	Gulbarga	10,960	1.5	1.0	2.4	2.0	1.8
	Hassan	6,812	1.0	1.0	1.0	1.5	1.2
	Haveri	4,820	1.0	1.0	1.0	1.0	1.0
	Kodagu	4,108	1.1	1.6	1.0	4.5	2.5
	Kolar	3,988	1.0	1.0	1.0	1.0	1.0
	Koppal	5,569	1.0	1.0	1.0	1.0	1.0
	Mandya	4,964	1.0	1.0	1.4	1.5	1.3
	Mysore	6,308	1.0	1.1	1.0	1.5	1.2
	Raichur	8,446	1.2	1.0	1.7	2.0	1.6
	Ramanagara	3,516	1.0	1.0	1.5	1.5	1.3
	Shimoga	8,473	1.1	1.3	1.0	1.0	1.1
	Tumkur	10,604	1.0	1.0	1.1	1.5	1.2
	Udupi	3,580	1.5	2.0	1.0	1.0	1.3
	Uttara Kannada	10,270	1.3	1.7	1.0	1.0	1.2
	Yadgir	5,276	1.3	1.0	1.9	2.0	1.6
Goa							
	North Goa	1,737	1.5	2.0	1.0	1.0	1.3
	South Goa	1,960	1.5	2.0	1.0	1.0	1.3

3.5 Exposure Vulnerability Ranking

For estimating exposure and its vulnerability, detailed urban agglomerate classification maps generated from high-resolution satellite images have been used. With the help of remote sensing techniques applied on high-resolution satellite imageries, 10 types of urban agglomeration areas have been delineated (Figures 3-1 and 3-2). For major city areas, even more detailed urban agglomerate classification has been created with high-resolution data layers as shown in Figure 3-3. These include urban, semi-urban, building blocks, industrial and rural villages' built-up areas. District level census 2011 population has been distributed to each population agglomeration cluster. For exposure vulnerability, 4 different layers viz. population density, residential built-up areas, high-rise building block density, and industrial areas have been developed individually at district level. Table 3-4 shows district level geographical area, population, population density, residential built-up area, industrial area, and residential built-up area.

Table 3-4: District level geographical area, population, population density, residential built-up area, residential built-up area in percentage, and industrial area of all State of Phase II

State	District	Geographical Area (sq km)	Population 2011	Population Density	Residential Built-Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in %)
Madhya Pradesh							
	Alirajpur	3,334	728,677	218.55	25.55	0.11	1%
	Anuppur	3,810	749,521	196.73	53.65	2.34	1%
	Ashoknagar	4,743	844,979	178.14	64.26	1.05	1%
	Balaghat	9,310	1,701,156	182.72	96.40	0.44	1%
	Barwani	5,426	1,385,659	255.37	40.44	2.80	1%
	Betul	10,074	1,575,247	156.37	77.68	0.62	1%
	Bhind	4,478	1,703,562	380.42	62.57	1.16	1%
	Bhopal	2,770	2,368,145	854.99	82.09	4.52	3%
	Burhanpur	3,231	756,993	234.29	27.59	0.33	1%
	Chhatarpur	8,717	1,762,857	202.23	67.40	1.48	1%
	Chhindwara	11,855	2,090,306	176.33	123.95	1.24	1%
	Damoh	7,337	1,263,703	172.24	83.03	2.20	1%
	Datia	2,682	786,375	293.17	36.33	0.38	1%
	Dewas	7,012	1,563,107	222.92	62.54	1.58	1%
	Dhar	8,152	2,184,672	267.98	125.80	12.08	2%
	Dindori	5,802	704,218	121.37	21.32	0.06	0%
	East Nimar	7,477	1,309,443	175.12	62.29	0.66	1%
	Guna	6,386	1,240,938	194.32	64.14	1.93	1%
	Gwalior	4,572	2,030,543	444.15	84.80	2.74	2%
	Harda	3,338	570,302	170.84	54.60	0.03	2%
	Hoshangabad	6,698	1,240,975	185.28	57.78	0.86	1%
	Indore	3,908	3,272,335	837.28	134.24	12.95	3%
	Jabalpur	5,127	2,460,714	479.99	105.38	7.18	2%
	Jhabua	3,442	1,024,091	297.56	20.24	0.37	1%

State	District	Geographical Area (sq km)	Population 2011	Population Density	Residential Built-Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in %)
	Katni	5,106	1,291,684	252.97	48.15	1.84	1%
	Mandla	7,566	1,053,522	139.25	61.03	1.37	1%
	Mandsaur	5,551	1,339,832	241.38	70.79	1.45	1%
	Morena	4,994	1,965,137	393.49	41.84	1.00	1%
	Narsimhapur	5,155	1,092,141	211.86	50.45	0.42	1%
	Neemuch	4,306	825,958	191.81	38.20	1.59	1%
	Panna	7,126	1,016,028	142.59	38.24	1.09	1%
	Raisen	8,494	1,331,699	156.78	51.62	2.88	1%
	Rajgarh	6,169	1,546,541	250.68	59.13	0.51	1%
	Ratlam	4,859	1,454,483	299.35	52.41	1.80	1%
	Rewa	6,363	2,363,744	371.50	43.03	1.13	1%
	Sagar	10,301	2,378,295	230.88	131.04	1.99	1%
	Satna	7,598	2,228,619	293.33	93.05	3.52	1%
	Sehore	6,573	1,311,008	199.47	45.46	0.80	1%
	Seoni	8,807	1,378,876	156.57	97.87	0.57	1%
	Shahdol	5,738	1,064,989	185.61	93.61	2.06	2%
	Shajapur	6,195	1,512,353	244.11	61.93	0.33	1%
	Sheopur	6,610	687,952	104.08	35.12	0.61	1%
	Shivpuri	10,306	1,725,818	167.46	85.39	0.94	1%
	Sidhi	4,830	1,126,515	233.24	22.09	0.45	0%
	Singrauli	5,822	1,178,132	202.35	25.14	0.95	0%
	Tikamgarh	5,052	1,444,920	286.02	61.80	0.13	1%
	Ujjain	6,097	1,986,597	325.84	110.09	2.97	2%
	Umaria	4,606	643,579	139.73	35.27	0.05	1%
	Vidisha	7,312	1,458,212	199.42	65.53	0.72	1%
	West Nimar	8,017	1,872,413	233.55	81.05	3.68	1%
Gujarat							
	Ahmadabad	8,108	7,208,200	889.05	214.89	41.78	3%
	Amreli	7,056	1,513,614	214.53	122.18	4.42	2%
	Anand	3,205	2,090,276	652.29	76.03	8.60	2%
	Banas Kantha	10,753	3,116,045	289.79	128.59	1.94	1%
	Bharuch	6,477	1,550,822	239.43	77.80	18.60	1%
	Bhavnagar	9,758	2,877,961	294.94	149.26	7.35	2%
	Dohad	3,657	2,126,558	581.50	33.71	0.87	1%
	Gandhinagar	1,652	1,387,478	839.77	46.01	3.08	3%
	Jamnagar	10,868	2,159,130	198.67	135.41	11.16	1%
	Junagadh	8,865	2,742,291	309.34	185.87	10.60	2%
	Kachchh	41,580	2,090,313	50.27	188.30	17.89	0%
	Kheda	3,955	2,298,934	581.23	91.91	2.45	2%
	Mahesana	4,396	2,027,727	461.23	112.54	8.23	3%

State	District	Geographical Area (sq km)	Population 2011	Population Density	Residential Built-Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in %)
	Narmada	2,817	590,379	209.61	31.14	0.61	1%
	Navsari	2,205	1,330,711	603.39	80.87	3.41	4%
	Panch Mahals	5,727	2,388,267	417.04	84.57	11.08	1%
	Patan	5,793	1,342,746	231.77	74.34	1.09	1%
	Porbandar	2,328	586,062	251.75	41.73	4.49	2%
	Rajkot	11,259	3,799,770	337.48	217.27	37.24	2%
	Sabar Kantha	7,400	2,427,346	328.02	123.60	2.09	2%
	Surat	4,336	6,079,231	1402.16	150.16	35.50	3%
	Surendranagar	10,431	1,755,873	168.32	112.57	7.42	1%
	Tapi	3,140	806,489	256.82	53.29	0.81	2%
	The Dangs	1,762	226,769	128.69	13.88	0.04	1%
	Vadodara	7,549	4,157,568	550.71	156.76	20.34	2%
	Valsad	2,950	1,703,068	577.38	82.02	21.89	3%
Daman & Diu							
	Daman	63	190,855	3024.35	7.78	2.28	12%
	Diu	28	52,056	1846.55	2.23	0.02	8%
Dadra & Nagar Haveli							
	Dadra & Nagar Haveli	490.28	342,853	699.31	7.92	7.82	2%
Karnataka							
	Bagalkot	6,550	1,890,826	288.68	90.39	2.92	1%
	Bangalore	2,199	9,588,910	4360.27	262.19	27.72	12%
	Bangalore Rural	2,301	987,257	429.00	46.52	9.83	2%
	Belgaum	13,427	4,778,439	355.89	228.68	9.92	2%
	Bellary	8,464	2,532,383	299.21	139.54	6.67	2%
	Bidar	5,446	1,700,018	312.15	71.12	2.66	1%
	Bijapur (K)	10,492	2,175,102	207.32	75.85	1.87	1%
	Chamarajanagar	5,651	1,020,962	180.66	69.79	0.11	1%
	Chikkaballapura	4,250	1,254,377	295.12	72.96	0.58	2%
	Chikmagalur	7,200	1,137,753	158.03	112.08	0.61	2%
	Chitradurga	8,437	1,660,378	196.80	116.65	1.28	1%
	Dakshina Kannada	4,861	2,083,625	428.65	123.82	6.64	3%
	Davanagere	5,922	1,946,905	328.78	137.65	3.10	2%
	Dharwad	4,256	1,846,993	433.96	90.93	6.01	2%
	Gadag	4,655	1,065,235	228.82	62.15	2.52	1%
	Gulbarga	10,960	2,564,892	234.01	105.08	4.86	1%
	Hassan	6,812	1,776,221	260.75	139.10	3.46	2%
	Haveri	4,820	1,598,506	331.61	122.48	1.12	3%
	Kodagu	4,108	554,762	135.05	57.31	0.90	1%
	Kolar	3,988	1,540,231	386.18	87.98	8.38	2%

State	District	Geographical Area (sq km)	Population 2011	Population Density	Residential Built-Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in %)
	Koppal	5,569	1,391,292	249.84	71.66	4.13	1%
	Mandya	4,964	1,808,680	364.33	162.45	5.15	3%
	Mysore	6,308	2,994,744	474.77	191.86	13.59	3%
	Raichur	8,446	1,924,773	227.88	108.32	4.08	1%
	Ramanagara	3,516	1,082,739	307.90	68.77	1.71	2%
	Shimoga	8,473	1,755,512	207.19	125.20	2.80	1%
	Tumkur	10,604	2,681,449	252.87	188.59	3.40	2%
	Udupi	3,580	1,177,908	329.02	31.85	0.98	1%
	Uttara Kannada	10,270	1,436,847	139.91	84.29	1.88	1%
	Yadgir	5,276	1,172,985	222.31	44.85	0.52	1%
Goa							
	North Goa	1,737	817,761	470.67	35.78	1.87	2%
	South Goa	1,960	639,962	326.53	24.37	1.72	1%

In order to assess the impact of each exposure vulnerability type, a vulnerability score/ ranking has been assigned to each layer at its base unit. The vulnerability score represents the level of vulnerability (very high to negligible) of a specific type of exposure in response to the occurrences of small and medium fire incidents. Base unit for vulnerability ranking is the district boundary. The natural break in value distribution has been considered for defining the ranking class.

Based on Census 2011 population, district-level population densities have been computed and grouped into five ranges based on the schema shown in Table 3-5. A ranking of 5 has been assigned to highly dense districts, having populations greater than 10,000 per sq km, and 1 to sparsely populated districts having less than 200 people per sq km area.

Table 3-5: Grouping schema for ranking of exposure and vulnerability layers

Population density	Ranking
>10,000	5
1,000 to 10,000	4
500 to 1,000	3
200 to 500	2
<200	1

Built-up area %	Ranking
>35 %	5
14% to 35 %	4
2% to 14 %	3
1% to 2 %	2
<1 %	1

Residential Built-up area sq km	Ranking
>190	5
100 to 190	4
50 to 100	3
20 to 50	2
<20	1

Industrial area sq km	Ranking
>10	5
5 to 10	4
2 to 5	3
1 to 2	2
< 1	1

As described earlier, various types of residential built-up areas have been delineated using high-resolution images. For assessing fire risk, both absolute built-up areas in sq km as well as built-up areas percent (ratio of built-up areas to the total area) are important parameters.

Figure 3-8 illustrates an example of district level ranking of residential built-up area percent and corresponding residential built up area in absolute terms (i.e. area in sq.km.). An example of this is shown in Figure 3-8 for Maharashtra. It can be seen that Pune district has the highest residential built-up area, while in terms of residential built-up area in percentage, Pune district comes at fifth rank (Figure 3-8).

District level values of residential built-up area in percent and in absolute terms (i.e. area in sq km.) have been grouped separately into five classes and assigned a ranking score of 1- 5 based on the schema shown in Table 3-5. Districts having > 35% residential built-up have been assigned 5th ranking, while districts having <1 % built-up area as whole have been assigned a rank of 1. Similarly, 5 ranking has been assigned to district wise residential built-up areas in sq km based on schema shown in Table 3-5. This schema has been prepared based on natural breaks of value distribution considering all 106 districts of the pilot study area. Because of its appropriateness, the schema has been used for ranking all the districts in the remaining 29 States also.

It is obvious that industrial areas in districts have much lower percentages than residential built-up areas. However, presence of industrial areas in a district has a significant influence in assessing fire risk. Hence, industrial areas in absolute terms (sq km) have been considered in risk ranking. In a similar fashion, district wise industrial areas have been grouped into five classes and vulnerability ranking has been assigned based on the schema described in Table 3-5. Districts having more than 10 sq km industrial plot area are ranked at 5, while districts having industrial area of less than 1 sq km are ranked at 1 (Table 3-5).

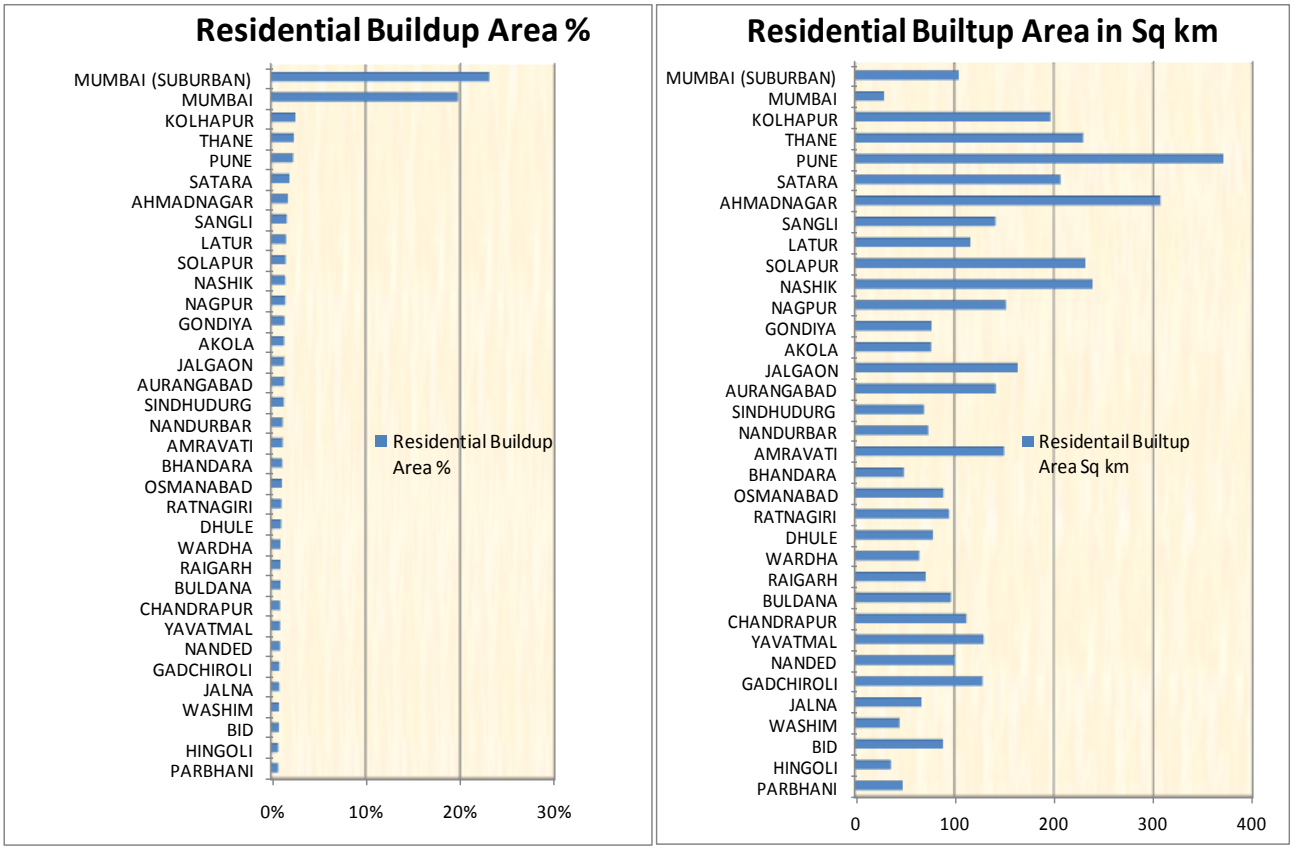


Figure 3-8 : Example of comparison of district level rankings for residential built-up area percentages and absolute areas (in sq km). The example shows a comparison for all 35 districts of Maharashtra State

An example of district level total residential built-up areas in sq km and industrial areas for all 35 districts of Maharashtra have been plotted for direct comparison in Figure 3-9. Industrial as well residential built-up area is the highest in Pune district. In contrast, Ahmadnagar, has second ranking in terms of residential built-up area, but in terms of industrial area, Thane district holds second ranking (Figure 3-9).

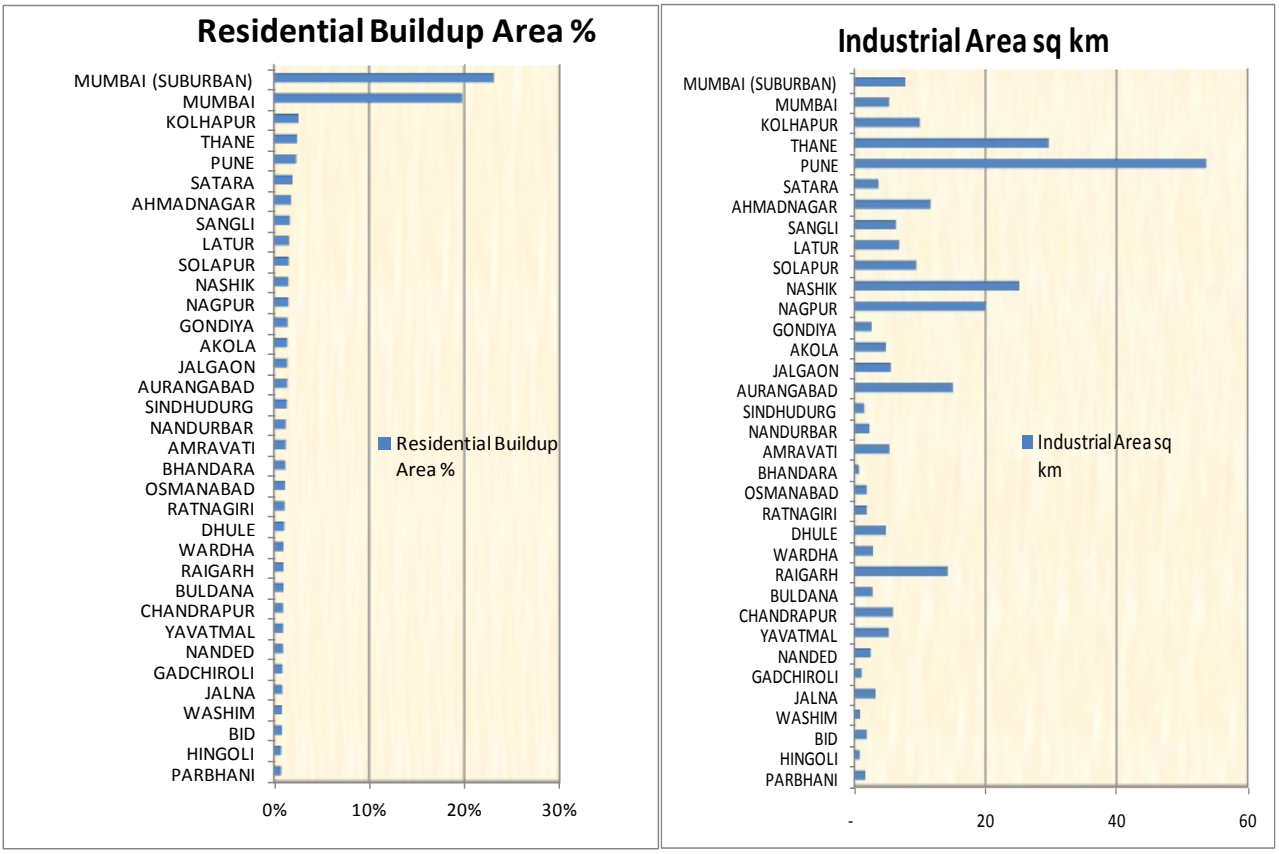


Figure 3-9 : Example of comparison of district level rankings for residential built-up areas and industrial areas (in sq km). The example shows a comparison for all 35 districts of Maharashtra State

Integrated Risk Analysis

After developing ranking of individual units in terms of hazard and exposure vulnerability, GIS layers have been overlaid on top of each other and a spatial analysis has been performed for integration in GIS environment. For combining hazard and risk, Weighted Factor Analysis (WFA) in GIS environment has been performed. Weighted ranking scores have been used in the integration analysis and quantified risk distribution for all districts. Values of weighted factor depend upon the importance of a particular hazard/ vulnerability class in risk analysis. For example, temperate zone hazard value of a district has a much lower weight than the population density of a district.

For integration of hazards, equal weights have been assigned to wind, seismic, and climatic hazards, while double weights have been given to hill zoning (Table 3-5). This is because, in hilly terrain, wooden houses, and heating provisions in buildings increase the chances of fire-incidences, and thus have been given higher weightage.

Four layers of exposure/ vulnerability, such as population density, residential built-up area percentage, residential built-up area in sq km and Industrial area in sq km seem to have equal importance in the occurrence of the number of fire incidents in a district. Hence, equal weights have been assigned in integration of these layers (Table 3-6).

After obtaining integrated individual weighted score for hazard and exposure vulnerability, fire risk categories have been obtained in quantitative terms by further integration of hazard and exposure vulnerability. It is obvious that in the occurrence of the number of fire incidents in a given district, exposure vulnerability has more importance than the prevailing hazard. Hence, in quantified integration, double weights have been assigned to exposure vulnerability (Table 3-6).

Table 3-6: Weightage assigned in risk scoring schema for integration of hazard and exposure vulnerability into fire risk categories

Hazard		Weightage	
H1	Wind Zoning	W1	0.2
H2	Seismic Zoning	W2	0.2
H3	Climate zoning	W3	0.2
H4	Hill zoning	W4	0.4
Integrated Hazard		H1*W1+H2*W2+H3*W3+H4*W4	

Exposure/ Vulnerability Class		Weightage	
EV1	Population Density	W1	0.25
EV2	Residential built-up area %	W2	0.25
EV3	Residential built-up area in sq km	W3	0.25
EV4	Industrial area in sq km	W4	0.25
Integrated Exposure Vulnerability		EV1*W1+EV2*W2+EV3*W3+EV4*W4	

Fire Risk score = Integrated Hazard x 2 (Integrated Exposure Vulnerability)

The quantified numeric values of district risk scores are again grouped into four descriptive categories of district level risk ranking (very high, high, medium, and low) as depicted in Table 3-7.

Table 3-7: District risk rankings for all Phase II States

State	District	Pop Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area % Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
Madhya Pradesh							
	Alirajpur	2	2	2	1	6	Medium
	Anuppur	1	3	2	3	6	Medium
	Ashoknagar	1	3	2	3	6	Medium
	Balaghat	1	3	2	1	5	Low
	Barwani	2	2	2	3	7	Medium
	Betul	1	3	2	1	5	Low
	Bhind	2	3	2	3	7	Medium
	Bhopal	3	3	3	4	8	High

State	District	Pop Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area % Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
	Burhanpur	2	2	2	1	6	Medium
	Chhatarpur	2	3	2	3	7	Medium
	Chhindwara	1	4	2	3	7	Medium
	Damoh	1	3	2	3	6	Medium
	Datia	2	2	2	1	6	Medium
	Dewas	2	3	2	3	7	Medium
	Dhar	2	4	3	5	9	Very High
	Dindori	1	2	1	1	4	Low
	EastNimar	1	3	2	1	5	Low
	Guna	1	3	2	3	6	Medium
	Gwalior	2	3	3	3	8	High
	Harda	1	3	3	1	6	Medium
	Hoshangabad	1	3	2	1	5	Low
	Indore	3	4	3	5	9	Very High
	Jabalpur	2	4	3	4	8	High
	Jhabua	2	2	2	1	6	Medium
	Katni	2	2	2	3	6	Medium
	Mandla	1	3	2	3	6	Medium
	Mandsaur	2	3	2	3	7	Medium
	Morena	2	2	2	1	6	Medium
	Narsimhapur	2	3	2	1	6	Medium
	Neemuch	1	2	2	3	6	Medium
	Panna	1	2	2	3	6	Medium
	Raisen	1	3	2	3	6	Medium
	Rajgarh	2	3	2	1	6	Medium
	Ratlam	2	3	2	3	7	Medium
	Rewa	2	2	2	3	6	Medium
	Sagar	2	4	2	3	7	Medium
	Satna	2	3	2	3	7	Medium
	Sehore	1	2	2	1	5	Low
	Seoni	1	3	2	1	5	Low
	Shahdol	1	3	3	3	7	Medium
	Shajapur	2	3	2	1	6	Medium

State	District	Pop Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area % Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
	Sheopur	1	2	2	1	5	Low
	Shivpuri	1	3	2	1	6	Medium
	Sidhi	2	2	1	1	5	Low
	Singrauli	2	2	1	1	5	Low
	Tikamgarh	2	3	2	1	6	Medium
	Ujjain	2	4	3	3	8	High
	Umaria	1	2	2	1	5	Low
	Vidisha	1	3	2	1	5	Low
	WestNimar	2	3	2	3	7	Medium
Gujarat							
	Ahmadabad	3	5	3	5	10	Very High
	Amreli	2	4	3	4	8	High
	Anand	3	3	3	4	9	Very High
	BanasKantha	2	4	2	3	8	High
	Bharuch	2	3	2	5	8	High
	Bhavnagar	2	4	3	4	9	Very High
	Dohad	3	2	2	1	6	Medium
	Gandhinagar	3	2	3	3	8	High
	Jamnagar	1	4	2	5	8	High
	Junagadh	2	4	3	5	9	Very High
	Kachchh	1	4	1	5	8	High
	Kheda	3	3	3	3	8	High
	Mahesana	2	4	3	4	9	Very High
	Narmada	2	2	2	1	6	Medium
	Navsari	3	3	3	3	8	High
	Panch Mahals	2	3	2	5	8	High
	Patan	2	3	2	3	7	Medium
	Porbandar	2	2	3	4	7	Medium
	Rajkot	2	5	3	5	10	Very High
	SabarKantha	2	4	3	3	8	High
	Surat	4	4	3	5	10	Very High
	Surendranagar	1	4	2	4	8	High
	Tapi	2	3	3	1	7	Medium

State	District	Pop Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area % Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
	The Dangs	1	1	2	1	5	Low
	Vadodara	3	4	3	5	10	Very High
	Valsad	3	3	3	5	9	Very High
Daman & Diu							
	Daman	4	1	4	3	7	Medium
	Diu	4	1	3	3	6	Medium
Dadra & Nagar Haveli							
	Dadra & Nagar Haveli	3	1	2	4	6	Medium
Karnataka							
	Bagalkot	2	3	2	3	6	Medium
	Bangalore	4	5	3	5	10	Very High
	Bangalore Rural	2	2	3	4	7	Medium
	Belgaum	2	5	3	4	8	High
	Bellary	2	4	3	4	8	High
	Bidar	2	3	2	3	7	Medium
	Bijapur (K)	2	3	2	3	6	Medium
	Chamarajanagar	1	3	2	1	6	Medium
	Chikkaballapura	2	3	3	1	6	Medium
	Chikmagalur	1	4	3	1	6	Medium
	Chitradurga	1	4	2	3	6	Medium
	Dakshina Kannada	2	4	3	4	8	High
	Davanagere	2	4	3	3	7	Medium
	Dharwad	2	3	3	4	7	Medium
	Gadag	2	3	2	3	6	Medium
	Gulbarga	2	4	2	4	8	High
	Hassan	2	4	3	3	7	Medium
	Haveri	2	4	3	3	7	Medium
	Kodagu	1	3	2	1	6	Medium
	Kolar	2	3	3	4	7	Medium
	Koppal	2	3	2	4	7	Medium
	Mandya	2	4	3	4	8	High
	Mysore	2	5	3	5	9	Very High
	Raichur	2	4	2	4	8	High

State	District	Pop Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area % Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
	Ramanagara	2	3	3	3	7	Medium
	Shimoga	2	4	2	3	7	Medium
	Tumkur	2	4	3	3	7	Medium
	Udupi	2	2	2	1	5	Low
	Uttara Kannada	1	3	2	3	6	Medium
	Yadgir	2	2	2	1	5	Low
Goa							
	North Goa	2	2	3	3	6	Medium
	South Goa	2	2	2	3	6	Medium

4 Field Surveys of Fire Stations for Data Collection

At present, there is a lack of a comprehensive centralized database on the distribution of fire service infrastructure, and the stock of existing fire fighting vehicles, manpower and specialized equipment, their types, and their quantities. Most of the information is either disaggregated or not updated. This information is required for undertaking the gap analysis, future planning, and improvement of institutional capacity, financial planning, and creating a roadmap for the next 10 years for revamping the fire services in the country. To have first-hand information on the distribution of the fire service stations across the country, trained human resources, infrastructure availability and their status, RMSI project team has carried out surveys of Fire Stations and collected data from Headquarters of all the States under the jurisdiction of DG, NDRF & CD (Fire) in the country. In addition to the survey of Fire Stations, the team has also collected the location (latitude, longitude) of Fire Stations using GPS. The geographical coordinate information is used for plotting all the Fire Station locations on the map to perform GIS based spatial analysis. This is required for the analysis of distribution of Fire Stations and gap analysis on fire-infrastructure, based on risk-category, response time, and population.

4.1 Field-Survey of individual Fire Station and collection of Headquarter Data

RMSI project team has designed a comprehensive “Fire Headquarter Data Collection Form” (*Annexure-1*) and individual “Fire Station Survey Form” (*Annexure-2*) to collect all the required information for each State/UT in the country.

The information includes but is not limited to:

i. Location (latitude, longitude) and location description of the Fire Station

ii. Name of fire-station in-charge and his contact details

iii. Fire Vehicles type, numbers, their model, year of manufacture/induction at the Fire Station, and general condition of fire vehicles

iv. Specialized firefighting equipment, their type, and quantity

v. Road access and connectivity to vulnerable areas

vi. Infrastructure facilities (accommodation) of fire-personnel and their distance from Fire Stations

vii. Duty patterns

viii. Staff details at different levels

ix. Water availability etc.

The Fire Headquarter Data Collection Form and individual Fire Station Survey Form have been designed in such a way as to extract most of the common information including communication, human resources, specialized equipment, fire-statistics etc. applicable for the entire State, in a quantitative way, which might help the analysis at a later stage. In addition to infrastructure information, RMSI also attempted to collect information/indicators related to vulnerability and risk through indirect questions like:

i. Year wise information on the number of events each unit had attended during the last 5 years and losses caused by fire events both in terms of assets and life.

ii. Few questions on the general perception of the fire officer and in charge of the unit on various types of risks in the Fire Station jurisdiction.

Analysis on the information of events over time and the loss can provide an understanding of the vulnerability and risk as well as the susceptibility trend over the year. The fire officer would be the key person who faces actual needs on the ground as well as in using the infrastructure for the service.

During the field survey in the pilot study, the RMSI team members have interacted with Fire Station In-charges to gather the required information. In addition to discussions with the Fire Station in charge, other key department officials have been contacted to know their perception about the fire risks and the difficulties that fire department is facing. The project team is ensuring that the Headquarter Data Collection Forms and Individual Fire Station Survey Forms are comprehensive and contain all information required for this assignment.

The field data collected by the survey team have undergone through quality checks and the project team has created a database with all collected information. The database has been designed in such a way that the data can be used for spatial and non-spatial analysis. All the Fire Stations have a unique code as identifier.

4.2 Stakeholder Analysis

Apart from the quantitative data collection on the distribution of fire service infrastructure, stock of the existing equipment and their quality, the RMSI team also interacted with some of the key fire officials and senior members in DGCD, MHA and NDRF. The focus of such discussions was more on institutional aspects (issues in the service delivery and suggestions), capacity, and future requirements. As these interactions are mostly with senior personnel of fire department, the focus has been to derive a broader picture in terms of requirements, investment, and institutional capacity building. This information has been compiled and summarized under various heads, for instance, requirement, investment, institutional capacity building, etc. RMSI key experts have been analyzing the diverse opinion of various fire officials and are providing their recommendations.

Any significant issue that was observed during this process, in terms of issues in the process of the delivery/bottlenecks in smooth operation were being highlighted along with RMSI's suggested solution.

5 Development of Fire Decision Support System (FDSS)

This chapter discusses the modeling software solution named FDSS (Fire Decision Support System), developed by RMSI as part of the deliverables. FDSS is a dynamic web-based system aimed at supporting decision makers take optimal decisions on complex tasks, such as resource prepositioning, gap analysis, prioritization, and resource optimization along with the day-to-day tasks. The most important aspect of FDSS is that it enables the apex fire management authority to provide the entire country's fire agencies information on a single platform.

5.1 Salient Features

Following is a brief description of the FDSS platform. The platform is built on a framework that is state-of-the-art and is the most suitable solution for users' needs.

The salient features of the FDSS platform include:

- Web based application built using .NET Framework 3.5 utilizing the GIS capabilities of an open source GIS Platform.
- Multi-tier system architecture that follows the Object Oriented Programming model with the following objectives:
    - Loose coupling between the various tiers – presentation, business and data
    - Ease of development and deployment
- Ability to navigate, query and render the spatial data
- Exposure view, query and update capabilities that will help the user to keep the information in the system up-to-date
- Ability to view and query the outputs in a tabular format
- A powerful reporting engine that enables a set of pre-formatted reports that provide various views of the outputs from the model
- A thematic map generator that uses the underlying GIS platform to depict the outputs from the model as pre-designed thematic maps.

5.2 High Level Design

FDSS has a multi-tier architecture to allow for modularity and scalability. The architecture follows the Object Oriented Programming model. The various tiers of the system are as shown in Figure 5-1.

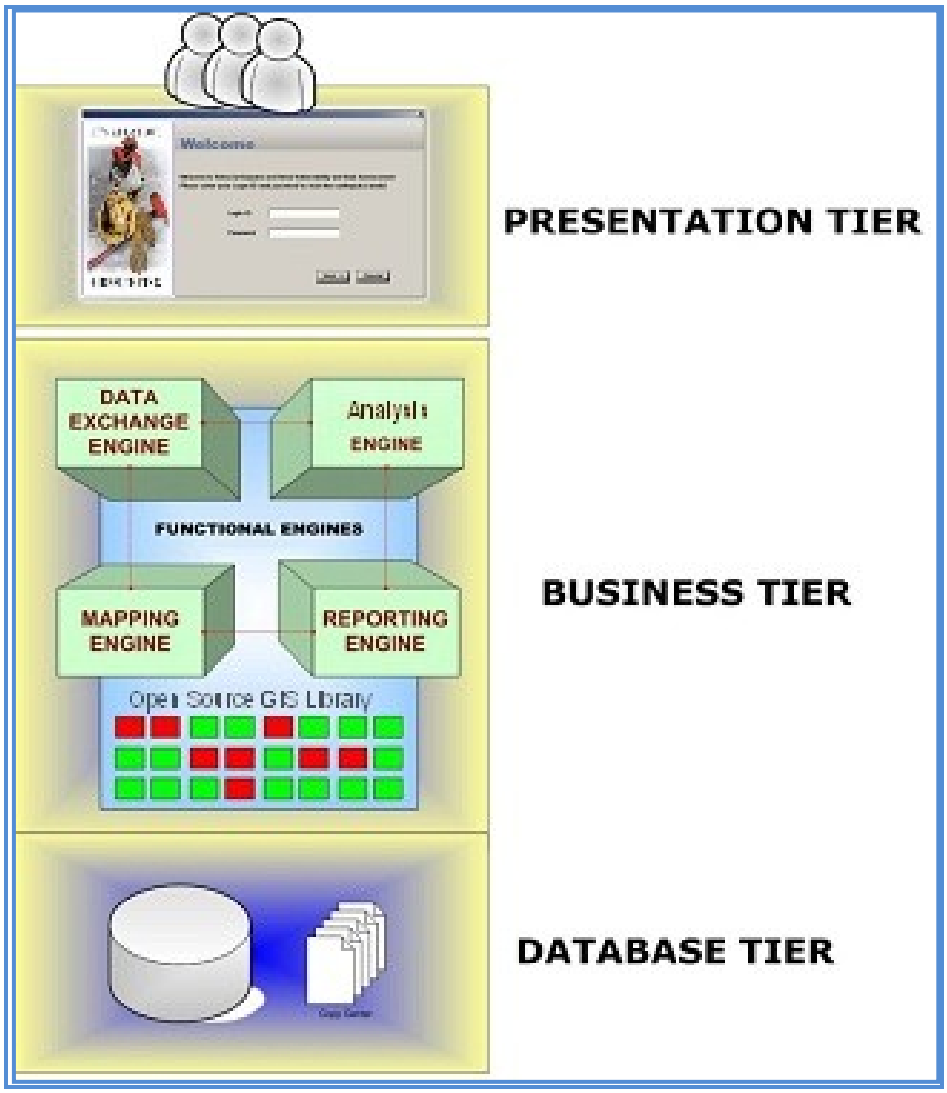


Figure 5-1 : Three-tier architecture

- **Presentation tier:** This user interface is responsible for gathering inputs from the user and passing on the same to the business layer for processing. The presentation layer ensures that the communications passing through are in the appropriate form for the recipient business objects in the business tier. In FDSS, the user interface constitutes this tier.
- **Business tier:** consists of the system business rules and computing logic as a set of business objects. This tier also interfaces with the data tier. The Mapping engine, Data Access engine, Reporting engine, and Analysis engine constitute this tier.
- **Database tier:** consists of the environment that allows persistence of user information – both lookup and computed data. Physical implementation of this layer can be files on the system or databases. In FDSS, relational database constitutes this tier and houses both spatial and non-spatial data.

Figure 5-2 shows the high-level design for the FDSS platform. The whole architecture is modular. The major modules are user Data Warehouse, Platform Components, and User Interface. The model components are stand-alone and are not dependent on the platform

components. Both perform their respective tasks working with the same data on the backend and are guided by the same user interface on the front end. The following sections discuss the various modules in detail and showcase how all the requirements has been delivered by the FDSS platform.

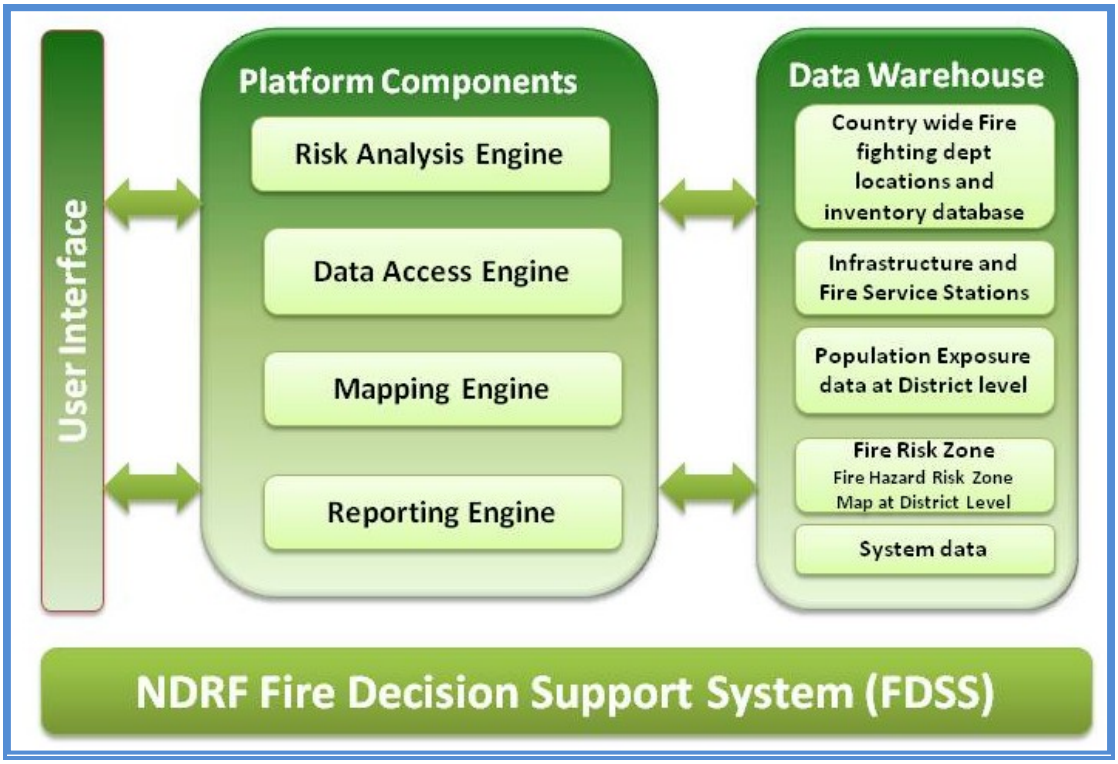


Figure 5-2 : High level design of FDSS

5.2.1 DATA WAREHOUSE

Data warehouse represents the Database tier. It stores all the input data to the model, system data, and the output results. The data can be categorized as spatial and non-spatial. All the spatial data resides either in the form of ESRI shape files and grids or Postgres based PostGIS database. Post GIS/ Postgres is an open source geo-spatial relational database system. All the non-spatial data is stored as tables in the Postgres database.

Spatial Data Layers: The spatial data layers stored in the data warehouse are:

- Fire station locations and inventory data at Fire Station level
- Land Use Land Cover classes by their use or occupancy
- Fire Risk Zone Map at district level
- Population density map at district level
- Road and Rail Network

5.3 Platform Components

Platform components represent the Application Tier. These components focus on the application logic for all data access, mapping and reporting. These are generic components that operate directly on the data warehouse and present the data in different views to the user.

Data Access Engine: Data Access Engine provides access to all non-spatial data that are stored in the Data Warehouse. This includes data viewing and editing capabilities. This allows for bulk building inventory updates and extraction of results so the outcome of the analysis can be reused for other applications.

Mapping Engine: Mapping engine provides all mapping capabilities to the application. The major component in mapping engine is the Map Viewer that loads the spatial data and displays the map and provides all basic map navigation functions like Zoom, Pan, Identify tool and calculate distance. This engine also provides spatial querying capabilities like buffer query and point in polygon query. In addition to this, the mapping engine also provides capabilities for defining symbology for various map layers including themes based on a range of values and unique values. All the layers are loaded with a predefined symbology. The mapping engine provides the ability to view the hazard, damage and loss on maps using predefined themes based on a range of values.

Reporting Engine: Reporting engine generates all the reports. FDSS provides a set of preformatted predefined reports that can be printed or exported into Excel format. This provides the ability to format the data into tables, generate summations, and create graphs. The following reports are generated at district and State levels by the reporting engine:

- Infrastructure Report
- Gap Analysis Report
- Status report for individual Fire Stations, district and State levels for and other reports required for decision making

The FDSS provides functionality to run GAP Analysis at two levels:

- State
- District

This system provides the option for running gap analysis for firefighting and rescue vehicles specialized equipment, fire fighting manpower, and buidling, Infrastructure. User can also opt to get output based on all the analysis parameters available.

User Interface: User Interface (Figure 5-3) comprises of the Presentation tier. This is the part of the FDSS platform that the user interacts with. User Interface for FDSS can be categorized into two types:

1) System Administration Interface
2) Application Interface

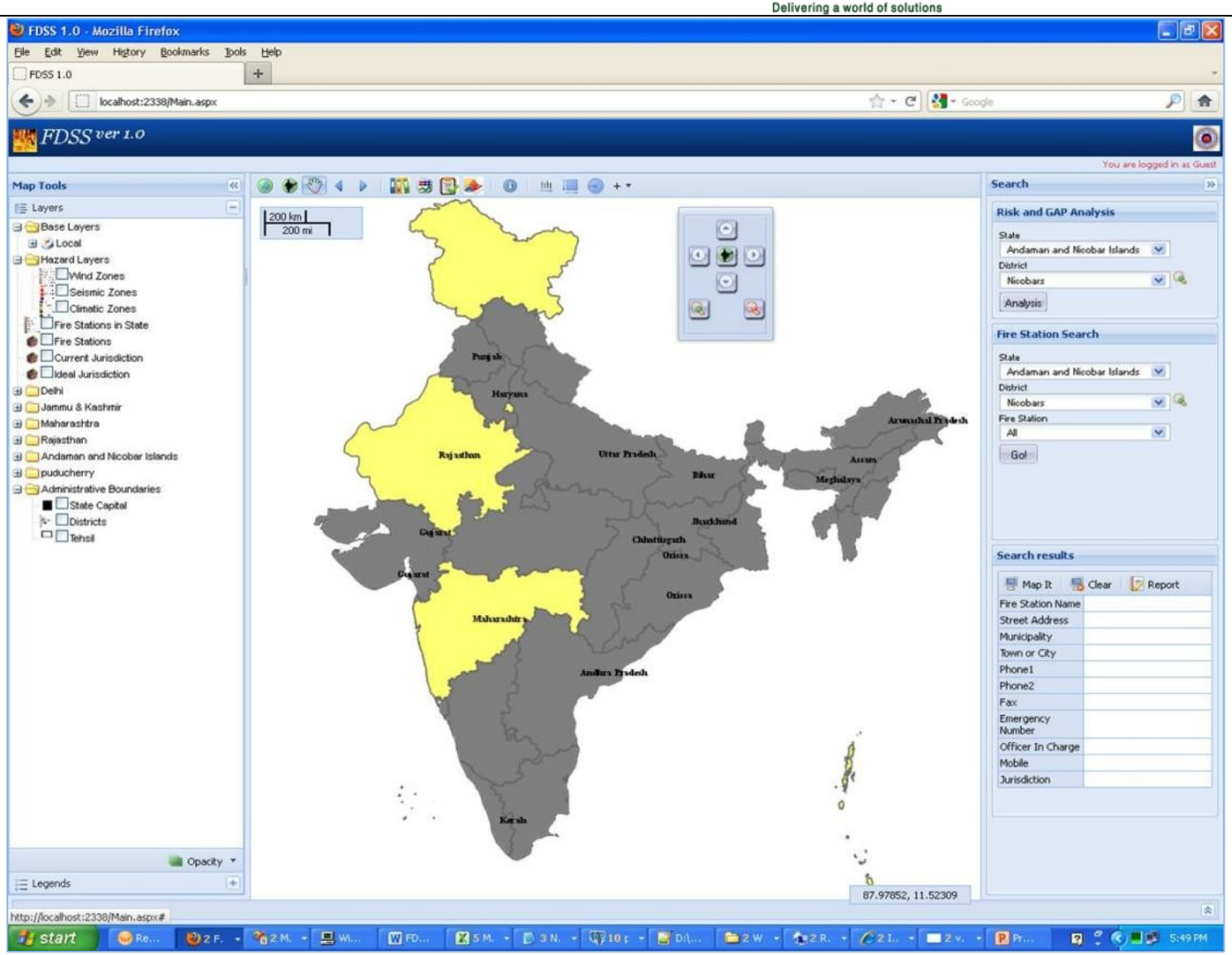


Figure 5-3 : User Interface for Base Analysis in FDSS. The example shows the States covered in the Pilot Phase of the study

5.4 System Administration Interface

This is an individual stand alone component run at the server only. This desktop interface allows the administrator to manage users and update exposure, thereby providing security for other users and preventing unauthorized updation of the building exposure data. All the data updation and maintenance is done through the system administration interface. Figure 5-4 shows the system administration interface of the application.

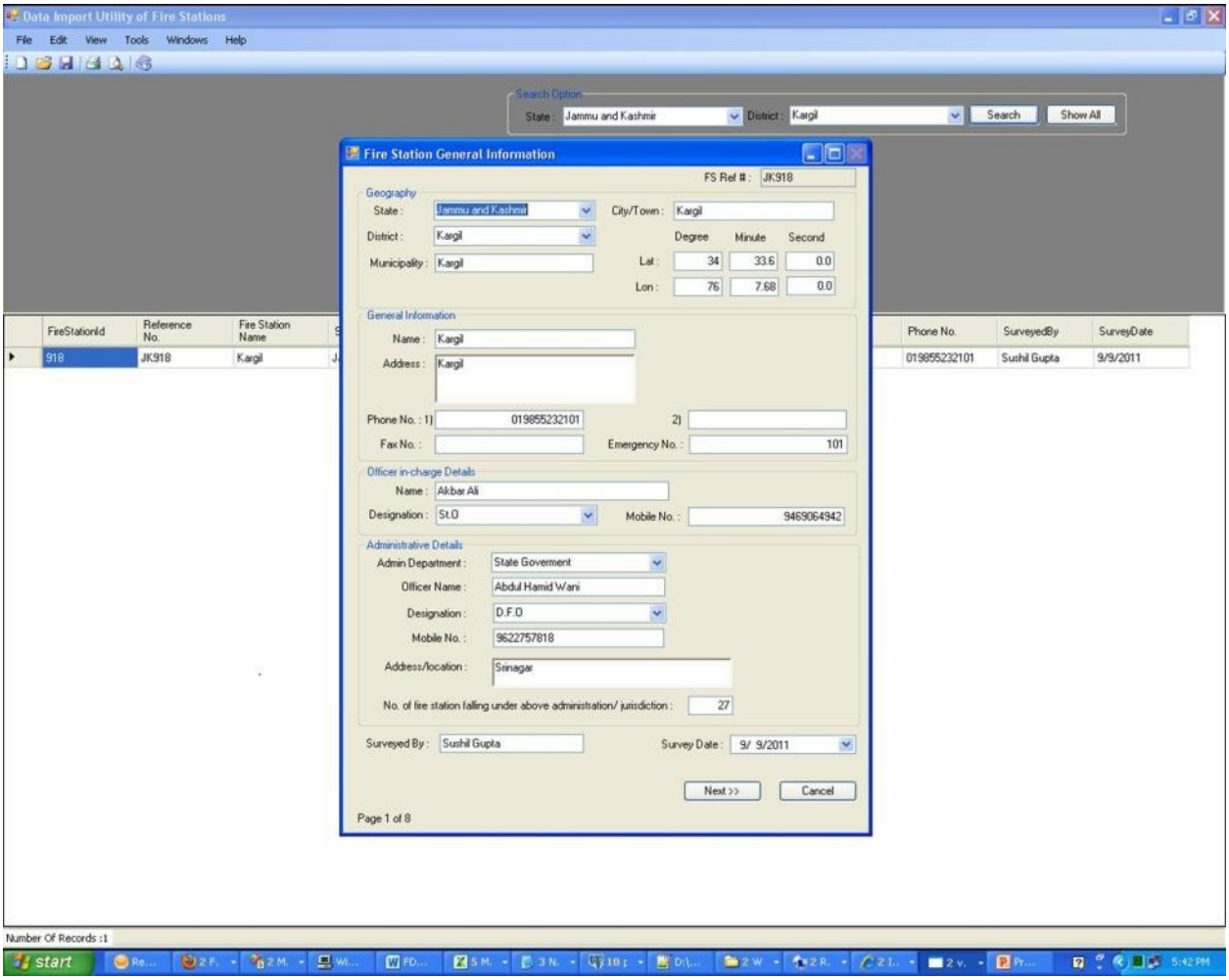


Figure 5-4 : System administration interface

5.5 Application Interface

Data Management: Exposure management provides the ability to view and query the underlying default demographic and Fire Station inventory datasets.

Map Management: The Map management interface provides support for viewing the information on a map by utilizing the Mapping Engine component from the Application Logic tier. It offers the following functionalities:

- Displays the following layers by default as the application is loaded:
  - Location of Fire Stations
  - Administrative boundary maps
  - Land use land cover map
  - Road / Rail network
  - Fire Risk Zone map

- Basic GIS tools like zoom, pan, zoom to selection, zoom to entire layer, location attribute information etc.
- Creates following maps based on analysis results:
    - Gap Analysis Map – showing gaps in existing resource, equipment and fire tenders (Figure 5-4)
- Adds custom layers to the layer manager and performs visual overlays
- Views attributes information, queries and analyzes the spatial data layers
- Enables users to view thematic maps based on defined attribute values.

Analysis Management: The analysis management interface provides the ability to execute the analysis. It allows the user the following options:

- View the fire risk analysis for any district or State
- Gap analysis at State and district levels

Results Management: This entails generating displays of results in pre-defined formats based on user selection. Following are the various types of result views that are available in FDSS.

- Reports providing predefined content in predefined format. This utilizes the Reporting Engine Component to display various reports. Following is a list of various reports:
    - Fire Station Profile report
    - Gap Analysis report

5.5.1 TECHNOLOGY

The physical servers also represent the logical needs elaboration servers and the physical clients also represent the logical clients.

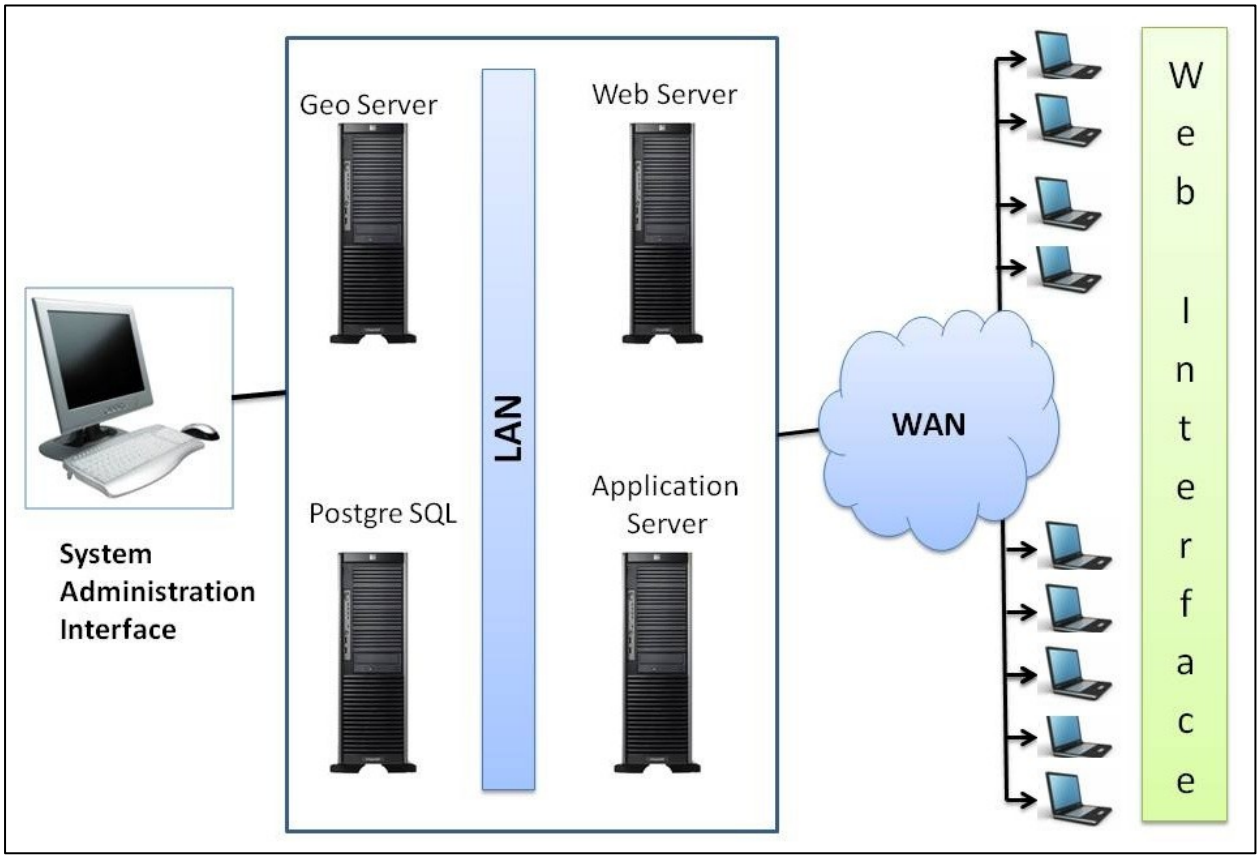


Figure 5-5 : FDSS - Systems Architecture

- The Frontend is web based, and registered users can view all kinds of maps and reports.
- Middleware: It is the Web server that hosts the web site and coordinates between the client and the backend servers for publishing maps and reports. Application Server serves as the main point of contact for the web server for all functionalities other than serving maps and GIS analyses. The application server is hosted in IIS 5.1 or higher and requires Dot net Framework 3.5.
- The backend consists of the following two components:

- Geo server and Geo web cache: This server handles map publishing and all the GIS functionalities. For all GIS analyses, it relies on the Post GIS database server. Geo server and Geo web cache are published in Apache Tomcat Server.
- Post GreSQL Database Server: This serves all the GIS and attributes data to both the application and map servers. In addition, it also takes care of all GIS analyses required for any functionality.

The technological framework for FDSS utilizes the following platforms:

Hardware Configuration

- Rack Server 2U having Intel Xeon (Quad Core) E5410 or higher processor support for dual multi core processor
- 16 GB DDR2-533 FB DIMM or higher ECC memory
- SVGA Video Controller with 16 MB RAM

- SAS Raid Controller having 128 MB buffer memory with battery backup and supporting RAID 0,1 and 5 Dual Gigabit Server Ethernet controller with teaming, load balancing and auto fail over feature
- 5X146GB SAS HS HDDD, IDE DVD ROM Drive with (N) hot swap Redunt Hot SEAP power supply

Software Configuration

- Operating System: Windows Server 2008
- Web Server: IIS 7.0
- Framework: .net Framework (3.5)

Supported Browser

- Internet Explorer 6.0 or higher
- Mozilla Firefox 3.0 or Higher

5.6 Advantages of Open Source Platform

The application software is built on open source GIS platform. The open source GIS platform has several advantages (Table 5-1) of production and development allowing users and developers not only to see the source code of software but also modify it and easily implement it in web applications.

Table 5-1: Advantages of Open Source Platform

Advantages	Open Source Platform	Proprietary Software Platform
Control and Audit 	Gives power to control software code and hence modification can be carried out to suit the requirements	Forces users to adhere to standards and flexibility provided in the software only. Modifications are based solely on vendor discretion
Low ownership Cost 	No license fees are required thereby reducing annual license fees cost to zero, zero cost of scale as open source doesn't require additional licenses as the installation grows	License fees are required
Quality and Excellence 	It's available publicly. A large no. of reviewers analyze the code making it more secure, increasing the quality and excellence in design	Not available publicly.
Flexibility & customization 	There is scope to customize the software toward end users' needs	Limited scope of customization

5.7 Identification of Gaps in Infrastructure, Up-gradation and Modernization Requirement

Gap identification is carried out in FDSS using the information captured as part of the field surveys and stakeholder interviews, distribution of Fire Stations and risk analysis. The gaps in infrastructure can be in terms of number of Fire Stations in both served and un-served areas, availability of fire vehicles, fire-personnel and building infrastructure in the operational Fire Stations, and availability of open area. Through the input of field survey work, risk categorization, and infrastructure requirement norms, gap analysis is performed in FDSS at the district and State level.

Gaps will primarily address the three areas:

5.7.1 INFRASTRUCTURE GAPS

This covers served/ un-served areas, unsuitable locations of Fire Stations, etc. This gap analysis is conducted by using suitably modified SFAC Norms, population density maps, existing Fire Station distribution and other infrastructural information obtained as part of the field surveys. In addition, the risk information has been used to reflect certain aspects of risk that affect the infrastructure. The outcomes of this analysis are information and maps that show the infrastructure deficiency at district and State levels.

5.7.2 EQUIPMENT GAPS

The objective of this analysis is to identify gaps in equipment existing at various Fire Stations against the population they serve, the hazards that the jurisdiction they serve is exposed to, trained map-power available, average response time to a fire call, etc. This will result in the identification of new types of equipment required, phasing out of old equipment and their replacement, and equipment effectiveness analysis.

5.7.3 CAPACITY GAPS

This would cover the shortage of fire fighting personnel and additional training requirements for existing teams, etc. This analysis is conducted using infrastructure analysis information, equipment analysis information, population density, SFAC norms and risk information as the primary datasets, and average response time. The primary outcomes would include the gap in capacity in terms of number of additional fire fighting personnel required, and the additional requirement of trainings on equipment, tools, technologies and emergency management approaches.

Similarly, district/State/ country level reports on up gradation and modernization requirements of existing Fire Stations including MIS, GIS, and communication systems are generated by comparison of availability of existing resources and up gradation and modernization requirements through gap analysis.

The outcomes of the above analyses are integrated to the Fire Decision Support System (FDSS), so similar analyses at a later stage may also be performed by changing the underlying datasets as things change on the ground.

5.8 Preparation of detail cost estimates with Capital and O&M Investment Plan

Once gaps in terms of number of Fire Stations, fire-personnel, infrastructure (building, vehicles and equipment), up gradation and modernization requirements of existing Fire Stations including MIS, GIS, and communication systems are finalized, the investment and

financial analysis is performed. This will involve reviewing the outcomes of the gap analysis, prioritizing them by district and estimating the cost of investment.

The investment costs is estimated separately for infrastructure development and improvements, capacity building, and equipment procurement and modernization. This is where the extensive experience of RMSI team in fire department operations, equipment procurement, and training needs assessment and planning has been applied. For more detailed information regarding the specification of firefighting and rescue vehicles and equipment, please refer to the Vehicle and Equipment Specification report submitted by RMSI.

The outcomes of this process are a detailed investment plan that shows year-by-year investments prioritized by district, gaps and associated benefits. The financial plan addresses investment for next 10-years in a year-by-year phased manner approach. The financial tool has been integrated to the FDSS, which helps in generating various reports related to detailed cost estimates with Capital and O&M Investment Plan for next 10 years, and to prioritize investments. This is based on the current cost estimate and technological enhancement. However, the tool have flexibility to change/modify the cost of various infrastructural elements and re-regenerate reports for prioritization of the investment plan.

5.9 Institutional Assessment and Capacity Building Plan

The National Fire Service College (NFSC), Nagpur and other State Fire Training Centres across the country are key institutions involved in improving the level of fire personnel knowledge and their overall capabilities to face the challenges of fire-fighting. The RMSI team surveyed NFSC Nagpur and Pilot State/UTs Fire Training Centres across the country and studied their programs to delineate their role and relationship for improvement in training facilities for fire personnel in the country.

Human resource bottlenecks at various levels of training fire officials (such as refresher's training, breathing training in smoke, industrial training, specialized training to handle high rise fires, etc.) to different cadre of officials, issue of language in training; physical fitness; duty patterns (8 hours and 12 hours versus 24 hours); availability of accommodation in fire-stations; pay-scale structures, and promotion progression etc. are studied in detail and recommendations are made for their implementation.

There are many ways of discovering funding avenues, such as introduction of Fire Tax, training programs to private sectors, tapping MP Local Area Development (MPLAD) funds etc. These issues are important since fire personnel need to be dedicated and motivated all times. For similar reasons, improvements in governance structure are imperative. Lack of fire-personnel is another challenge. For this, revamping training facilities in the country is another important aspect in any capacity building plan.

Computerization of fire and emergency services and strict audit by a central authority can be one mechanism to ensure a good finance mechanism for capital expenditures and operation and maintenance. Training of fire personnel in the use of computers is another aspect, which is very important from the implementation perspective.

It may be noted that RMSI team is aware of past studies on the subject such as the Recommendations by the SFAC and kept these studies in mind while making recommendations for the Capacity Building Plan.

RMSI team has also prepared a detailed Roadmap for the Capacity Building Plan at country level for its implementation in next 10 years.

6 International and National Norms

6.1 Literature Survey

Under this task, standards and practices that are being followed in various developed countries for fire safety norms, such as in USA -NFPA (1211, 1710, 1720), Japan, UK, and Germany, are studied and compared.

As per literature survey and personnel communications with fire officials in different countries, international norms regarding response time *(defined as **en route time taken by the fire fighting vehicle from the Fire Station to fire emergency scene, and turnout time is not included in it**)* differs from country to country.

6.2 Response Time

The practices regarding response time of fire tenders/ambulances in different countries are as follows:

6.2.1 GERMANY

The response from Germany (27.10.2011) is as follows:

*"1. **Concerning the response time in Berlin**. On the basis of an agreement between CFO and the Ministry of Interior the options are:*

*Calls in Risk Areas class A (higher risks) - 15 fire-fighters must arrive in **max.15 minutes** at 90% of all calls and*

Calls in Risk Areas class B (lower risks) - 15 fire-fighters must arrive in max.15 minutes at 50% of all calls.

*The standard turn out time of a fire truck is **60 seconds for professionals**, as **for volunteers** the turn out time should not be higher **4 minutes**, otherwise the Control Centre will automatically send a professional fire truck.*

*Ambulance cars must be at the scene within **8 minutes** in 75% of all calls."*

2. Temperature problem - heating devices in the garage (close the doors) and additional a electrical wire is going to the motor section of the vehicle for saving working temperature of the trucks."

From the above, it may be inferred that in Germany, areas have been divided only into two Risk Categories (higher, lower) and **response time** in urban areas varies from **8 - 15 minutes**. As far as turnout time is concerned, it varies from 1 to 4 minutes.

6.2.2 JAPAN

Fire Service laws of Japan and its background:

1. The Japanese system of laws and regulations regarding fire service law (Hierarchy structure)
   A .Law: Fire Service Act
   B. Cabinet order: Order for Enforcement of the Fire Service Act
   ・Specify the type of building fire protection
   ・Technical standards for installation and maintenance of fire prevention equipment
C Ministerial ordinance: Rule for Enforcement of the Fire Service Act
   ・Details of technical standards for installation and maintenance of fire prevention equipment"
D. Municipal ordinances: Fire prevention ordinance"

2. Requirements for Fire prevention equipment
All Fire prevention equipment are necessary to have national certification in Japan (regulation not standard).

3. Background of Japanese fire service
・Fire service in Japan consists of **one unit per municipality**.
・Under the laws, fire prevention regulations are enacted by each of the municipalities.
・Fire prevention regulations are slightly different for each individual municipality.

- **Japanese Regulation, the response time has not been determined.**

According to the Fire Service Law Enforcement Order (**not regulation**), the fire panel shall be installed where there are always people in Japan.

In large buildings, the fire panel has been installed in Guard Room. Security people are always monitoring the fire panel.
At the same time the alarm is sounded, Fire tenders will rush to the site for extinguishing the fire.
Time to reach the site, which varies depending on the building, assumed at **5 to 10 minutes. (not determined by law).**

2. Since, there are several Islands in Japan, is there any different Regulations for Islands?
Almost the same.

As you know, Japan is made up of three islands and many small islands. There has prefectures, among which are divided into municipalities regardless of islands."

From the above, it may be inferred that in Japan, each municipality has at least one Fire Station and response time varies from 5 to 10 minutes, depending upon the location of building.

6.2.3 USA

"There are three National Fire Protection Association (NFPA) standards that contain time requirements that influence the delivery of fire and emergency medical services. These are:

1. **NFPA 1221**, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems;
2. **NFPA 1710**, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments; and
3. **NFPA 1720**, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments.

NFPA 1710 contains time objectives that shall be established by career fire departments as follows:

- **Turnout time:** One minute (60 seconds) for turnout time
- **Fire response time:** Four minutes (240 seconds) or less for the arrival of the first arriving engine company at a fire suppression incident and/or eight minutes (480 seconds) or less for the deployment of a full first alarm assignment at a fire suppression incident
- **First responder or higher emergency medical response time:** Four minutes (240 seconds) or less for the arrival of a unit with first responder or higher-level capability at an emergency medical incident
- **Advanced life support response time:** Eight minutes (480 seconds) or less for the arrival of an advanced life support unit at an emergency medical incident, where the service is provided by the fire department

The standard States that the fire department shall establish a performance objective of not less than 90 percent for the achievement of each response time objective. NFPA 1710 does contain a time objective for dispatch time by requiring that "All communications facilities, equipment, staffing, and operating procedures shall comply with NFPA 1221." For the purposes of NFPA 1710, the following definitions apply:

- **Dispatch time:** The point of receipt of the emergency alarm at the public safety answering point to the point where sufficient information is known to the dispatcher and applicable units are notified of the emergency
- **Turnout time:** The time that begins when units acknowledge notification of the emergency to the beginning point of response time
- **Response time:** The time that begins when units are en route to the emergency incident and ends when units arrive at the scene

NFPA 1720 contains a time objective for dispatch time by requiring that "All communications facilities, equipment, staffing, and operating procedures shall comply with NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems." NFPA 1720 contains no time requirements for turnout and response times.

NFPA 1221 requires that 95 percent of alarms shall be answered within 15 seconds, 99 percent of alarms shall be answered in 40 seconds, and the dispatch of the emergency

response agency shall be completed within 60 seconds 95 percent of the time. The time lines for dispatching are taken from NFPA 1221:

- After the receipt of a call for assistance, the fire department will respond with the first unit to that location within three minutes.
- After receipt of a call for assistance, the fire department will respond with a unit to that location, within four minutes, to 90 percent of area served.

After receipt of a call for a medical emergency, the fire department will respond with an engine company to that location within four minutes and an ambulance within six minutes."

From the above, it may be inferred that in USA, response time varies from **(3 - 4 minutes) to 8 minutes.**

6.2.4 UK

The London Fire Brigade (LFB) is run by the London Fire and Emergency Planning Authority as part of a group of organizations operating under the 'umbrella' of the Greater London Authority. It is the third largest firefighting organization in the world, with **111 Fire Stations** (plus 1 River Thames-based station) from which it operates across the 1,587 sq km of Greater London, with its resident population of some 7.4 million. This increases by a further 500,000 each day during working hours.

In the year 2005/06 the London Fire Brigade answered some 268,000 emergency calls and attended nearly 156,000 incidents. On an average, the first fire engine arrived at an incident **within 8 minutes on 92 per cent of occasions**, meeting the Brigade's target, and **within 5 minutes on nearly 65 per cent of occasions**. When required, a second fire engine was on scene within ten minutes on 93 per cent of occasions, exceeding the target. (Hooper, Nov-Dec, 2006; http://www.cadcorp.com/pdf/PA-firebrigade_ukv4i5.pdf).

Another recent review of "Fire and Rescue Service response times" (Fire Research Series 1/2009) concludes that response times have increased due to traffic conditions, which was similar to the finding of the London Fire and Emergency Planning Authority thematic report, which concluded that it now ***takes 50 seconds longer for a 1st appliance to arrive on average and one minute longer for a second appliance.***

From the above, it may be inferred that in UK, response time varies from **5 to 8 minutes.**

6.2.5 INDIA

"Standing Fire and Advisory Council (SFAC) reviewed the norms in various countries, and as given in the RFP, has laid down norms for the Fire and Emergency Services throughout the country based on:-

- *Response time, fire risk, and population*
- *Depending on risk category A, B, and C the recommended response time for first fire tender is 3, 5, and 7 minutes, respectively*
- *One Fire Station per 10 sq. km in urban areas and one Fire Station per 50 sq. km in rural areas*
- *One Rescue Tender per 3 – 10 lakhs population*
- In rural areas, the recommended response time is 20 minutes

From the above, it can be inferred that SFAC norms are based on the idealized conditions of the western world and would be too demanding, thus requiring some modifications.

To see the practicability of SFAC norms, RMSI did several simulations through *network analysis* taking different average vehicle speeds for Delhi State. These different speed simulations were presented on Nov. 02, 2011 to DFS officials and on Nov 03, 2011 to Fire Advisor and Deputy Fire Advisor at DG, NDRF, MHA. After discussions with both DFS and MHA officials, the average fire vehicle speeds on main roads has been taken as 40 km/hr and minor roads as 20 km/ hr. While, for congested areas, such as Sadar Bazar, Delhi, the average fire vehicle speed on main roads has been taken as 20 km/hr and for minor roads as 10 km/hr, respectively. RMSI choose Delhi, because it has a high density of Fire Stations in comparison to the rest of the States/UTs.

Taking SFAC norms as a guideline, RMSI analyzed the requirements of Fire Stations in Delhi, keeping a response time of 3 minutes for very high-risk category, 5 minutes for high category and taking response time in rural area as 20 minutes. *It may be noted that areas served by other agencies, such as the Airport and Military Cantonment have been excluded from the gap analysis, so that there is no duplicity of Fire Stations in those areas. Additionally, areas covered by forests, rivers, sparsely inhabited (small pockets of a few houses, say in a river channel) etc. have also not been considered in the gap analysis.* To make a distinction, the Fire Stations in rural areas are designated as **Fire Stations/Fire Posts**.

Thus, taking the vehicle speeds discussed earlier, and response time as per SFAC norms, Delhi requires additional **120** Fire Stations in urban areas and **10** rural Fire Stations/posts in rural areas (Table 6-1).

Table 6-1: Number of operational and additional Fire Stations and Fire Posts required in Delhi

Urban		Rural	
Operational Fire Stations	Additional Fire Stations	Operational Fire Station/ Fire Post	Additional Fire Stations/ Fire Posts
51	**120**	**1**	**10**

As per SFAC norms, one Fire Station is required per 10 sq. km in urban areas and per 50 sq. km in rural areas. This seems to be based on average area per station over a large area/State.

From the above analysis, the average area per Fire Station in urban areas in Delhi comes to 4.7 sq km, while in rural area; it comes to 62.5 sq km. This analysis also shows that the average Fire Station coverage area in urban areas is too low when compared to the norms specified by SFAC, which is 10 sq km in urban area. Moreover, population covered in such a small area of less than 5 sq km is sometimes very low to justify opening of a new Fire Station, thus contradicting the area based norm of SFAC. Moreover, additional required number of Fire Stations will be too high and it may not be possible to set-up so many Fire Stations in Delhi, where land availability in urban areas is scarce.

Thus, keeping in view the above analyses, RMSI reanalyzed the requirements of Fire Stations in Delhi, by modifying the response time of 5 - 7 minutes for various risk categories and keeping the response time in rural area as 20 minutes. Accordingly, the proposed requirement of additional number of Fire Stations in urban and rural areas is shown in Table 6-2. In terms of average area and population served by the revised response time, the average area served comes to 8.38 sq km (close to 10 sq km) in urban areas serving an average population of 1, 61,289.

Table 6-2: Revised number of operational and additional Fire Stations and Fire Posts required in Delhi

Urban		Rural		Total
Operational Fire Stations	Additional Fire Stations	Operational Fire Station/ Fire Post	Additional Fire Stations/ Fire Posts	
51	**46**	**1**	**9**	**107**

As discussed in section 6.2.4, Greater London Authority operates 112 Fire Stations in an area of 1,587 sq km of Greater London, which is equivalent to on an average one Fire Station per 14.2 sq km. A comparison of the proposed 107 Fire Stations serving an area of 1483 sq km Delhi shows that in Delhi there will be one Fire Station on an average area of 13.9 sq km, which is almost equal to the average area per Fire Station in Greater London.

Thus, keeping in view the above analyses, RMSI recommend to modify the SFAC norms *(response time and area based)* to *response time based* norms for positioning a Fire Station, as response area will vary from place to place depending upon the road network:

Depending upon the risk category, the recommended response time for first fire tender is 5 - 7 minutes in urban areas and 20 minutes in rural areas.

Annex-1: Fire Headquarter Data Collection Form

This questionnaire is prepared in consultation with Directorate General NDRF & CD for collecting basic information all fire infrastructure in the country as part of the project "Fire-Risk and Hazard analysis in the Country" with an objective to Prepare Capital Investment and Institutional Strengthening Plan for Accelerated Development of Fire Services in the Country. All information collection through this questionnaire will be kept confidential and will only be used for the preparation of the report and other deliverables of the project. Directorate General NDRF/ CD has entrusted RMSI Private Limited to carry out this assignment and State Officials are requested to provide required authentic information which is very important for preparation of this report and future development plans of the department.

A. Fire Headquarters General Information

HQ Ref #.....

Location Details

Fire Headquarters/Zone/District Office ---------- State ----------
Address ……..
……..
Office Phone numbers (with STD code):…… Fax ……Web site (if any)……
Name & Designation of the Head of Department: ……
Name & Designation of the nominated person by the dept. for providing data:
……
Mobile number …….. Email (s):……

Area under Jurisdiction

Zonal Office (name and street address)	Num of districts covered	Census 2011 Population (to be filled by RMSI)	Num of Fire stations (Operational)	Num of Fire stations (under Construction)	Num of Fire stations proposed for future expansion

Surveyed by: **Date:** (Signature of the official provided the information)

Area under Jurisdiction in each Zonal Office (provide jurisdiction map for each individual Fire Station)

Name of Zonal office …….

S.N.	Name of Fire stations	Name of district	Under direct Jurisdiction control of [1]	Population (to be filled by RMSI)	Num of Fire stations (Operational)	Num of Fire stations (under Construction)	Num of Fire stations proposed for future expansion	Any additional Information

Name of Zonal office …….

S.N.	Name of Fire stations	Name of district	Under direct Jurisdiction control of [1]	Population (to be filled by RMSI)	Num of Fire stations (Operational)	Num of Fire stations (under Construction)	Num of Fire stations proposed for future expansion	Any additional Information

Name of Zonal office …….

[1] State Government Fire Department Police Department Municipal Corporation Others specify

S.N.	Name of Fire stations	Name of district	Under direct Jurisdiction control of [1]	Population (to be filled by RMSI)	Num of Fire stations (Operational)	Num of Fire stations (under Construction)	Num of Fire stations proposed for future expansion	Any additional Information

Please add additional sheets if required

C. Details of Proposed Fire Station

S.N.	Name of the Site for Proposed Fire Station	District	Status of Work in Progress, (e.g. approval awaited, plan cleared, land acquired/ allocated, % of construction completed)	Remarks

Please attach additional sheets if required

D. Human Resources and Staff Welfare (Please attach additional sheets for each zonal, divisional, and sub-div. Fire Stations)

Organization Structure and Human resources (Operational Staff including higher level officers)

By State/ zonal Level

Zone Name ……..

Level	Designation	Pay-scale	Duty Pattern	Number of sanctioned posts	Total Number of Filled posts	Total No of Vacant posts	Remark, if any
11	Director General / Asst. Director General						
10	Director / Deputy Director						
9	Divisional Officer (D.O.)/ Fire Prevention Officer						
8	Station Officer (St. O)						
7	Sub Officer (S.O)						
6	Fire Engine Operator cum Driver (FEOD)/ Leading Fire Operator (LFO)						
5	Fire Operator (FO)						
4	Cleaner/ Sweeper						
3	Other Officers (Chief Mobilizing Officer/						

	Mobilizing Officer/ Asst. Mobilizing Officer)						
2	Other Officers (Mechanical Superintendent/ Foreman)						
1	Other Staffs (Mechanic/ Mechanic-Helper)						
Any Other							

Please attach additional sheets if required for each Fire zonal region/ division human resources *(broad categories of designations are mentioned below for reference)*

Level 10*: Director General/ Director;* ***Level 9****: CFO/ CO;* ***Level 8****: Deputy CFO/Joint Director;* ***Level 7****: AD/Deputy Controller/Deputy Director/DO;* ***Level 6****: ADO/ Inspector/EO/Fire Supervisor;* ***Level 5****: DFO/ADFO/AFO/Fire In-charge;* ***Level 4****: St.O/Sub Inspector/Station In-charge/ASt O./AEO;* ***Level 3****: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/;* ***Level 2*** *: LFM/ Mechanic Driver/Head Constable/Store Superintendant;* ***Level 1*** *: FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk;* ***Level 0:*** *Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Recruitment Rules for entry level in organization chart (Please provide copy of State recruitment rules in detail)

Level	Designations	Essential qualification as per recruitment rule	Preferential	Training / Experience	Departmental Reservation policy if any
8					
7					
6					
5					

4					
3	FEOD				
2	Leading Fire Operator				
1	Fire Operator				
Any Other					

Staff Welfare:

Please list the Staff welfare measures being followed in the State:

Ration money: Rs…….
Sports facilities: ……
TV for common room: …….
Cash rewards and recognition: Rs…….
Incentives, through benevolent fund: Rs…….. ……
Insurance: Rs…….....
Other schemes etc……

Measures to Improve Staff Efficiency

S. no	Type of Drill	Frequency *(Daily/Weekly, Bi-Monthly, Quarterly)*	Remarks
1.	**Squad Drill**	Daily	
2.	**Pump/ Hose Drill - Dry**	Weekly	
3.	**Pump/ Hose Drill - Wet**	Bimonthly	
4.	**Ladder/ Rescue Drill**	Monthly	
5.	**Rope Rescue Drill**	others	
6.			
7.			

E. Training Details

Name of State Training Centre and address: ……

Number of Faculty/Trainers with Designation: ……

……

……

S. N.	Name of Training Courses	Duration (months)	Maximum capacity	Number of personnel Trained annually	Year
1					
2					
3					
4					

Training obtained by fire-staff annually (sub-officer course and above)

Year	Type of Training Obtained/ name of training course	Within State Training Centre	At NFSC, Nagpur	Other State Training Centre (mention City, State)	Foreign country	Total Number of personnel Trained
2011						
2010						

2009						
2008						
2007						
2006						

Please provide yearly break-up for the last 5 years

Training Centre Infrastructure for basic training and sub-officer course: Provide details of facilities at the training centre, short comings etc.

……
……
……
……
……
……

F. Inventory of Equipment

Division Wise Fire Vehicles

Fire Station Name ----------

Division/ Station Name	Number of Deployment of fire fighting units											
	water tender	Water Browser	Foam Tender	Dry Chemical Powder Tender	Emergency Tender/Rescue Tender/ Rescue Responder	Motor Pump	Motor Cycle	BA Van	Hose Tender	Aerial Ladder Platform	Hazmat Van	Others

Please provide separate list for working, non-working and under procurement

Additional Equipment

Fire Station / District/ Division Name ----------

Division/ Station Name	Gas Cutters	Bolt Cutters	B.A. Sets with B.A. Comp	Circular Saw with Diamond Blade(Electric)	Electric Hammer	Chain Saw-Concrete	Chain Saw-Wood	Pneumatic Lifting bags	Hydraulic Spreader and Cutters/ Cobmi-tool	Rescue Boats

Any other not covered in above list

…….

……..

……..

Please provide separate list for each division/district

G. Communication between HQ and Zonal/district office

Details of Control rooms

Centralized Control Room for the entire State: Yes / No, if yes please provide location and street address:

S.No	Name of Control Room for the Division/district	Size in terms of number of Emergency Fire Telephone (EFT) lines	Command and Control		Remark
			Manual	Computerized	
1					
2					
3					
4					

State Communication centre is connected with Zonal/District office through: Internet/Intranet/Wireless/Telephone lines

State Communication centre is connected with individual Fire Station through: Internet/Intranet/Wireless/Telephone lines

Frequency of Fire Report Transmission:

From Individual Fire Station to District/Zonal Hq: Instantaneous, daily, weekly, bi-weekly/monthly
From Individual Fire Station to State Hq: Instantaneous, daily, weekly, bi-weekly/monthly
From Individual District/Zonal Hq to District/Zone Hq: Instantaneous, daily, weekly, bi-weekly/monthly

Does State have a communication policy?*, if yes, please provide a copy of the report:*

Does State have any approved plans to improve communication?, if yes, please provide a copy of the plan:

H. Financial Details

Name of Zone

……

(If information provided zone wise)

Budget for year ……..

Plan			Non-Plan		
Capital (Rs)	**Revenue (Rs)**		**Capital (Rs)**	**Revenue (Rs)**	
	Equipment			Equipment	
	Maintenance			Maintenance	
	POL			POL	

Please repeat if information is available for each zone/ State more than one year

I. Fire and other Incidences Summary (last 5 years)

Please provide information for each Fire Station, and District/division and Headquarter Level summary

Name of Station …….

Number of Fire and other Incidence (P= Public and FS= Fire Service)

Year	Total Calls (A+B+C+D)	Total Fire Incidence (A)	Occupancy wise break up of fire incidence				Total Rescue incidence (B)	Break up of Rescue incidence				Special service calls (C)	False/ malicious calls (D)	Total injured		Num of Deaths	
			Residential	Industrial	Institutional/ commercial	Others		Road Accidents	Building collapse	Animal	Others			P	FS	P	FS
2010-11																	
2009-10																	
2008-09																	
2007-06																	
2006-07																	

Severity of fire incidences at each Fire Station, and District/division and Headquarter Level summary

Year	Total no of Small Fire Incidence	Total no of Medium Fire Incidence	Total no of Serious Fire Incidence	Brief description of Major Fire Incidence
2010-11				
2009-10				
2008-09				

Year	Total no of Small Fire Incidence	Total no of Medium Fire Incidence	Total no of Serious Fire Incidence	Brief description of Major Fire Incidence
2007-06				
2006-07				

(Attach additional sheets for each region/ and addition year)
Please provide definition of fire types
……
……
……
Severity of events: Small fire – estimated loss of Rs. 10 lakh, Medium – Rs. 10 to 50 lakh, Serious - >Rs. 50 lakh, any fire where there is human death to be consider as Serious fire. (As per the compendium, even there is causalities, it is considered as serious, but the causality severity not mentioned

J. Public Awareness Programmes

Public Awareness Programmes organized in last One Year
Name of Zonal/district Office ……

Total no. of programs in the year including Fire Safety Week (a +b + c)	Total no. of persons attended (d + e + f)	No of Programs Organized			No of Persons attended			Brief description of the programmes
		Govt./ PSU (a)	Pvt. Locations (b)	Schools (c)	Govt./ PSU (d)	Pvt. Locations (e)	Schools (f)	

K. Suggestions/views of the department for improvement of fire and emergency service in the State

1.
2.
3.
4.
5.
6.
7.
8.

L. Contact person Details for Communication at RMSI (On behalf of DGCD, Fire Project Cell):

Postal Address:

Mr Sushil Gupta
General Manager,
Risk Modeling and Insurance,
A-8, RMSI, Sector-16, NOIDA
PIN 201301 (U.P.) INDIA

Mobile- +91 9818798715
Phone (Office): +91 0120 2511102/ 2512101 ext 2612
(Office): +91 120 4040512 (direct)
Fax (Office): +91 0120 2511109/ 2510963
email<Sushil.Gupta@rmsi.com>
sushilgupta74@yahoo.com

www.rmsi.com

Annex-2: Fire Station Survey Form

This questionnaire is prepared in consultation with Directorate General NDRF & CD for collecting basic information all fire infrastructure in the country as part of the project "Fire-Risk and Hazard analysis in the Country" with an objective to Prepare Capital Investment and Institutional Strengthening Plan for Accelerated Development of Fire and Emergency Services in the Country. All information collection through this questionnaire will be kept confidential and will only be used for the preparation of the report and other deliverables of the project. Directorate General NDRF has entrusted RMSI Private Limited to carry out this assignment and State Officials and Official in-charge of Fire Station are requested to provide required authentic information which is very important for preparation of this report and future development plans of the department.

SW FS Ref #.....

A. Fire Station General Information

State	District	City/ Town	Block / Tehsil	Municipality	Latitude , Longitude (to be filled by RMSI)(DDM format)		ID

Fire Station Name ……

Address of the Fire Station (with landmark) …….

Station Phone number(s) with STD code: 1) ……. 2)……. 3)……

Fax No: …….. Emergency No: ……..

Fire Station Type based on served area: Urban ☐ ***Rural*** ☐

Name of officer in-charge …… Designation ……..

Mobile number *(officer in-charge)* : ……..

Fire station is under the administration of (put tick mark in the box)

State Government ☐ Municipal Corporation ☐ Police Department ☐ Others specify…….

The Fire Station falls under the jurisdiction of (Division/Zone/Municipality) -…….

Name of Administrative District/Divisional/Zonal Fire Officer- ……..……Mobile……..

Address/location of District/Divisional/Zonal HQ- ……

Number of total Fire Stations fall under above jurisdiction/ administration- ……

Surveyed by: **Date:**

(Signature of Witness from Fire Department)
Name & Designation

B. Fire Station Infrastructure Details

Does Fire station has its own building: Yes in good condition , Yes, but condition is not good & need new building.

No permanent building

If Fire Station is temporarily operational from borrowed/ rented building of ……(Private, Municipality, Police, any other ……)

Please mentioned the status : Land acquired -…Yes/ No… and building under construction -……Yes/ No….

How many bay station should be in new Fire Station building

If permanent building - Fire station belongs to State Fire Department / State Government / Municipal Corporation / Police fire Service/ any other

Provide building details

Number of Floors	Number of Rooms	Approx Plot Area (SQM)	Approx Built-up Area (SQM)

Whole Fire Station Building Structure Type : Pacca - Reinforced concrete (RCC) frame structure Pacca -Masonry with RCC Roof
Pacca Masonry walls with flexible Roof Kachha masonry walls with Tin Roof Kaccha Tin shade Temp Porta- cabins
Kaccha wooden structure with tin Roof Others kaccha type specify ……

Mixed (kachha and pacca) (in case different parts of Fire Stations has different structure types)

If whole station building is not a permanent (Pacca) building structure and need new partial building, please specify the details of partial components that needs to be build

Vehicle bays (with num of bays) Fire station office building Barracks Staff quarters

Age of building structure/ year of construction- …….. (write year in the blank space and tick in the box below)

Less than 5yrs 5-10 yrs 10-20yrs More than 20 yrs

Number of Bays/Garages for the Fire Vehicles - How many fire vehicle parked within Bay/ Garage

Structure of Bay/ Garrage- Pacca- RCC/Masonry Kaccha Tin Shade Open any other Kaccha ……..

Availability of Staff Quarters - Yes No , If Yes, mention numbers……

Availability of Barracks - Yes ☐ No ☐ , If Yes, mention numbers and total capacity…… ,……

Availability of T.V. in Barracks - Yes ☐ No ☐ Any other entertainment indoor/ outdoor……

Provision of Mess/ Canteen facilities in Fire Station- Yes ☐ No ☐

Availability of Watch room /Control Room- Yes ☐ No ☐ If yes, is it computerized - Yes ☐ No ☐

Is Watch room /Control room online/ internet connected with zonal/ headquarter Yes ☐ No ☐

Availability of drill/ parade ground - Yes ☐ No ☐ Availability of hose drying/ drill tower - Yes ☐ No ☐

Power Supply in the Fire Station Watch Room/ Control Room -

Electricity: Uninterrupted 24 Hrs ☐ Interrupted supply ☐ Availability of standby generator ☐ Inverter for control room ☐

Does the Fire Station maintain ambulance unit ? Yes ☐ No ☐

C. Communication Systems

1. Between Public and Fire control room/ watch room
   i. Landline Telephone: Yes ☐ No ☐ , If 'Yes', mention number of land line phone in operation…….
   ii. Emergency phone number- 101 or,……..Connection Type : Direct ☐ Indirect ☐ Not Available ☐
2. Hotline between Important agencies and Fire control room
   Oil industries/ storage ☐ Airport ☐ PCR ☐ Banks ☐ District Magistrate Office ☐
   Others specify…….
3. Automatic Fire Alarm between High Rise Buildings and Fire Station: Yes ☐ No ☐ If yes, num. of buildings …….
   If with any other agency, specify: ……

Availability of GPS on Fire Engines and other vehicles - Yes ☐ No ☐ , If Yes, mention number of vehicles: ……...

4. Between Fire Station Control Room and Fire Vehicles
   Static Wireless Set in watch room Yes ☐ No ☐ If 'Yes', mention number of operational phones …….
   Number of Mobile wireless sets: ☐ Number of Walky-Talky: ☐ Number of Satellite Phones: ☐
5. Type of Frequency used- HF ☐ VHF ☐ UHF ☐

D. Water Supply Details for Fire Fighting Purpose

Whether 24 hours water available in fire vehicles? Yes ☐ No ☐

Water sources used by Fire Vehicles within Fire station

Direct supply… ☐ … b) Overhead tank ☐ c) Pumping from underground tank …☐

d) Pumping by Tube well ☐ .. e) any other ……..

Any storage of water within Fire Station for fire vehicles- Yes ☐ No ☐

Water sources regularly used by Fire Vehicles outside Fire station (also mention distance in km from Fire Station)

City over-head tank with coupling arrangements ☐ River ☐ Stream ☐ Well ☐ Pond ☐ Lake ☐

Other location / static fire hydrant available in the vicinity - Yes ☐ No ☐ , If 'Yes', provide number and distance (km) ……,……..…

Overall, is there any scarcity of water for fire vehicles- Yes ☐ No ☐

E. Human Resources

Permanent Staff Details- :

S. no.	Designation	Total Number of Permanent Working Staff	Duty pattern/ Shifts (hrs)	Vacant, but sanctioned posts	Numbers of temporary/ contract persons (if any)
1.	Senior Fire Officers		24 hrs		
2.	Station Officer (St.O)/(FSO)				
3.	Sub Officer (S.O)/FSSO				
4.	Leading Fire Men (LFM)				
5.	Driver				
6.	Fire Man (FM)				

S. no.	Designation	Total Number of Permanent Working Staff	Duty pattern/ Shifts (hrs)	Vacant, but sanctioned posts	Numbers of temporary/ contract persons (if any)
7.	Sweeper				
8.	Cook				
9.	Any other				
10.	Any other				

Total Permanent Staff in the Fire Station [ ] Details of Temporary staff/ Contract persons (if any)……

***Level 10**: Director General/ Director; **Level 9**: CFO/ CO; **Level 8**: Deputy CFO/Joint Director; **Level 7**: AD/Deputy Controller/Deputy Director/DO; **Level 6**: ADO/ Inspector/EO/Fire Supervisor; **Level 5**: DFO/ADFO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Mode to maintain Physical Fitness

S. no	Type of Drill	Yes/No	S. no	Type of Drill	Yes/No
8.	P.T./ Parade	Daily/……..	4.	Vehicle maintenance	Weekly/Monthly/Quarterly/……
9.	Fire Drill	Daily/Weekly……	5.	Any other	……
10.	Games	Daily/ ……			

F. Fire Risk Covered in the Area under Jurisdiction

Jurisdiction of Fire Station (in approx sq km) ……*(collect current* jurisdiction *map from the Fire Station)*

Fire Risk	If Yes, Brief description of its Name, Type, Risks involved	Dist. From FS (km)	No. of Units
Old city Area/ congested areas			
Jhuggi -Jhopdi (Thatched House Clusters)			
Industrial Area (also mention whether small/medium/large scale)			
Industrial Area (any other)			
High-Rise Buildings (>15m height)			
Major Scrap yards (Iron/Wood etc)			
Oil Mills/Storage/Processing Units			
Refineries			
Underground Gas pipe lines			
LPG Bottling Plant			
Water –Treatment Plant (chlorine cylinders)			
Bulk Fuel Storage Area/ Petrol Pump			
Major Hazardous (MAH) units			

Fire Risk	If Yes, Brief description of its Name, Type, Risks involved	Dist. From FS (km)	No. of Units
Explosive manufacturing/stores			
Port/ dockyard area			
Railway Station			
Airport Area			
Wild Forest-Area			
Vicinity to Coast			
Army Ammunition Storage			
Cross-Border Shelling			
Any other			
Any other			

Availability of water for Fire Fighting in High-Rise Building as per National Building Code (NBC) - All ☐ Few ☐ No ☐

Applicability of NBC/ local laws in District/ State for fire safety of High-Rise building - All ☐ Few ☐ No ☐

Applicability of NBC/ local laws for fire safety in industrial and other buildings- All ☐ Few ☐ No ☐

G. Status of Fire Fighting Vehicles (attach separate sheet if number of vehicle are more than space provided below)

(Total number of Fire Fighting Vehicles at station ……..…)

Sl No	Fire Vehicle Type	Fire Dept. Vehicle Number	Vehicle Registration Number	Make	Year of Fabrication (age)	Size/ water capacity (ltr)	Pumping capacity/ size (LPM)	Comm. System mounted on vehicle	If not in running condition (off road)
	Water Tender (WT) 1							Wireless / GPS	Minor/ Major/Condemned
	Water Tender (WT) 2							Wireless / GPS	Minor/ Major/Condemned
	Water Tender (WT) 3							Wireless / GPS	Minor/ Major/Condemned
	Water Bowser (WB) 1							Wireless / GPS	Minor/ Major/Condemned
	Water Bowser (WB) 2							Wireless / GPS	Minor/ Major/Condemned
	Foam Tender (FT)							Wireless / GPS	Minor/ Major/Condemned
	DCP Tender					kg		Wireless / GPS	Minor/ Major/Condemned
	Multi-purpose Tender							Wireless / GPS	Minor/ Major/Condemned
	Hose Tender (HT)							Wireless / GPS	Minor/ Major/Condemned
	Rescue / emergency tender/ responder							Wireless / GPS	Minor/ Major/Condemned
	Advanced Rescue Tender (with inst. to handle hazardous materials)							Wireless / GPS	Minor/ Major/Condemned
	Aerial Ladder Platform (ALP)							Wireless / GPS	Minor/ Major/Condemned
	Turn Table Ladder (TTL)							Wireless /	Minor/

Sl No	Fire Vehicle Type	Fire Dept. Vehicle Number	Vehicle Registration Number	Make	Year of Fabrication (age)	Size/ water capacity (ltr)	Pumping capacity/ size (LPM)	Comm. System mounted on vehicle	If not in running condition (off road)
								GPS	Major/Condemned
	Hazmat Van							Wireless / GPS	Minor/ Major/Condemned
	B.A. Van							Wireless / GPS	Minor/ Major/Condemned
	Quick Response Tender (QRT)							Wireless / GPS	Minor/ Major/Condemned
	Motor Cycle Mist 1							Wireless / GPS	Minor/ Major/Condemned
	Motor Cycle Mist 2							Wireless / GPS	Minor/ Major/Condemned
	Rescue Boat							Wireless / GPS	Minor/ Major/Condemned
	Fire Boat							Wireless / GPS	Minor/ Major/Condemned
	High Pressure Light Van							Wireless / GPS	Minor/ Major/Condemned
	Any Other							Wireless / GPS	Minor/ Major/Condemned

Details of Vehicles- other than Fire Fighting/ Official Use

Sl No	Fire Vehicle Type	Vehicle Registration Number	Make	If allotted to individual	Comm. System mounted on vehicle	If not in running condition (off road)
	Ambulance				Wireless / GPS	Minor/ Major/Condemned
	Motor cycle (office use)				Wireless / GPS	Minor/ Major/Condemned

Sl No	Fire Vehicle Type	Vehicle Registration Number	Make	If allotted to individual	Comm. System mounted on vehicle	If not in running condition (off road)
	Motor cycle (office use)				Wireless / GPS	Minor/ Major/Condemned
	Jeep/ Gypsy (office use)				Wireless / GPS	Minor/ Major/Condemned
	Jeep/ Gypsy (office use)				Wireless / GPS	Minor/ Major/Condemned
	Bus/ Mini Bus				Wireless / GPS	Minor/ Major/Condemned
	Other Transport Vehicle				Wireless / GPS	Minor/ Major/Condemned
	Any other				Wireless / GPS	Minor/ Major/Condemned

H. Specialized Equipment provided (mention total quantity for all equipment including vehicle and storage)

Equipment	Number/ Quantity	Equipment	Number/ Quantity
Self rescue units ropes/slugs (ft)		Ladders (extension + hook)	
Foam compound (ltr.)		Hand controlled nozzle/ branches	
Foam making branches (tool)		Fog/ Mist Branch	
Breathing Apparatus (B.A.) Sets		B.A. Compressor	
Personal Protection Suits (multi-layer suits etc)		Combi-Tool	
Personal Protection Equipment (PPE) (protection suit with BA sets etc)		Jumping cushion / sheets	
Chemical Suit		Dry Chemical Powder (DCP) Extinguisher	
Lock cutter		First-Aid Box	
Hydraulic Rescue Tool (spreader, cutter, rams)		Portable Pump	
Electric powered hammer/ floor breaker		Submersible Pumps	
Electric chain saw for wood		Pneumatic Lifting Bag (capacity -Ton)	
Electric powered concrete cutter saw		Thermal Imaging Camera	

Equipment	Number/ Quantity	Equipment	Number/ Quantity
Electric chain saw for concrete		Life Locator Equipment	
Petrol Powered Concrete Cutter Saw		Chemical Leakage/Gas Detection Kit	
Petrol Chain Saw for Concrete		Radio-active Leakage Detection Kit	
Petrol Chain Saw for Wood		Curtain Spray Nozzle	
Hydraulic Chain Saw for Wood		Escape Chutes (length m)	
Long Branch		Search Light	
Short Branch		Generator Set	
Diffuser		Robots if any	
Lifebuoy		Fire-Curtain	
Life Jacket		Floating Pump	
Diving Suit (Wet / Dry)		Smoke Exhauster/ PPV	
Fire Beater		Any Other…	
Inflatable Lighting Tower		Any Other…	

I. Other Dress Accessories

Normal Dangri	Individual issue / Group use	
Helmets (steel/leather/fiber)	Individual issue / Group use	
Gum Boots	Individual issue / Group use	
Fire retardant Dangri	Individual issue / Group use	
Any Other		

Any other incentives for staff such as ration money, insurance etc

Ration money – Yes ☐ No ☐ Amount (Rs) ……..

Insurance - Yes ☐ No ☐ Amount (Rs) ……..

J. Suggestions/views of fire-official for improvement of fire and emergency service at the station

1)……
……
……..

2)……..……
……..……
……

3)
……
……

K. Other Fire Station (nearby) not belonging to Fire Service Department

Airport / Defence Installations / Power Plant (all type) / Oil Refineries / Private Agency / Other Industries etc.

a) Name/Agency-…… cooperation with the above Fire Station …….
(in large fire only/ all small & big fires/ no cooperation)

Details of any mutual-aid scheme / ……

b) Name/Agency-…… cooperation with the above Fire Station …….
(in large fire only/ all small & big fires/ no cooperation)

Details of any mutual-aid scheme / ……

c) Name/Agency-…… cooperation with the above Fire Station …….
(in large fire only/ all small & big fires/ no cooperation)

Details of any mutual-aid scheme / ……

L. Fire Calls and other Incidence Statistics (last 3-5 years) Name of Fire Station ……..

Monthly number of fire calls and other special service calls (use additional sheet to pen down the Fire Statistics for last 5 years)

Month-Year	Total Calls (A+B+C+D)	Total Fire Incidence calls (A)	Occupancy wise break up of fire incidence (if any)				Total Rescue incidence (B)	Break up of Rescue incidence (if any)				Special service calls (C)	False / malicious calls (D)	Total injured		Total Death
			Residential	Industrial	Institutional/ commercial	Others		Road Accidents	Building collapse	Animal	Others			Minor	Major	
12-Jul																
12-Jun																
12-May																
12-Apr																
12-Mar																
12-Feb																
12-Jan																
11-Dec																
11-Nov																
11-Oct																
11-Sep																
11-Aug																

11-Jul															
11-Jun															
11-May															
11-Apr															
11-Mar															
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11-Jan															
10-Dec															
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9-Dec															

9-Nov															
9-Oct															
9-Sep															
9-Aug															
9-Jul															
9-Jun															
9-May															
9-Apr															
9-Mar															
9-Feb															
9-Jan															
8-Dec															
8-Nov															
8-Oct															
8-Sep															
8-Aug															

Please send Fire call statistics to :

Mr. Sushil Gupta (General Manager), Risk Modeling & Insurance,
A-7, RMSI, Sector 16, Noida 201301, Fax: 0120 2511109
Mobile: 08826100332, phone: 0120 4040512(direct)
Sushil.Gupta@rmsi.com

PART B

7 Delhi State

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8 Rajasthan State

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9 Maharashtra State

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10 Jammu and Kashmir State

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11Puducherry UT

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12 Andaman & Nicobar Islands UT

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13 Chandigarh UT

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14 Haryana State

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15 Himachal Pradesh State

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16 Punjab State

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17 Uttarakhand State

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18 Uttar Pradesh State

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19 Dadra and Nagar Haveli UT

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20 Daman and Diu UT

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21 Goa State

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22 Gujarat State

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23 Karnataka State

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24 Madhya Pradesh State

24.1 Introduction

This State of central India is geographically located between latitudes 21.07°N to 26.87°N and longitudes 74.03°E–82.8 °E. It shares its borders with Maharashtra, Gujarat, Chhattisgarh, Uttar Pradesh and Rajasthan (Figure 24.1). Madhya Pradesh with a total population of 72,597,565 (as per Census 2011, Table 24-1) is geographically spread across a total area of 3,08,1245 sq.km. The State accounts for about 9.4 percent of the land area of India. Before the creation of Chhattisgarh in 2000, which was carved out from Madhya Pradesh, it was the largest State in India. A large land area of about 31 percent of the State is covered by forests.

The geography of Madhya Pradesh can be divided into the following regions- Malwa, Nimar, Bundelkhand, Chambal, Baghelkhand, Mahakoshal and the central Vindhya and Satpura region. All these regions show distinct linguistic, cultural and geographical patterns. Malwa is a plateau region in the northwest area to the north of the Vindhya Range. The Nimar (Nemar) region lies in the western part of the Narmada river valley. It is in the south of the Vindhyas, in the southwest region of the State. Bundelkhand has rolling hills and fertile valleys and slopes downward the Gangetic plain. Baghelkhand is a hilly region, located in the north-eastern area of the State, and it includes the eastern end of the Vindhya Range. Mahakoshal region can be found in the south-eastern part of Madhya Pradesh and includes the eastern end of the Narmada river valley and the eastern Satpuras.

The State, located in the central part of the country, experiences a subtropical type of climate. Summer season in this State stretches from the month of April to June, when the weather remains hot and dry with temperature rising up to 42° C. Monsoon sets in the month of July and continues till September. Rainfall decreases from the eastern part to the State's west with an average annual rainfall of 1, 370 mm. However, the districts towards its south east receive heavy rainfall of even 2, 150 mm at times. The State experiences a dry and cold winter during December and January.

Agriculture is the largest area of occupation in Madhya Pradesh. Around one fifth of the cultivated land is under irrigation. This land is a fascinating amalgam of scenic beauty, history and modern urban planning. Madhya Pradesh is famous for its legendary tourist destinations such as the temples of Khajuraho, the majestic forts of Gwalior, Buddhist stupas of Sanchi and the various wildlife sanctuaries that Madhya Pradesh is peppered with.

Currently, Madhya Pradesh Fire service has only 292 operational Fire Stations spread over all the States (Figure 24-2), and a few Fire Stations out of 292 are being operated by Police Fire Service. Table 24-2 provides the district wise details, i.e., number of operational Fire Stations, geographical, population as per Census 2011, and average estimated population served by each Fire Station in Madhya Pradesh. On an average each Fire Station in the State is serving more than two Lakhs forty eight thousand population.

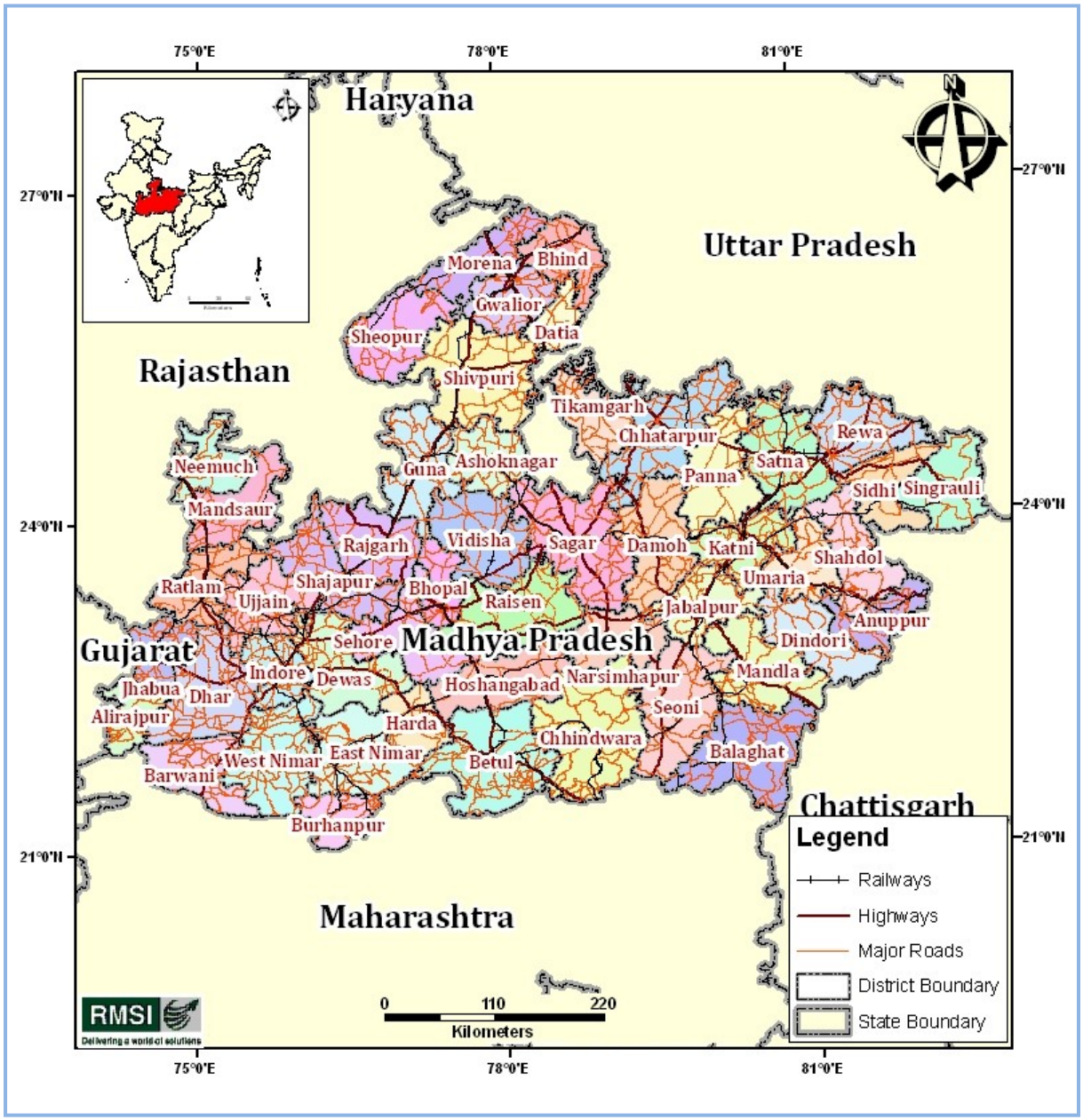

Figure 24-1: District map of Madhya Pradesh State

Table 24-1: Madhya Pradesh Demography as per Census 2011

Madhya Pradesh State			
No. of Districts	50		Percentage of Urban Population
No. of Sub-Districts	342		
No. of Towns	476		27.6%
No of Villages	54,903		
Population			
	Total	**Rural**	**Urban**
Persons	72,597,565	52,537,899	20,059,666
Males	37,612,920	27,142,409	10,470,511
Females	34,984,645	25,395,490	9,589,155
Sex Ratio (females per 1,000 males)	930	936	916

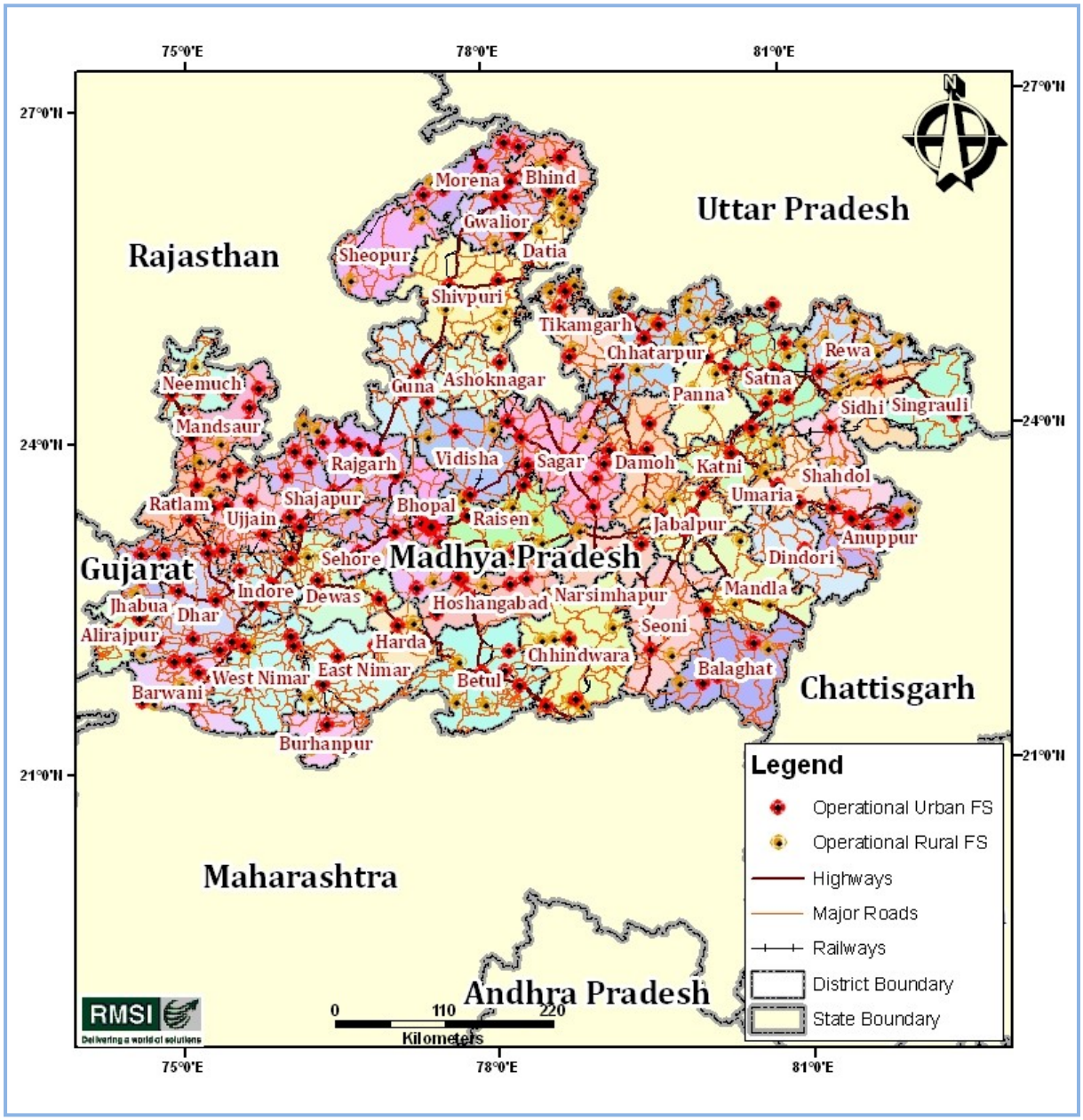

Figure 24-2: Locations of operational Fire Stations in Madhya Pradesh

Table 24-2: Summary of district level operational Fire Stations in Madhya Pradesh

District Name	Total Population (Census 2011)	Number of Fire Station operational	Average Population per Fire station
Alirajpur	728,677	3	242,892
Anuppur	749,521	4	187,380
Ashoknagar	844,979	2	422,490
Balaghat	1,701,156	5	340,231
Barwani	1,385,659	7	197,951
Betul	1,575,247	8	196,906
Bhind	1,703,562	8	212,945
Bhopal	2,368,145	7	338,306
Burhanpur	756,993	3	252,331
Chhatarpur	1,762,857	12	146,905
Chhindwara	2,090,306	12	174,192
Damoh	1,263,703	5	252,741
Datia	786,375	4	196,594
Dewas	1,563,107	7	223,301
Dhar	2,184,672	9	242,741
Dindori	704,218	1	704,218
East Nimar	1,309,443	4	327,361
Guna	1,240,938	3	413,646
Gwalior	2,030,543	5	406,109
Harda	570,302	3	190,101
Hoshangabad	1,240,975	6	206,829
Indore	3,272,335	8	409,042
Jabalpur	2,460,714	6	410,119
Jhabua	1,024,091	4	256,023
Katni	1,291,684	4	322,921
Mandla	1,053,522	5	210,704
Mandsaur	1,339,832	7	191,405
Morena	1,965,137	8	245,642
Narsimhapur	1,092,141	5	218,428
Neemuch	825,958	5	165,192
Panna	1,016,028	6	169,338
Raisen	1,331,699	10	133,170
Rajgarh	1,546,541	10	154,654
Ratlam	1,454,483	6	242,414
Rewa	2,363,744	10	236,374
Sagar	2,378,295	8	297,287
Satna	2,228,619	8	278,577
Sehore	1,311,008	7	187,287
Seoni	1,378,876	3	459,625
Shahdol	1,064,989	5	212,998
Shajapur	1,512,353	8	189,044
Sheopur	687,952	3	229,317
Shivpuri	1,725,818	5	345,164
Sidhi	1,126,515	3	375,505
Singrauli	1,178,132	2	589,066
Tikamgarh	1,444,920	6	240,820
Ujjain	1,986,597	7	283,800

District Name	Total Population (Census 2011)	Number of Fire Station operational	Average Population per Fire station
Umaria	643,579	3	214,526
Vidisha	1,458,212	5	291,642
West Nimar	1,872,413	7	267,488
Total	**72,597,565**	**292**	**248,622**

24.2 Field Surveys of Fire Stations for Data Collection

To have first-hand information on the distribution of the fire service stations across the country, infrastructure availability and their status, fire fighting manpower etc., RMSI project team has carried out detailed surveys of Fire Stations and collected data though individual "Fire Station Survey Form" and Fire Headquarter Data Collection Form" as shown in Annexure 1 & 2. The collected information for each Fire Station is following categories:

1. Fire station general information
2. Fire station infrastructure details
3. Communication systems
4. Water supply details for firefighting purpose
5. Human resources
6. Fire risk covered in the area under jurisdiction
7. Status of fire fighting vehicles
8. Specialized equipment provided (Specify whether kept in vehicle or in stores)
9. Other accessories
10. Fire calls and other fire incidence statistics (last 3-5 years)

Besides the collection of field survey data, RMSI team has also collected the location coordinates (latitude, longitude) of Fire Stations using Geo Positioning System (GPS). The geographical coordinate information is used for plotting all the Fire Station locations in the map to perform GIS based spatial analyses. This is also used in the analysis of distribution of new proposed Fire Stations and gap analysis on fire-infrastructure, based on risk-category, response time, and population criteria.

24.3 Infrastructure Gap Analysis

24.3.1 Fire Station Location Gap Analysis

As discussed in section 6.2.5, response time of 5-7 minutes in urban area and 20 minutes in rural area has been considered. With network analysis, ideal jurisdiction areas have been delineated for all operating Fire Stations. In delineation of ideal jurisdiction areas, built-up areas such as various types of residential areas and industrial areas with estimated population has also been considered. After delineation of ideal jurisdiction area, un-served gaps in urban agglomeration have been identified. These un-served gaps are shown to be filled by new proposed urban Fire Stations. Table 24-3 shows district level summary of number of operational and new proposed Fire Stations with population covered within their ideal jurisdiction area.

Rural areas of Madhya Pradesh State are similarly covered with new rural Fire Stations. It may be noted that rural populations are very sparsely distributed in the State. Hence, locations of rural Fire Stations are demarcated to the nearest relatively bigger village having population of more than 5,000 -10,000 or major roads intersection. District level numbers of new rural Fire Stations are given in Table 24-3. Figures 24-2 to 24-12 depict representative

detailed maps showing delineated ideal jurisdiction areas for operational and new proposed urban Fire Stations and location of new rural Fire Station in the State.

Detailed list of delineated operational, new urban and rural Fire Stations/Fire Posts in Madhya Pradesh State are given in Table 24-38 and Table 24-39.

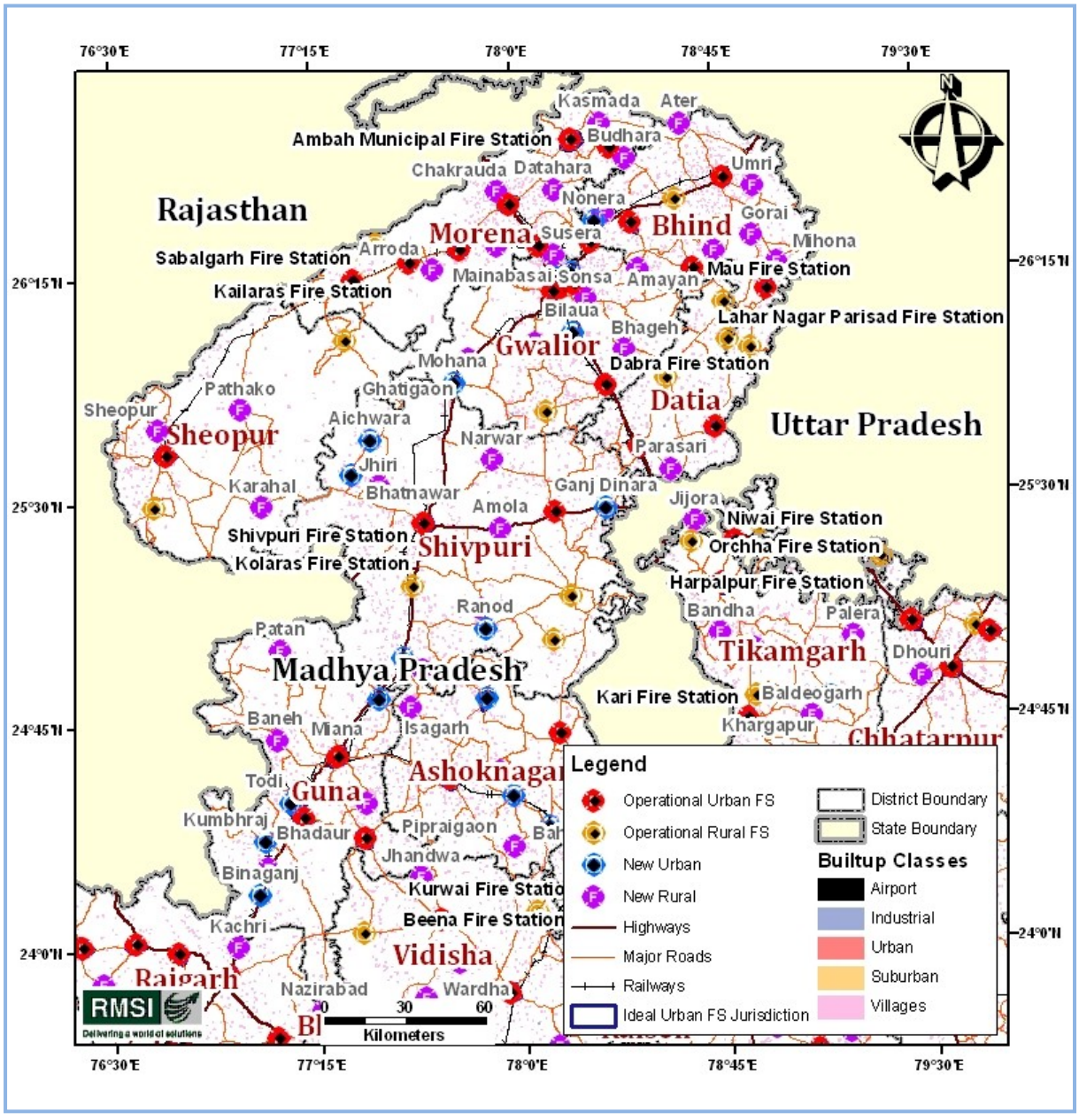

Figure 24-3: Locations of operational and new Fire Stations in North Madhya Pradesh

Table 24-3: District level number of operational and new Fire Stations in the State of Madhya Pradesh

District	Num of Operational Fire Stations	Ideally Served Population under Operational Fire Stations	Num of New Urban Fire Stations	Ideally Served Population under new urban Fire Stations	Num of New Rural Fire Stations	Total Fire Stations
Alirajpur	3	137,525	0	-	3	6
Anuppur	4	247,877	2	157,948	4	10
Ashoknagar	2	105,634	3	53,664	3	8
Balaghat	5	785,911	0	-	5	10
Barwani	7	630,494	0	-	2	9
Betul	8	1,042,224	0	-	3	11
Bhind	8	829,618	1	18,515	7	16
Bhopal	7	1,062,309	5	709,796	3	15
Burhanpur	3	478,948	0	-	1	4
Chhatarpur	12	1,248,664	0	-	2	14
Chhindwara	12	1,761,014	0	-	3	15
Damoh	5	531,967	1	10,895	3	9
Datia	4	425,396	0	-	1	5
Dewas	7	1,373,471	1	58,976	1	9
Dhar	9	618,473	1	129,262	7	17
Dindori	1	87,495	0	-	3	4
East Nimar	4	856,144	0	-	2	6
Guna	3	267,904	5	135,167	4	12
Gwalior	5	1,183,336	4	302,890	5	14
Harda	3	430,000	0	-	1	4
Hoshangabad	6	621,084	1	68,267	2	9
Indore	8	973,964	8	1,208,768	4	20
Jabalpur	6	1,021,160	6	742,075	3	15
Jhabua	4	458,549	1	102,654	0	5
Katni	4	534,746	2	84,610	4	10
Mandla	5	750,554	0	-	1	6
Mandsaur	7	778,473	0	-	4	11
Morena	8	831,485	0	-	6	14
Narsimhapur	5	446,899	0	-	2	7
Neemuch	5	484,218	2	26,895	2	9
Panna	6	805,049	0	-	2	8
Raisen	10	1,349,717	0	-	1	11
Rajgarh	10	867,521	0	-	3	13
Ratlam	6	824,742	1	89,100	2	9
Rewa	10	1,851,934	1	89,344	1	12
Sagar	8	738,978	2	139,473	8	18
Satna	8	932,778	2	163,206	5	15
Sehore	7	816,265	0	-	2	9
Seoni	3	605,396	0	-	4	7
Shahdol	5	509,204	0	-	4	9
Shajapur	8	578,777	0	-	4	12
Sheopur	3	382,177	0	-	3	6
Shivpuri	5	696,142	5	118,021	5	15
Sidhi	3	626,412	0	-	2	5

District	Num of Operational Fire Stations	Ideally Served Population under Operational Fire Stations	Num of New Urban Fire Stations	Ideally Served Population under new urban Fire Stations	Num of New Rural Fire Stations	Total Fire Stations
Singrauli	2	80,822	2	184,367	5	9
Tikamgarh	6	494,992	1	26,004	5	12
Ujjain	7	531,973	1	208,605	5	13
Umaria	3	279,450	0	-	2	5
Vidisha	5	790,213	0	-	4	9
West Nimar	7	920,626	0	-	5	12
Total	**292**	**35,688,704**	**58**	**4,828,502**	**163**	**513**

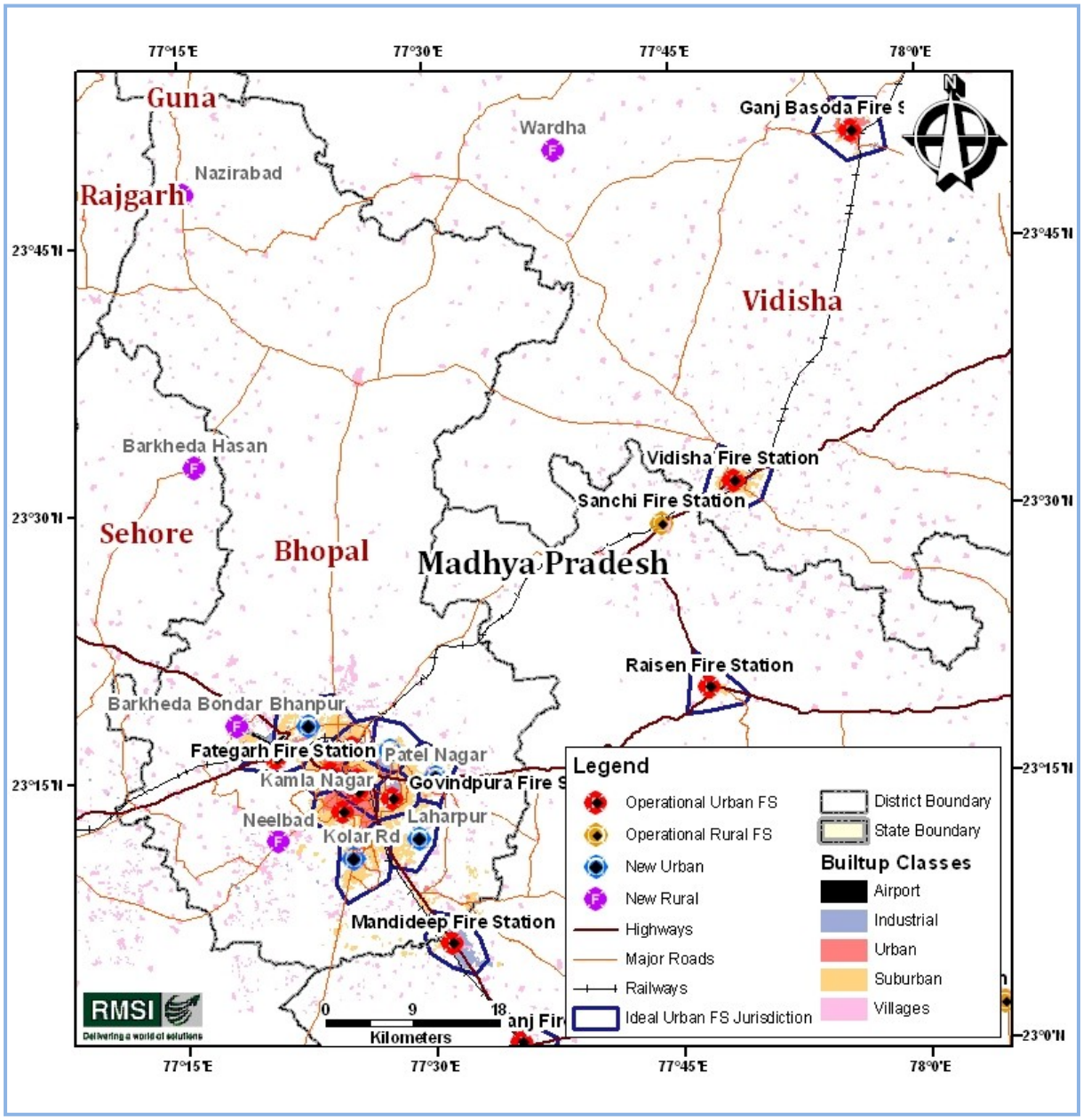

Figure 24-4: Fire stations gap analysis for Bhopal rural areas

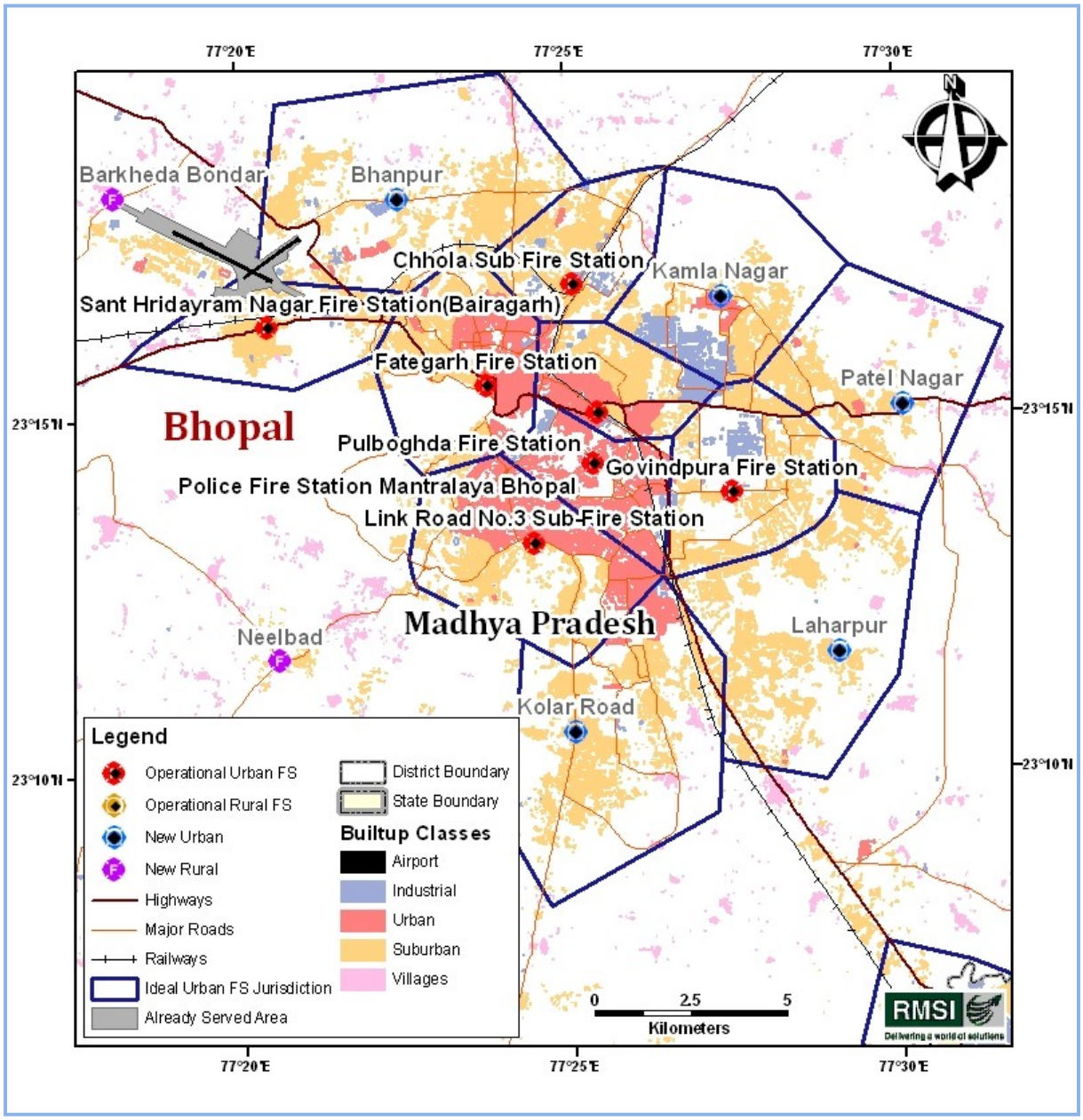

Figure 24-5: Fire stations gap analysis for Bhopal urban areas

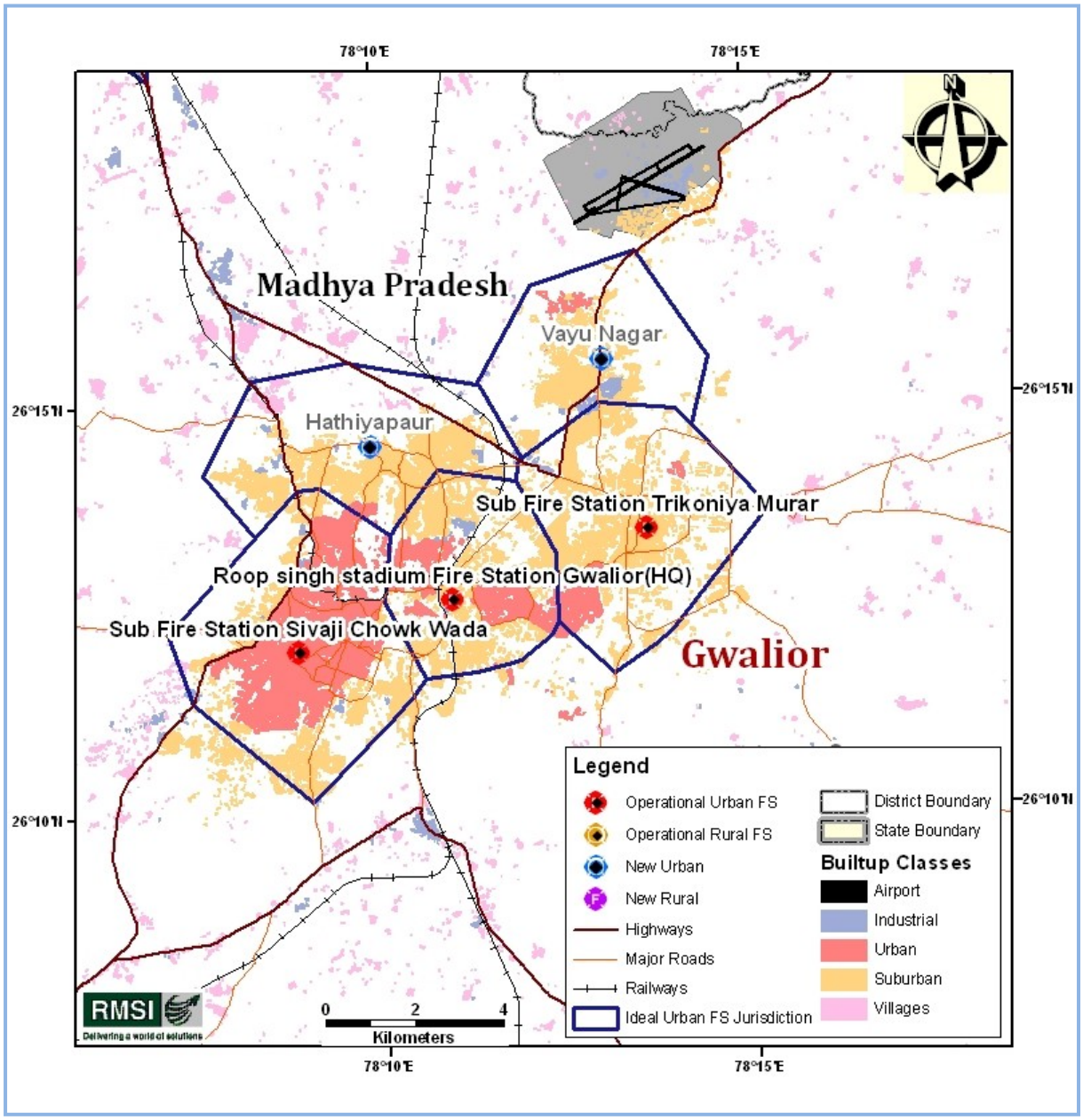

Figure 24-6: Fire stations gap analysis for Gwalior urban areas

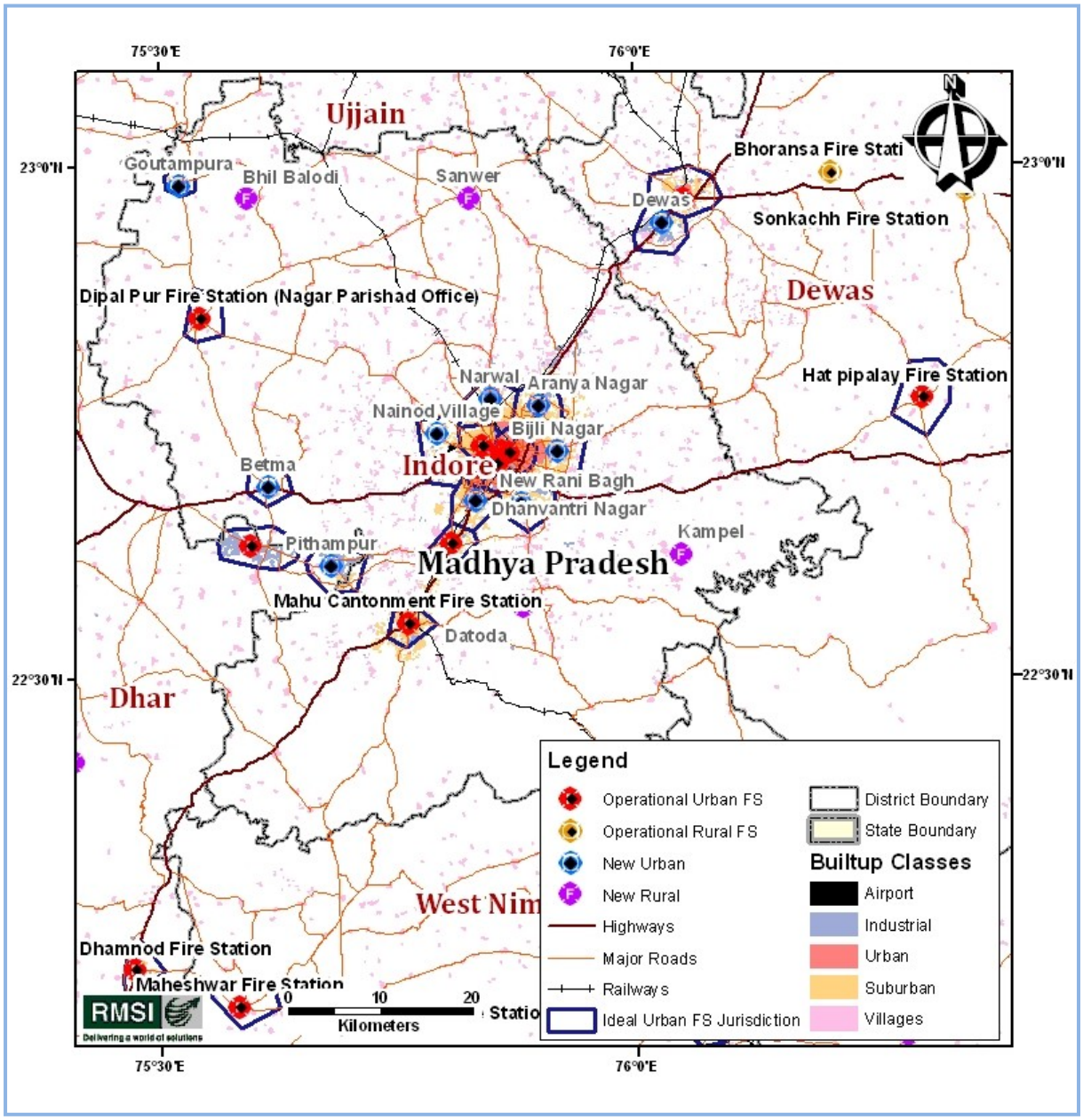

Figure 24-7: Fire stations gap analysis for Indore rural areas

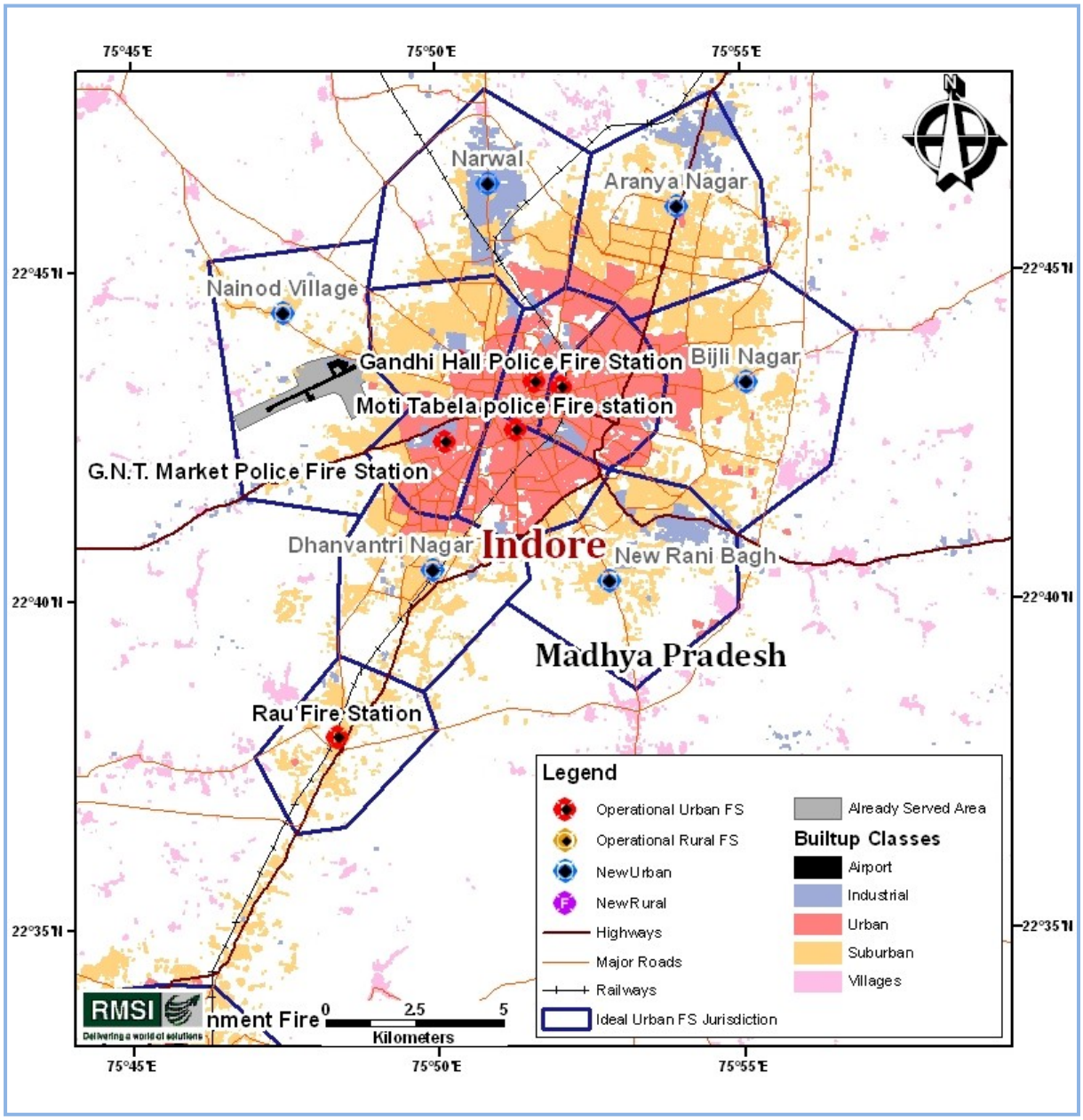

Figure 24-8: Fire stations gap analysis for Indore rural areas

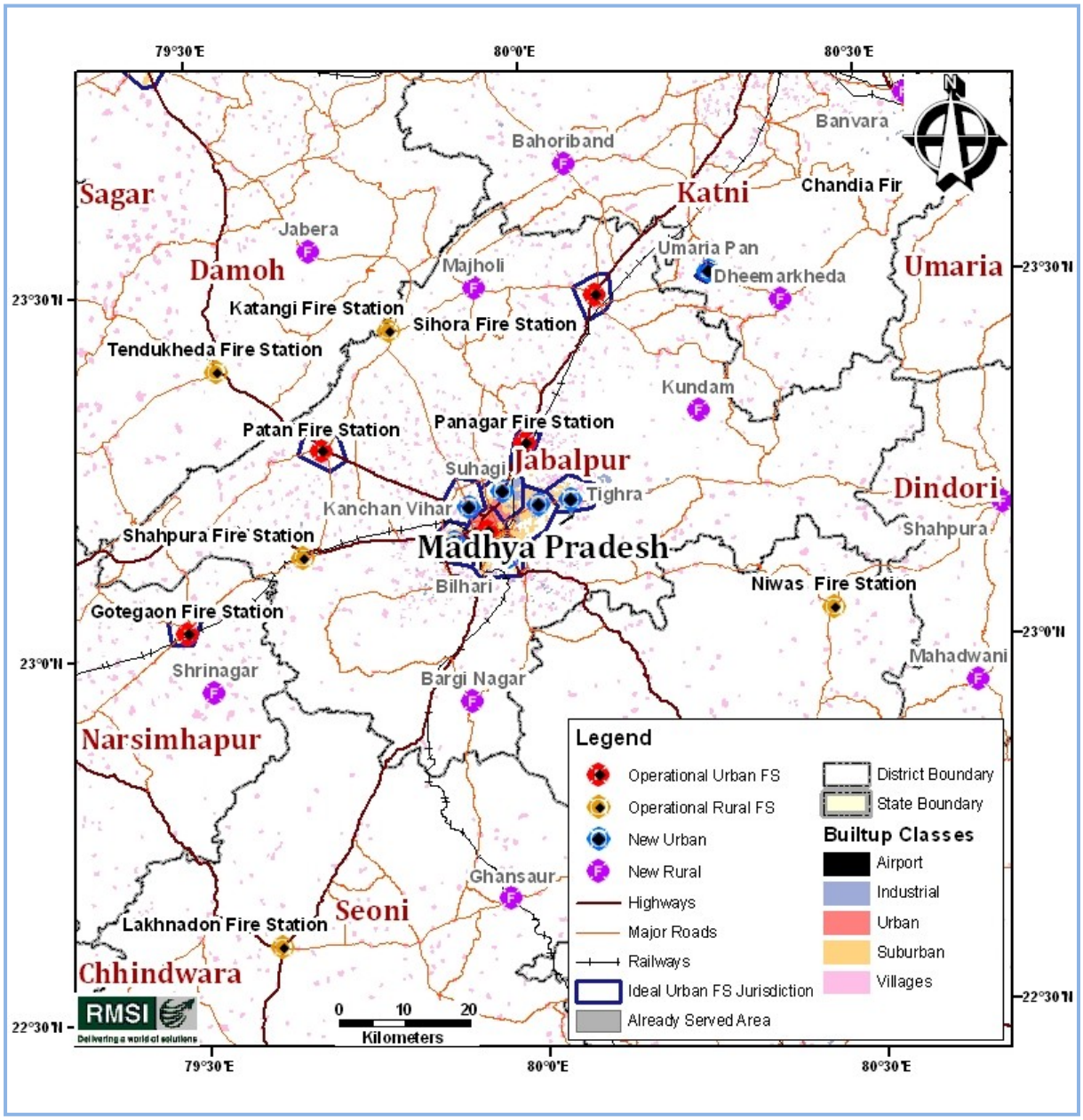

Figure 24-9: Fire stations gap analysis for Jabalpur rural areas

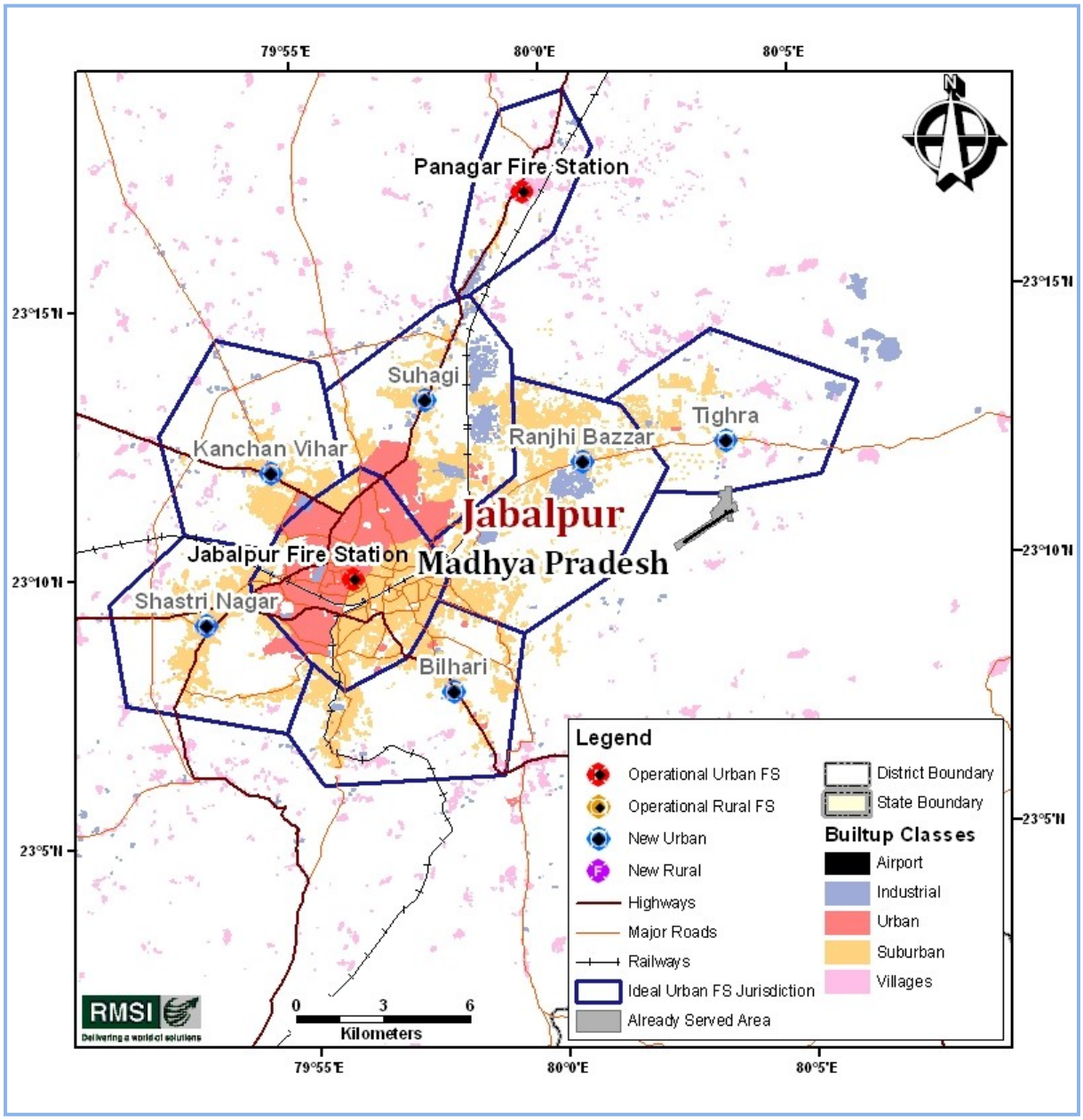

Figure 24-10: Fire stations gap analysis for Jabalpur urban areas

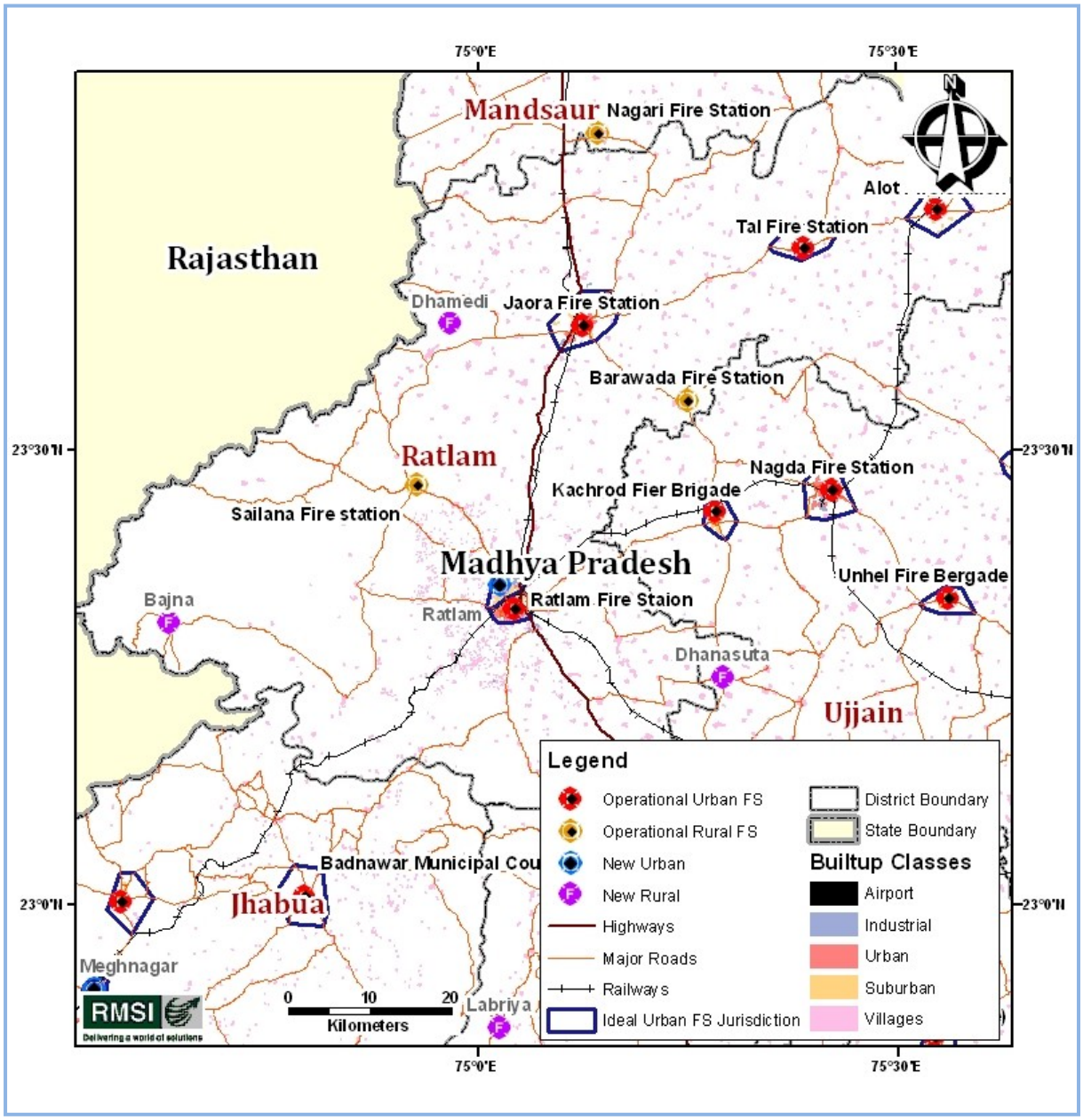

Figure 24-11: Fire stations gap analysis for Ratlam rural areas

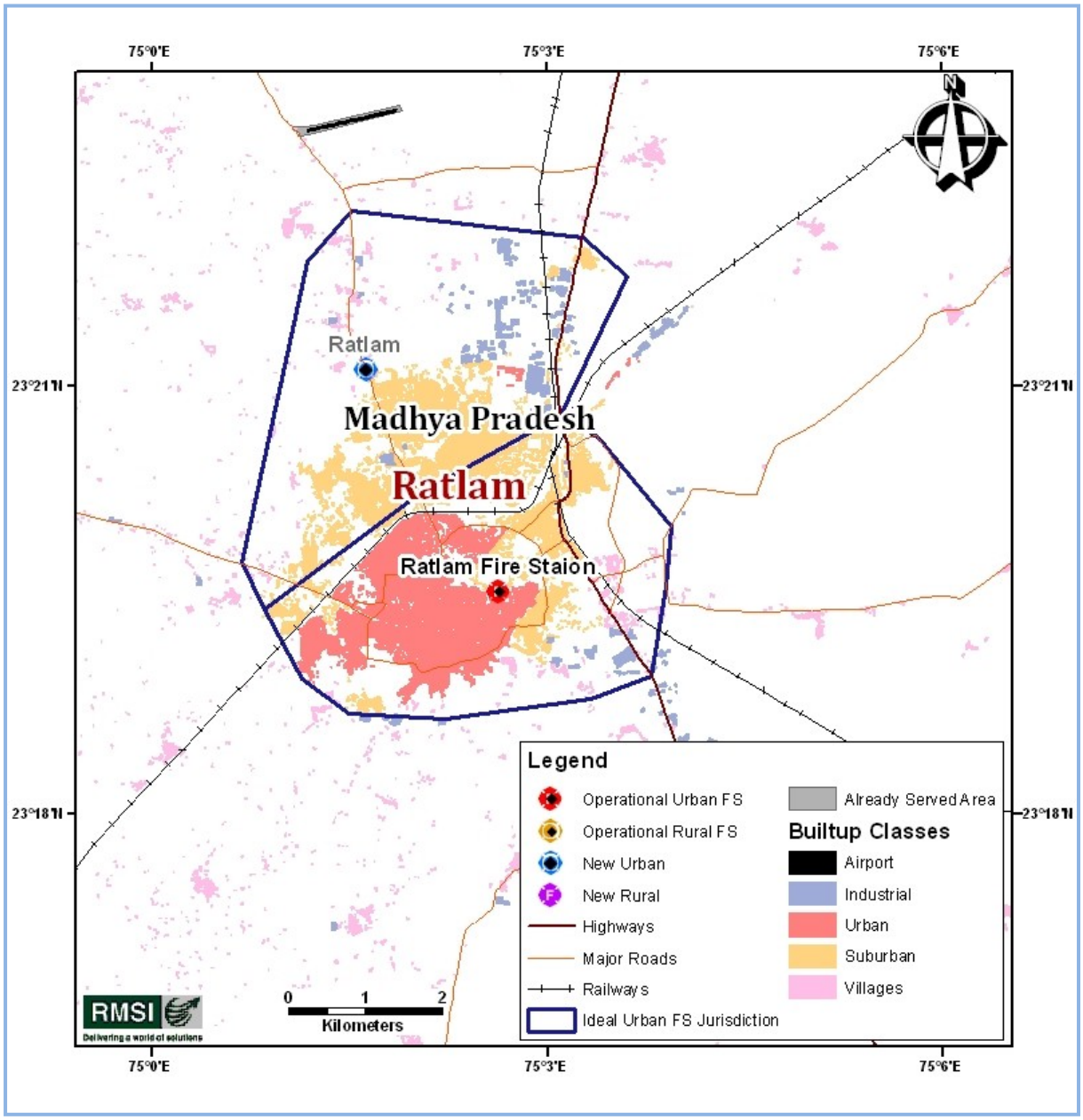

Figure 24-12: Fire stations gap analysis for Ratlam urban Areas

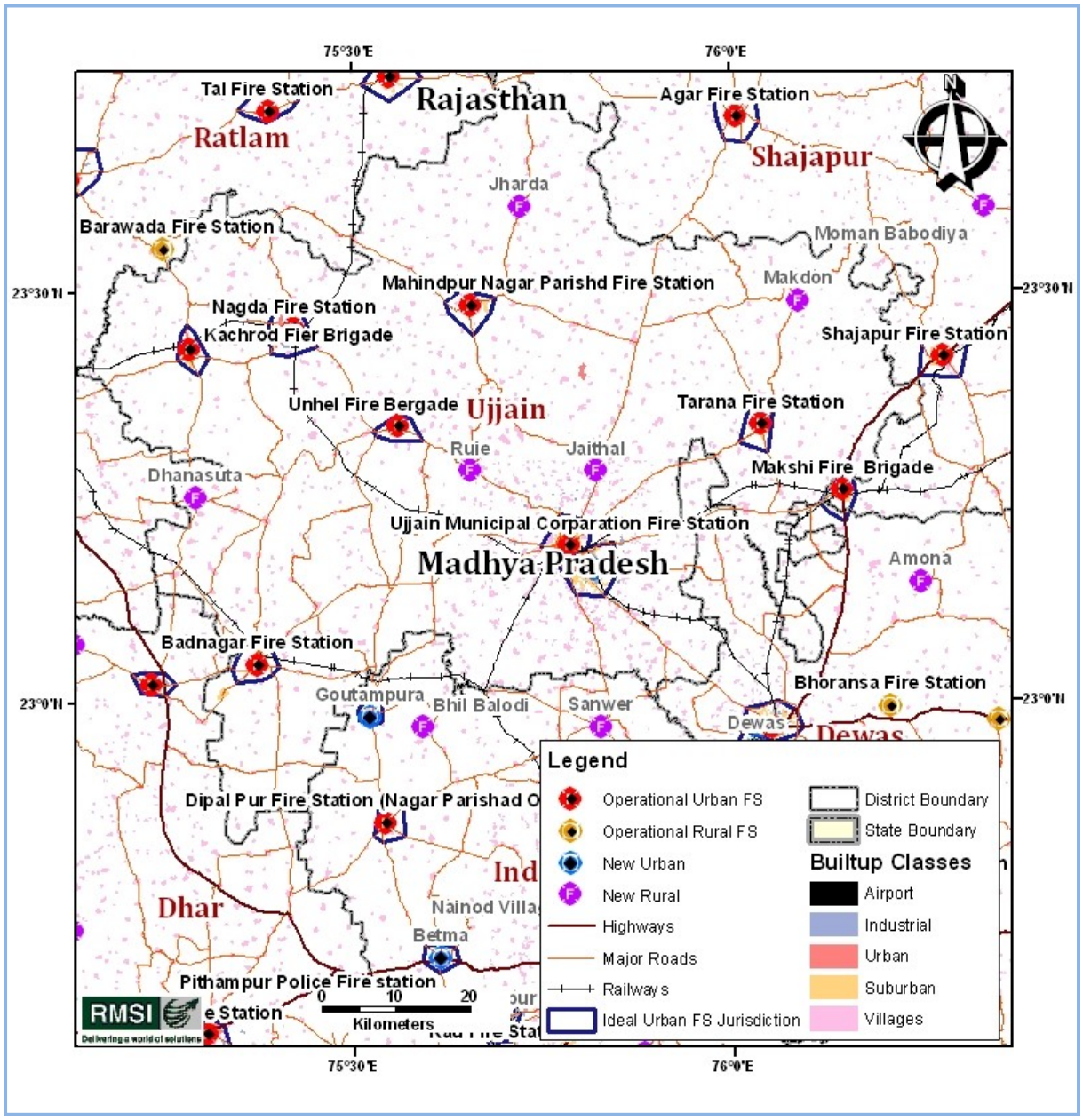

Figure 24-13: Fire stations gap analysis for Ujjain rural Areas

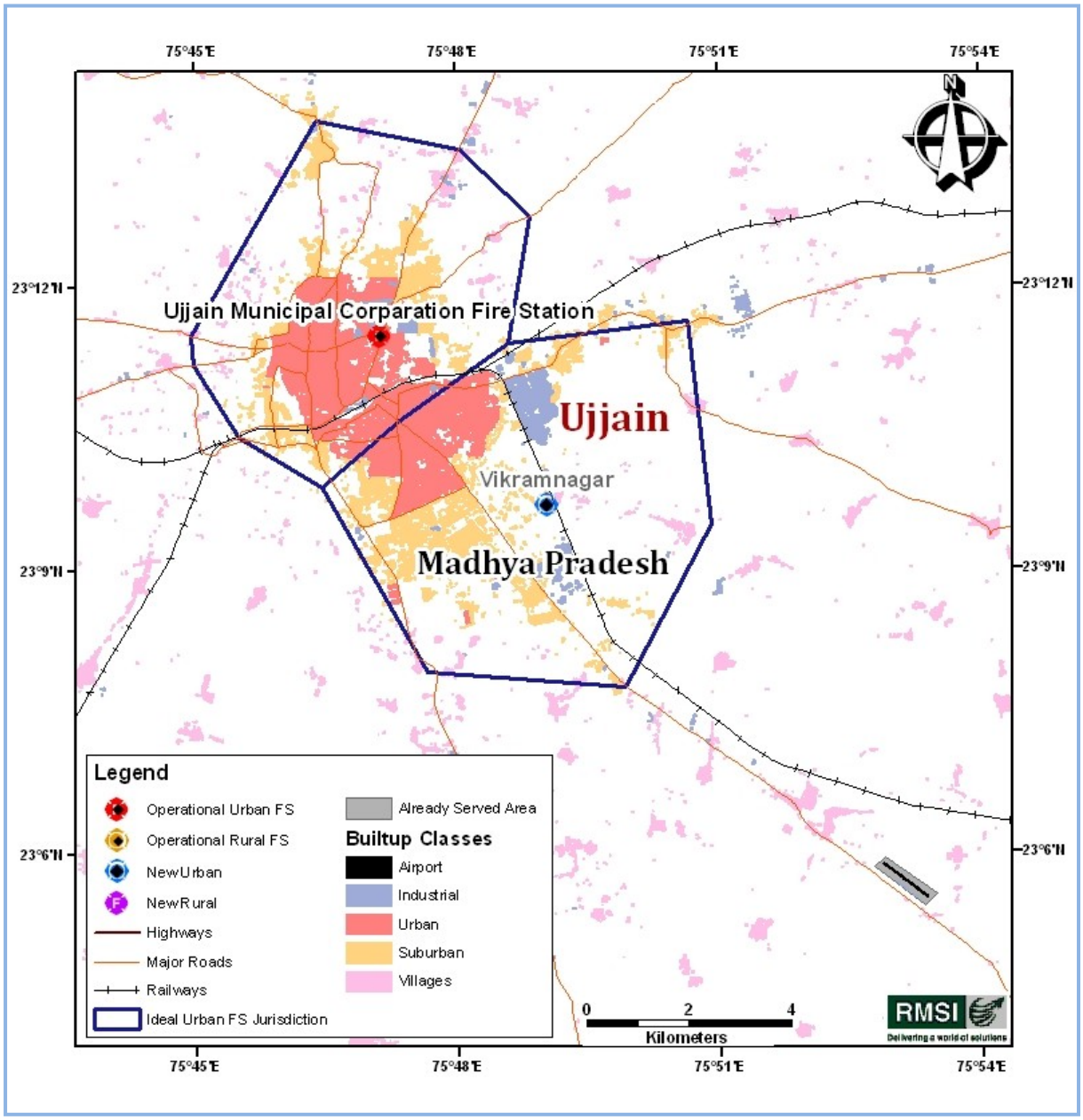

Figure 24-14: Fire stations gap analysis for Ujjain urban areas

24.3.2 FIRE FIGHTING AND RESCUE VEHICLES AND EQUIPMENT GAP

For firefighting and rescue vehicles and specialized equipment gap analysis at the operational Fire Stations and the additional Fire Stations in urban and rural areas, the following criteria have been followed, which have been basically taken from SFAC norms and minor changes have been made with expert opinion, for optimization of resources.

1. **Pumping Unit:** For counting of existing pumping units at various Fire Stations, equipment such as Fire Tender, Water Bowser, Water Mist Mini Fire Tender, Foam Tender, Crash Fire Tender, Fire Engine, Jumbo Tanker, and Multi-purpose Tender have been counted as one pumping unit. The SFAC criteria with some modifications have been proposed for estimating the requirement of pumping units. Accordingly, one pumping unit per 50,000 populations (subject to minimum one) up to 3 lakhs population has been considered. For population of more than 3 Lakhs, one additional pumping unit per Lakhs of population has been considered. For example, if the population is 3,50,000 or more but less than 4,50,000, there should be 7 pumping units. At Fire Stations, where pumping unit requirements are coming to 2 or more units, half the units will be Water Tender and half the units will be Water Bowser, for example, for 2 pumping unit requirement, one will be Water Tender and one Water Bowser, however, for 3 pumping unit requirement, 2 will be Water Tender and 1 will be Water Bowser. *However, in hilly States, the criteria have been further relaxed.*

   Note: *we have considered pumping unit as a complete unit with water carrying capacity pumping unit, however, trailer fire pump with towing vehicle or a jeep fire engine, QRT with mist unit, or motor cycle with mist set have not been considered as a pumping unit. QRT with mist unit or motor cycle with mist set has been considered as a unit to cut response time in congested areas in urban areas.*

2. **Foam Tender:** For those Fire Stations, in whose jurisdiction small industrial area also lie, one Water Tender should be replaced with Foam Tender.

3. **DCP Tender:** Minimum one per district or one for 8-10 Fire Stations. Fire stations, having a large industrial plot area (in their ideal jurisdiction) of above 1.0 - 3.0 sq km, should have additionally one DCP tender. For industrial areas more than 3.0 - 6.0 sq km, there should be 2 DCP Tenders and so on.

4. **Advanced Rescue Tender:** One per district (minimum) up to 10 Lakhs population, and one additional unit for every 10 Lakhs urban population.

5. **Hydraulic Platform/ALP/TTL:** One per district depending upon the presence of high-rise buildings (height more than 15 m). Additional unit is to be provided for districts having a large number of such building blocks, i.e., Central Business Districts.

   It may be noted that Hydraulic Platform/ALP/TTL is not a replacement for in-built systems in high-rise buildings. Moreover, equipment is heavy and maneuvering on roads becomes difficult, where there are overhead electrical lines.

6. **HAZMAT Van:** Hazmat van is used rarely and is a very costly equipment requiring highly trained manpower. Hence, to optimize on resources and manpower, HAZMAT van is not recommended for future procurement in the State. However, for that purpose, an Advanced Rescue Responder is proposed (at Sr. No 4), which will have equipment to handle hazardous material release.

7. **Crash Fire Tender:** Crash Fire Tender is not recommended for the State Fire and Emergency Service. Instead, for Fire Stations in the funnel area on either side of the airport, one WT should be replaced with Foam Tender depending upon the State policy.

8. **BA Van, Light Van and Control Van:** One each per district. However, to optimize on resources and manpower, we are proposing a BA Van- cum-Light Van – cum-Control Van.
9. **Hose Tender:** One per district (minimum) or one for 8-10 Fire Stations.
10. **Trailer Pump:** Though Trailer Pumps are prescribed in SFAC norms, it is not recommended for future use, as this needs an additional towing vehicle. In place of this, procurement of Portable Pumps are recommended, which will be part of a Fire Tender **(Specialized Equipment at Sl. No. 12).**
11. **QRT:** One each at Fire Stations serving a population density (total population in the FS jurisdiction/area of jurisdiction, in sq km) above 30,000 persons/sq km in metro and big cities, above 15,000 persons/sq km in other cities, or in congested areas based on field-survey.

    Note: The criteria of population density has been relaxed for hilly State from 15,000 person/sq km (in plains) to 5,000 person/sq km in the Fire Station jurisdiction Fire Station
12. **Motorcycle with 2-water mist sets:** One each at Fire Stations serving population density above 10,000 persons/sq km with QRT.
13. **Fire Boat:** One each at selected Fire Stations, in whose jurisdiction some inhabitated areas exist near water bodies, such as lake, major river, sea, where fire fighting can be better performed, through watercourse.
14. **Ambulance:** It is seen that Ambulance services are also with some of the State fire services and in few other States this is looked after by the Ministry of Health department of the States e.g., Rajasthan State has a modern fleet of Ambulances (108), well equipped with GPS, medical equipment and staff under National Rural Health Mission (Rajasthan), CATS (Centralized Accident Trauma Service, Ministry of Health) in case of Delhi State.

    It is observed during visit to the Fire Stations by the RMSI team that wherever the Ambulance are available with fire services, they neither have the Paramedic staff, nor adequate life support/normal equipment, and cannot be considered as an efficient system. It is therefore felt that either ambulance service should be run by Health Department through various hospitals / health centers or provide fully trained staff to fire services with properly equipped Ambulances. Accordingly, cost of the ambulance is not included in the gap analysis of the present study. However, the ambulance cost may be added, in case, it is decided in a particular State that Ambulance service should be part of fire services.
15. **Educational Van**: One per district and one additional unit for every 30 Lakhs district population.

At rural Fire Station/ Fire Post, if the estimated pumping unit is two, then one water tender with a QRT on pickup truck having 500 - 600 liters of water mist capacity along with a motor cycle with two water mist backpacks will be provided. This will help in quick response, as majority of rural villages inside roads are small in width and congested. This will also help in optimization of resources. For rural Fire Stations/ Fire Posts where less than 10,000 persons are residing within its jurisdiction, QRT and motor cycle with two water mist backpacks has only been recommended.

It may be noted that if a fire is responded to immediately, it may not flare-up into large fire; hence, QRT and Motorcycle are being considered as a quick responder and not as full-fledged fire units. In case of large fires, nearby Fire Station(s) will provide support with Water Tenders and Water Bowsers.

For reserve requirement, RMSI estimated reserve requirement of 20% at district level, and these will be distributed to individual Fire Stations by the concerned fire officials. This will help in optimizing the additional requirements of minimum one reserve at each Fire Station.

Specialized Equipment:

Specialized equipment for Fire Stations in urban areas shall be provided as per the following criteria:

1. **Hydraulic Rescue Tool:** One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction including Hydraulic Cutter, Hydraulic Spreader, Hydraulic Pump, Power Wedge, and Hydraulic Rescue Ram depending upon the seismic Zone IV and V or minimum one per district.
2. **Combi-Tool:** One Combi-Tool set shall be provided with each fire-fighting vehicle.
3. **B.A. Set with BA Compressor:** Four B. A. Sets per fire fighting vehicle with minimum one compressor per Fire Station
4. **First Aid Box:** One for each fire fighting vehicle (minimum two at each Fire Station) with regular replacement of expired medicines
5. **Thermal Imaging Camera:** One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction or minimum one per district
6. **Personal Protection Equipment (PPE):** One Set for each pumping unit or a minimum of two for each Fire Station
7. **Hydraulic Chain Saw/Cutter for Wood:** One for each Fire Station
8. **Electric/Petrol Chain Saw/Cutter for Wood:** One for each Fire Station
9. **Electric/Petrol Chain Saw/Cutter for Concrete:** One for each Fire Station
10. **Hand Held Gas Detector:** One piece per Vehicle
11. **Victim Location Device (Acoustic**): One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction or minimum one per district
12. **Portable Pump:** One for each fire fighting unit
13. **Floating Pump**: One for each Fire Boat
14. **Smoke Exhauster/PPV:** One per Fire Stations located in urban areas (minimum one per district)
15. **Pneumatic Lifting Bags:** One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction or minimum one per district
16. **Inflatable Lighting Tower:** One per Fire Station
17. **High Capacity LED Torch Light:** One piece per vehicle

Note: *Other smaller equipment such as ropes, Fireman Axe, Small Hammer, different Branches/Nozzles, Foam Compound has not been mentioned separately, as these are standard items for any Fire Station/post.*

For rural Fire Station/Fire Post, following specialized equipment has been recommended:

1. **B.A. Set with BA Compressor:** Two B. A. set per fire fighting vehicle with one compressor per Fire Station/post
2. **Personal Protection Equipment (PPE):** One set per fire fighting vehicle
3. **Electric/Petrol Chain Saw/Cutter for Wood:** One per Fire Station/post
4. **Hydraulic Chain Saw/Cutter for Wood:** One per Fire Station/post
5. **Portable Pump:** One for each fire fighting unit
6. **Inflatable Lighting Tower:** One per Fire Station
7. **High Capacity LED Torch Light:** One piece per fire fighting vehicle
8. **First Aid Box:** One per fire fighting vehicle

For reserve requirement, RMSI estimated reserve requirement of 20% at district level, and these will be distributed to individual Fire Stations by the concerned fire officials. . *The replacement of condemned / major repair (off road) vehicles as well as instruments from operating Fire Stations can be accounted as reserve and these will be distributed to individual Fire Stations by the concerned fire officials.* This will help in optimizing the additional requirements of minimum one reserve at each Fire Station.

Communication Equipment:

For better coordination between Fire Station and fire fighting staff, communication plays an important role. Hence, there is a need that each fire vehicle and Fire Station is equipped with a communication device. Accordingly, following communication equipment for urban Fire Station are recommended:

1. **Static Wireless Set (VHF):** One set at each Fire Station
2. **Mobile Wireless Set (VHF):** One per vehicle
3. **Walky-Talky:** Fire StationOne per Vehicle
4. **Megaphone:** One set per Fire Station/post

Additionally, at each rural Fire Post, each QRT should be equipped with 1 mobile wireless set and 1 walky-talky.

Detailed district level list of currently operational fire fighting vehicles available with Madhya Pradesh Fire Services (As on Aug, 2012), vehicle gap in operational Fire Stations for ideal jurisdiction area, additional vehicle required for new urban and rural Fire Stations and total vehicle gap for existing and new urban Fire Stations are shown in Table 24-4 to 24-7. Similarly, gap analysis for specialized fire equipment is shown in Tables 24-8 to 24-15.

Table 24-4: List of operational firefighting vehicles available with Madhya Pradesh Fire Services (As on Aug, 2012)

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Alirajpur	3	137,525	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Anuppur	4	247,877	2	2	0	0	0	0	0	0	0	0	0	0	0	0	4
Ashoknagar	2	105,634	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Balaghat	5	785,911	8	0	1	0	0	0	0	0	0	0	0	0	0	0	9
Barwani	7	630,494	10	0	0	0	0	0	0	0	0	0	0	0	1	0	11
Betul	8	1,042,224	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Bhind	8	829,618	13	0	1	0	0	2	0	0	0	0	0	0	1	0	17
Bhopal	7	1,062,309	23	3	4	1	1	0	0	0	0	0	0	0	10	0	42
Burhanpur	3	478,948	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Chhatarpur	12	1,248,664	13	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Chhindwara	12	1,761,014	15	0	0	3	0	0	0	0	0	0	0	0	0	0	18
Damoh	5	531,967	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Datia	4	425,396	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Dewas	7	1,373,471	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Dhar	9	618,473	12	1	1	3	1	1	1	0	0	0	0	0	1	0	21
Dindori	1	87,495	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
East Nimar	4	856,144	7	1	0	0	0	0	0	0	0	0	0	0	0	0	8
Guna	3	267,904	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Gwalior	5	1,183,336	13	0	1	0	0	0	0	0	0	0	0	0	0	0	14
Harda	3	430,000	4	0	0	0	0	0	0	0	0	0	0	0	1	0	5
Hoshangabad	6	621,084	10	1	0	0	0	0	0	0	0	0	0	0	0	0	11
Indore	8	973,964	29	1	5	1	1	2	0	0	0	0	0	0	2	0	41
Jabalpur	6	1,021,160	13	0	1	1	0	0	0	0	0	0	0	0	0	0	15
Jhabua	4	458,549	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Katni	4	534,746	6	0	0	0	0	0	0	0	0	0	0	0	1	0	7
Mandla	5	750,554	6	0	1	0	0	0	0	0	0	0	0	0	0	0	7

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Mandsaur	7	778,473	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Morena	8	831,485	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Narsimhapur	5	446,899	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Neemuch	5	484,218	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Panna	6	805,049	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Raisen	10	1,349,717	12	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Rajgarh	10	867,521	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Ratlam	6	824,742	7	1	0	0	0	0	0	0	0	0	0	0	1	0	9
Rewa	10	1,851,934	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Sagar	8	738,978	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Satna	8	932,778	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Sehore	7	816,265	10	1	0	0	0	0	0	0	0	0	0	0	0	0	11
Seoni	3	605,396	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Shahdol	5	509,204	6	0	0	0	0	0	0	0	0	0	0	0	1	0	7
Shajapur	8	578,777	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Sheopur	3	382,177	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Shivpuri	5	696,142	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Sidhi	3	626,412	4	0	0	0	0	0	0	0	0	0	0	0	1	0	5
Singrauli	2	80,822	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Tikamgarh	6	494,992	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Ujjain	7	531,973	12	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Umaria	3	279,450	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Vidisha	5	790,213	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7
West Nimar	7	920,626	10	1	0	0	0	0	0	0	0	0	0	0	0	0	11
Total	**292**	**35,688,704**	**415**	**12**	**15**	**9**	**3**	**5**	**1**	**0**	**0**	**0**	**0**	**0**	**20**	**0**	**480**

Table 24-5: Vehicle gap in operational Fire Stations for their ideal jurisdiction area

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Alirajpur	3	137,525	-1	0	0	1	0	1	1	1	0	2	2	0	0	1	8
Anuppur	4	247,877	0	1	1	1	0	1	1	1	0	2	2	0	0	1	11
Ashoknagar	2	105,634	0	0	0	1	0	1	1	1	0	1	1	0	0	1	7
Balaghat	5	785,911	3	2	3	1	0	1	1	1	0	3	3	0	0	1	19
Barwani	7	630,494	1	0	2	1	0	1	1	1	0	3	3	0	0	1	14
Betul	8	1,042,224	2	3	4	1	0	1	1	1	0	5	5	0	0	1	24
Bhind	8	829,618	0	2	3	1	0	0	2	1	0	4	4	0	0	1	18
Bhopal	7	1,062,309	-7	1	2	1	1	2	2	1	0	1	1	0	0	1	6
Burhanpur	3	478,948	3	2	2	1	0	1	1	1	0	2	2	0	0	1	16
Chhatarpur	12	1,248,664	1	4	5	1	0	1	2	1	0	9	9	0	0	1	34
Chhindwara	12	1,761,014	8	7	5	-2	0	1	2	1	0	9	9	0	0	1	41
Damoh	5	531,967	3	2	2	1	0	1	1	1	0	2	2	0	0	1	16
Datia	4	425,396	2	1	0	1	0	1	1	1	0	3	3	0	0	1	14
Dewas	7	1,373,471	9	10	2	1	1	1	1	1	0	5	5	0	0	1	37
Dhar	9	618,473	-3	0	3	-2	-1	3	1	1	0	2	2	0	0	1	7
Dindori	1	87,495	0	0	1	1	0	1	1	1	0	1	1	0	0	1	8
East Nimar	4	856,144	4	4	2	1	0	1	1	1	0	3	3	0	0	1	21
Guna	3	267,904	0	1	1	1	0	1	1	1	0	1	1	0	0	1	9
Gwalior	5	1,183,336	4	6	3	1	2	1	2	1	0	3	3	0	0	1	27
Harda	3	430,000	3	3	0	1	0	1	1	1	0	2	2	0	0	1	15
Hoshangabad	6	621,084	1	2	1	1	0	1	1	1	0	2	2	0	0	1	13
Indore	8	973,964	-11	-1	0	1	1	0	2	1	0	4	4	0	0	1	2
Jabalpur	6	1,021,160	2	3	2	0	1	1	2	1	0	3	3	0	0	1	19
Jhabua	4	458,549	0	3	2	1	0	1	1	1	0	2	2	0	0	1	14
Katni	4	534,746	2	1	1	1	0	1	1	1	0	3	3	0	0	1	15
Mandla	5	750,554	5	3	1	1	0	2	1	1	0	4	4	0	0	1	23
Mandsaur	7	778,473	3	4	3	1	0	1	1	1	0	3	3	0	0	1	21

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Morena	8	831,485	2	4	3	1	0	1	2	1	0	2	2	0	0	1	19
Narsimhapur	5	446,899	0	2	3	1	0	1	1	1	0	2	2	0	0	1	14
Neemuch	5	484,218	2	1	2	1	0	1	1	1	0	2	2	0	0	1	14
Panna	6	805,049	2	3	5	1	0	1	1	1	0	5	5	0	0	1	25
Raisen	10	1,349,717	7	7	2	1	0	1	1	1	0	6	6	0	0	1	33
Rajgarh	10	867,521	4	3	2	1	0	1	2	1	0	4	4	0	0	1	23
Ratlam	6	824,742	5	3	2	1	1	1	1	1	0	3	3	0	0	1	22
Rewa	10	1,851,934	13	9	3	1	1	1	1	1	0	10	10	0	0	1	51
Sagar	8	738,978	1	4	2	1	1	1	1	1	0	2	2	0	0	1	17
Satna	8	932,778	4	3	4	1	1	1	1	1	0	3	3	0	0	1	23
Sehore	7	816,265	1	3	3	1	0	1	1	1	0	4	4	0	0	1	20
Seoni	3	605,396	5	3	1	1	0	1	1	1	0	3	3	0	0	1	20
Shahdol	5	509,204	0	3	3	1	0	1	1	1	0	2	2	0	0	1	15
Shajapur	8	578,777	1	2	0	1	0	1	1	1	0	3	3	0	0	1	14
Sheopur	3	382,177	2	1	1	1	0	1	1	1	0	3	3	0	0	1	15
Shivpuri	5	696,142	3	3	2	1	0	1	2	1	0	4	4	0	0	1	22
Sidhi	3	626,412	2	4	3	1	0	1	1	1	0	3	3	0	0	1	20
Singrauli	2	80,822	-1	0	0	1	0	1	1	1	0	1	1	0	0	1	6
Tikamgarh	6	494,992	0	2	2	1	0	1	2	1	0	4	4	0	0	1	18
Ujjain	7	531,973	0	1	2	1	1	1	1	1	0	1	1	0	0	1	11
Umaria	3	279,450	-1	1	1	1	0	1	1	1	0	2	2	0	0	1	10
Vidisha	5	790,213	4	4	3	1	0	1	1	1	0	3	3	0	0	1	22
West Nimar	7	920,626	2	3	3	1	0	1	2	1	0	3	3	0	0	1	20
Total	**292**	**35,688,704**	**92**	**133**	**103**	**43**	**10**	**52**	**62**	**50**	**0**	**159**	**159**	**0**	**0**	**50**	**913**

Table 24-6: Total gap in operational and new urban Fire Stations under their ideal jurisdiction areas

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Alirajpur	3	137,525	-1	0	0	1	0	1	1	1	0	2	2	0	0	1	8
Anuppur	6	405,825	2	2	2	1	0	2	1	1	0	2	2	0	0	1	16
Ashoknagar	5	159,298	3	0	0	1	0	1	1	1	0	1	1	0	0	1	10
Balaghat	5	785,911	3	2	3	1	0	1	1	1	0	3	3	0	0	1	19
Barwani	7	630,494	1	0	2	1	0	1	1	1	0	3	3	0	0	1	14
Betul	8	1,042,224	2	3	4	1	0	1	1	1	0	5	5	0	0	1	24
Bhind	9	848,133	1	2	3	1	0	0	2	1	0	4	4	0	0	1	19
Bhopal	12	1,772,105	0	6	7	1	1	3	2	1	0	1	1	0	0	1	24
Burhanpur	3	478,948	3	2	2	1	0	1	1	1	0	2	2	0	0	1	16
Chhatarpur	12	1,248,664	1	4	5	1	0	1	2	1	0	9	9	0	0	1	34
Chhindwara	12	1,761,014	8	7	5	-2	0	1	2	1	0	9	9	0	0	1	41
Damoh	6	542,862	4	2	2	1	0	1	1	1	0	2	2	0	0	1	17
Datia	4	425,396	2	1	0	1	0	1	1	1	0	3	3	0	0	1	14
Dewas	8	1,432,447	10	10	2	1	1	2	1	1	0	5	5	0	0	1	39
Dhar	10	747,735	-2	1	4	-2	-1	4	1	1	0	2	2	0	0	1	11
Dindori	1	87,495	0	0	1	1	0	1	1	1	0	1	1	0	0	1	8
East Nimar	4	856,144	4	4	2	1	0	1	1	1	0	3	3	0	0	1	21
Guna	8	403,071	5	1	1	1	0	2	1	1	0	1	1	0	0	1	15
Gwalior	9	1,486,226	9	7	4	1	2	1	2	1	0	3	3	0	0	1	34
Harda	3	430,000	3	3	0	1	0	1	1	1	0	2	2	0	0	1	15
Hoshangabad	7	689,351	2	2	2	1	0	1	1	1	0	2	2	0	0	1	15
Indore	16	2,182,732	4	6	6	1	1	3	3	1	0	4	4	0	0	2	35
Jabalpur	12	1,763,235	10	8	7	0	1	3	2	1	0	3	3	0	0	1	39
Jhabua	5	561,203	1	4	3	1	0	1	1	1	0	2	2	0	0	1	17
Katni	6	619,356	4	1	2	1	0	1	1	1	0	3	3	0	0	1	18
Mandla	5	750,554	5	3	1	1	0	2	1	1	0	4	4	0	0	1	23
Mandsaur	7	778,473	3	4	3	1	0	1	1	1	0	3	3	0	0	1	21

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Morena	8	831,485	2	4	3	1	0	1	2	1	0	2	2	0	0	1	19
Narsimhapur	5	446,899	0	2	3	1	0	1	1	1	0	2	2	0	0	1	14
Neemuch	7	511,113	4	1	2	1	0	1	1	1	0	2	2	0	0	1	16
Panna	6	805,049	2	3	5	1	0	1	1	1	0	5	5	0	0	1	25
Raisen	10	1,349,717	7	7	2	1	0	1	1	1	0	6	6	0	0	1	33
Rajgarh	10	867,521	4	3	2	1	0	1	2	1	0	4	4	0	0	1	23
Ratlam	7	913,842	6	3	3	1	1	1	1	1	0	3	3	0	0	1	24
Rewa	11	1,941,278	14	9	4	1	1	1	1	1	0	10	10	0	0	1	53
Sagar	10	878,451	3	4	3	1	1	1	1	1	0	2	2	0	0	1	20
Satna	10	1,095,984	6	4	5	1	1	2	2	1	0	3	3	0	0	1	29
Sehore	7	816,265	1	3	3	1	0	1	1	1	0	4	4	0	0	1	20
Seoni	3	605,396	5	3	1	1	0	1	1	1	0	3	3	0	0	1	20
Shahdol	5	509,204	0	3	3	1	0	1	1	1	0	2	2	0	0	1	15
Shajapur	8	578,777	1	2	0	1	0	1	1	1	0	3	3	0	0	1	14
Sheopur	3	382,177	2	1	1	1	0	1	1	1	0	3	3	0	0	1	15
Shivpuri	10	814,163	8	3	2	1	0	1	2	1	0	4	4	0	0	1	27
Sidhi	3	626,412	2	4	3	1	0	1	1	1	0	3	3	0	0	1	20
Singrauli	4	265,189	1	1	1	1	0	1	1	1	0	1	1	0	0	1	10
Tikamgarh	7	520,996	1	2	2	1	0	1	2	1	0	4	4	0	0	1	19
Ujjain	8	740,578	2	3	3	1	1	2	2	1	0	1	1	0	0	1	18
Umaria	3	279,450	-1	1	1	1	0	1	1	1	0	2	2	0	0	1	10
Vidisha	5	790,213	4	4	3	1	0	1	1	1	0	3	3	0	0	1	22
West Nimar	7	920,626	2	3	3	1	0	1	2	1	0	3	3	0	0	1	20
Total	**350**	**40,517,206**	**163**	**158**	**131**	**43**	**10**	**64**	**65**	**50**	**0**	**159**	**159**	**0**	**0**	**51**	**1053**

Table 24-7: Additional vehicle required for new rural Fire Stations under their ideal jurisdiction areas

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Alirajpur	3	697,028	6	4	3	0	0	0	0	0	0	3	3	0	0	0	19
Anuppur	4	406,681	4	1	1	0	0	0	0	0	0	4	4	0	0	0	14
Ashoknagar	3	631,371	5	4	3	0	0	0	0	0	0	3	3	0	0	0	18
Balaghat	5	821,415	8	6	2	0	0	0	0	0	0	5	5	0	0	0	26
Barwani	2	429,164	5	3	1	0	0	0	0	0	0	2	2	0	0	0	13
Betul	3	591,168	5	3	2	0	0	0	0	0	0	3	3	0	0	0	16
Bhind	7	951,333	9	6	2	0	0	0	0	0	0	7	7	0	0	0	31
Bhopal	3	613,405	5	4	2	0	0	0	0	0	0	3	3	0	0	0	17
Burhanpur	1	297,817	4	3	0	0	0	0	0	0	0	1	1	0	0	0	9
Chhatarpur	2	285,553	2	1	1	0	0	0	0	0	0	2	2	0	0	0	8
Chhindwara	3	388,632	4	2	1	0	0	0	0	0	0	3	3	0	0	0	13
Damoh	3	688,173	6	5	3	0	0	0	0	0	0	3	3	0	0	0	20
Datia	1	342,536	3	2	1	0	0	0	0	0	0	1	1	0	0	0	8
Dewas	1	262,137	3	3	0	0	0	0	0	0	0	1	1	0	0	0	8
Dhar	7	2,031,201	21	15	5	0	0	0	0	0	0	7	7	0	0	0	55
Dindori	3	583,957	6	5	1	0	0	0	0	0	0	3	3	0	0	0	18
East Nimar	2	466,287	4	4	1	0	0	0	0	0	0	2	2	0	0	0	13
Guna	4	701,432	6	4	3	0	0	0	0	0	0	4	4	0	0	0	21
Gwalior	5	702,391	7	3	3	0	0	1	0	0	0	5	5	0	0	0	24
Harda	1	347,900	4	3	0	0	0	0	0	0	0	1	1	0	0	0	9
Hoshangabad	2	360,074	4	2	1	0	0	0	0	0	0	2	2	0	0	0	11
Indore	4	1,278,164	13	9	4	0	0	1	0	0	0	4	4	0	0	0	35
Jabalpur	3	658,704	5	4	3	0	0	1	0	0	0	3	3	0	0	0	19
Jhabua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Katni	4	723,529	6	3	4	0	0	0	0	0	0	4	4	0	0	0	21
Mandla	1	221,131	2	1	1	0	0	0	0	0	0	1	1	0	0	0	6
Mandsaur	4	655,983	5	2	4	0	0	0	0	0	0	4	4	0	0	0	19

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Morena	6	1,028,801	9	7	3	0	0	0	0	0	0	6	6	0	0	0	31
Narsimhapur	2	516,650	5	4	2	0	0	0	0	0	0	2	2	0	0	0	15
Neemuch	2	390,866	4	2	1	0	0	0	0	0	0	2	2	0	0	0	11
Panna	2	320,156	2	1	2	0	0	0	0	0	0	2	2	0	0	0	9
Raisen	1	156,585	1	1	1	0	0	0	0	0	0	1	1	0	0	0	5
Rajgarh	3	733,532	7	7	1	0	0	0	0	0	0	3	3	0	0	0	21
Ratlam	2	349,165	2	2	2	0	0	0	0	0	0	2	2	0	0	0	10
Rewa	1	118,947	1	0	1	0	0	0	0	0	0	1	1	0	0	0	4
Sagar	8	1,730,755	16	12	6	0	0	0	0	0	0	8	8	0	0	0	50
Satna	5	1,178,027	12	7	5	0	0	0	0	0	0	5	5	0	0	0	34
Sehore	2	354,001	3	2	1	0	0	0	0	0	0	2	2	0	0	0	10
Seoni	4	829,058	9	7	2	0	0	0	0	0	0	4	4	0	0	0	26
Shahdol	4	673,557	6	5	2	0	0	0	0	0	0	4	4	0	0	0	21
Shajapur	4	825,584	7	6	2	0	0	0	0	0	0	4	4	0	0	0	23
Sheopur	3	369,415	4	1	1	0	0	0	0	0	0	3	3	0	0	0	12
Shivpuri	5	844,670	7	5	3	0	0	0	0	0	0	5	5	0	0	0	25
Sidhi	2	454,058	5	3	1	0	0	0	0	0	0	2	2	0	0	0	13
Singrauli	5	1,060,492	11	8	2	0	0	0	0	0	0	5	5	0	0	0	31
Tikamgarh	5	931,039	11	9	1	0	0	0	0	0	0	5	5	0	0	0	31
Ujjain	5	1,163,544	10	8	4	0	0	0	0	0	0	5	5	0	0	0	32
Umaria	2	248,658	3	1	0	0	0	0	0	0	0	2	2	0	0	0	8
Vidisha	4	684,952	6	3	3	0	0	0	0	0	0	4	4	0	0	0	20
West Nimar	5	981,086	9	6	3	0	0	0	0	0	0	5	5	0	0	0	28
Total	**163**	**32,080,764**	**302**	**209**	**101**	**0**	**0**	**3**	**0**	**0**	**0**	**163**	**163**	**0**	**0**	**0**	**941**

Table 24-8: List of specialized equipment available with Madhya Pradesh Fire Services department (As on Aug, 2012)

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Alirajpur	3	137,525	0	0	0	0	2	0	2	0	0	0	0	0	0	0
Anuppur	4	247,877	0	0	0	0	2	0	0	0	0	0	0	0	4	1
Ashoknagar	2	105,634	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Balaghat	5	785,911	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Barwani	7	630,494	0	0	0	0	6	0	5	0	0	0	0	0	0	0
Betul	8	1,042,224	0	0	4	0	8	0	2	0	0	0	0	0	2	0
Bhind	8	829,618	0	1	0	0	15	0	12	5	0	0	2	0	3	0
Bhopal	7	1,062,309	0	0	13	0	2	0	3	14	0	14	0	0	4	0
Burhanpur	3	478,948	0	2	0	0	0	0	3	0	0	0	0	0	0	0
Chhatarpur	12	1,248,664	0	0	0	0	9	0	0	0	0	0	0	0	9	0
Chhindwara	12	1,761,014	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Damoh	5	531,967	0	0	4	0	3	0	2	0	0	0	0	0	2	0
Datia	4	425,396	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Dewas	7	1,373,471	0	0	0	0	7	0	0	0	0	0	0	0	1	0
Dhar	9	618,473	0	0	2	0	7	0	13	0	0	2	0	0	0	0
Dindori	1	87,495	0	0	0	0	0	0	0	0	0	0	0	0	1	0
East Nimar	4	856,144	0	2	0	0	1	0	1	0	0	0	0	0	0	0
Guna	3	267,904	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gwalior	5	1,183,336	0	0	10	0	15	0	0	0	0	4	0	0	4	0
Harda	3	430,000	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Hoshangabad	6	621,084	0	0	6	1	6	0	2	0	0	0	0	0	1	0
Indore	8	973,964	6	0	8	1	37	0	48	17	0	5	7	0	9	0
Jabalpur	6	1,021,160	0	0	2	0	4	0	1	1	0	0	0	0	2	0
Jhabua	4	458,549	0	0	0	0	2	0	5	0	0	0	4	0	0	0
Katni	4	534,746	0	0	0	0	2	0	2	0	0	0	0	0	6	0

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Mandla	5	750,554	0	0	2	0	1	0	0	0	0	0	0	0	3	0
Mandsaur	7	778,473	0	0	6	0	6	0	11	0	0	0	0	0	1	0
Morena	8	831,485	0	0	2	0	8	0	0	0	0	0	0	0	0	0
Narsimhapur	5	446,899	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Neemuch	5	484,218	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Panna	6	805,049	0	0	1	0	4	0	0	0	0	0	0	0	1	0
Raisen	10	1,349,717	0	2	16	1	8	0	3	0	0	0	1	0	6	0
Rajgarh	10	867,521	0	0	0	0	3	0	0	0	0	1	0	0	1	0
Ratlam	6	824,742	0	0	1	1	6	0	4	0	0	1	0	0	0	0
Rewa	10	1,851,934	1	0	0	0	0	0	2	0	0	0	0	0	5	0
Sagar	8	738,978	0	1	3	0	10	0	0	0	0	1	0	0	3	0
Satna	8	932,778	0	0	1	0	3	0	0	0	0	0	0	0	2	0
Sehore	7	816,265	0	1	0	0	2	0	3	0	0	0	0	0	0	0
Seoni	3	605,396	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Shahdol	5	509,204	0	0	0	0	4	0	10	0	0	0	0	0	5	0
Shajapur	8	578,777	0	0	0	0	5	0	0	0	0	1	0	0	0	0
Sheopur	3	382,177	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Shivpuri	5	696,142	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Sidhi	3	626,412	0	0	0	0	2	0	0	0	0	0	0	0	3	0
Singrauli	2	80,822	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Tikamgarh	6	494,992	0	0	0	0	5	0	0	1	0	0	0	0	2	0
Ujjain	7	531,973	0	0	3	0	4	0	0	0	0	4	0	0	1	0
Umaria	3	279,450	0	0	0	0	4	0	1	0	0	0	0	0	4	0
Vidisha	5	790,213	0	1	0	0	4	0	0	0	0	0	0	0	5	0
West Nimar	7	920,626	0	8	0	0	4	0	19	0	0	0	0	0	0	0
Total	**292**	**35,688,704**	**7**	**19**	**84**	**4**	**219**	**0**	**155**	**38**	**0**	**33**	**14**	**0**	**98**	**1**

Table 24-9: List of specialized equipment available with Madhya Pradesh Fire Services department (As on Aug, 2012) (continued..)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Alirajpur	3	137,525	0	0	0	0	0	0	0	0	0	0	0	4
Anuppur	4	247,877	0	0	0	0	0	5	0	0	0	0	0	12
Ashoknagar	2	105,634	0	0	0	0	0	0	0	0	0	0	0	1
Balaghat	5	785,911	0	0	0	0	0	2	0	0	0	0	0	4
Barwani	7	630,494	0	0	0	0	0	6	0	0	0	0	0	17
Betul	8	1,042,224	0	0	0	0	0	7	0	0	0	0	0	23
Bhind	8	829,618	0	0	0	0	0	5	0	0	0	0	0	43
Bhopal	7	1,062,309	2	4	0	0	0	4	0	9	13	4	0	86
Burhanpur	3	478,948	0	0	0	0	0	3	0	0	0	0	0	8
Chhatarpur	12	1,248,664	0	0	0	0	0	0	0	0	0	0	0	18
Chhindwara	12	1,761,014	0	0	0	0	0	9	0	0	0	0	0	11
Damoh	5	531,967	0	0	0	0	0	0	0	0	0	0	0	11
Datia	4	425,396	0	0	0	0	0	1	0	0	0	0	0	2
Dewas	7	1,373,471	0	0	0	0	0	0	0	0	0	0	0	8
Dhar	9	618,473	0	0	0	0	0	4	0	0	0	0	0	28
Dindori	1	87,495	0	0	0	0	0	0	0	0	0	0	0	1
East Nimar	4	856,144	0	0	0	0	0	3	0	0	0	0	0	7
Guna	3	267,904	0	0	0	0	0	0	0	0	0	0	0	0
Gwalior	5	1,183,336	0	0	0	0	0	7	0	0	0	0	0	40
Harda	3	430,000	0	0	0	0	0	0	0	0	0	0	0	2
Hoshangabad	6	621,084	0	0	0	0	0	6	0	0	0	0	0	22
Indore	8	973,964	0	0	0	0	0	19	0	27	27	13	0	224
Jabalpur	6	1,021,160	0	0	0	0	0	12	0	2	2	2	0	28
Jhabua	4	458,549	0	0	0	0	0	5	0	0	0	0	0	16
Katni	4	534,746	0	0	0	0	0	5	0	0	0	0	0	15
Mandla	5	750,554	0	0	0	0	0	1	0	0	0	0	0	7
Mandsaur	7	778,473	0	0	0	0	0	7	0	0	0	0	0	31
Morena	8	831,485	0	0	0	0	0	0	0	0	0	0	0	10

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Narsimhapur	5	446,899	0	0	0	0	0	1	0	0	0	0	0	3
Neemuch	5	484,218	0	0	0	0	0	2	0	0	0	0	0	2
Panna	6	805,049	0	0	0	0	0	0	0	0	0	0	0	6
Raisen	10	1,349,717	0	0	0	0	0	5	0	0	0	0	0	42
Rajgarh	10	867,521	0	0	0	0	0	0	0	0	0	0	0	5
Ratlam	6	824,742	0	0	0	0	0	4	0	0	0	0	0	17
Rewa	10	1,851,934	0	0	0	0	0	4	0	0	0	0	0	12
Sagar	8	738,978	0	0	0	0	0	0	0	1	0	2	0	21
Satna	8	932,778	0	0	0	0	0	0	0	0	0	0	0	6
Sehore	7	816,265	0	0	0	0	0	1	0	0	0	0	0	7
Seoni	3	605,396	0	0	0	0	0	2	0	0	0	0	0	4
Shahdol	5	509,204	0	0	0	0	0	12	0	0	0	0	0	31
Shajapur	8	578,777	0	0	0	0	0	1	0	0	0	0	0	7
Sheopur	3	382,177	0	0	0	0	0	0	0	0	0	0	0	1
Shivpuri	5	696,142	0	0	0	0	0	0	0	0	0	0	0	2
Sidhi	3	626,412	0	0	0	0	0	2	0	0	0	0	0	7
Singrauli	2	80,822	0	0	0	0	0	2	0	0	0	0	0	5
Tikamgarh	6	494,992	0	0	0	0	0	0	0	0	0	0	0	8
Ujjain	7	531,973	0	0	0	0	0	1	0	0	0	0	0	13
Umaria	3	279,450	0	0	0	0	0	6	0	0	0	0	0	15
Vidisha	5	790,213	0	0	0	0	0	0	0	0	0	0	0	10
West Nimar	7	920,626	0	0	0	0	0	2	0	0	0	0	0	33
Total	**292**	**35,688,704**	**2**	**4**	**0**	**0**	**0**	**156**	**0**	**39**	**42**	**21**	**0**	**936**

Table 24-10: Specialized equipment gap in operational Fire Stations for ideal jurisdiction area

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Alirajpur	3	137,525	1	4	19	4	5	1	0	4	4	6	4	1	5	0
Anuppur	4	247,877	1	7	34	5	8	1	4	5	5	10	7	1	4	0
Ashoknagar	2	105,634	1	5	17	2	5	1	2	2	2	5	5	1	4	0
Balaghat	5	785,911	1	12	89	6	22	1	4	6	6	24	12	1	20	0
Barwani	7	630,494	1	12	70	8	16	1	1	8	8	19	12	1	16	0
Betul	8	1,042,224	1	10	99	10	22	1	3	10	10	29	10	1	22	0
Bhind	8	829,618	1	12	101	10	15	1	-6	5	10	28	11	1	20	0
Bhopal	7	1,062,309	4	32	114	8	30	4	5	-6	8	18	32	4	23	0
Burhanpur	3	478,948	1	6	58	4	16	1	-1	4	4	16	8	1	13	0
Chhatarpur	12	1,248,664	1	11	132	14	31	1	5	14	14	38	11	1	23	0
Chhindwara	12	1,761,014	1	11	190	14	54	1	5	14	14	53	11	1	42	0
Damoh	5	531,967	1	10	58	6	16	1	3	6	6	17	10	1	12	0
Datia	4	425,396	1	5	46	5	13	1	2	5	5	13	5	1	11	0
Dewas	7	1,373,471	1	12	146	8	33	1	4	8	8	40	12	1	32	0
Dhar	9	618,473	1	16	70	11	15	1	-3	11	11	17	16	1	16	0
Dindori	1	87,495	1	4	12	1	4	1	1	1	1	4	4	1	2	0
East Nimar	4	856,144	1	6	94	5	25	1	1	5	5	25	8	1	21	0
Guna	3	267,904	1	8	31	4	10	1	4	4	4	8	8	1	7	0
Gwalior	5	1,183,336	4	28	127	6	21	4	5	6	6	32	28	4	26	0
Harda	3	430,000	1	3	53	4	15	1	1	4	4	14	4	1	12	0
Hoshangabad	6	621,084	1	12	71	6	16	1	4	7	7	20	12	1	16	0
Indore	8	973,964	-4	32	112	9	-3	2	-38	-7	10	27	25	2	18	0
Jabalpur	6	1,021,160	1	17	106	7	27	1	4	6	7	29	17	1	22	0
Jhabua	4	458,549	1	8	58	5	14	1	-1	5	5	16	4	1	13	0
Katni	4	534,746	1	6	55	5	14	1	0	5	5	16	6	1	7	0

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Mandla	5	750,554	1	6	84	6	24	1	2	6	6	24	6	1	17	0
Mandsaur	7	778,473	1	11	92	8	24	1	-5	8	8	26	11	1	21	0
Morena	8	831,485	1	22	94	10	19	1	8	10	10	25	22	1	21	0
Narsimhapur	5	446,899	1	10	53	6	15	1	5	6	6	14	10	1	11	0
Neemuch	5	484,218	1	8	58	6	18	1	5	6	6	16	8	1	13	0
Panna	6	805,049	1	5	88	7	22	1	2	7	7	25	5	1	20	0
Raisen	10	1,349,717	1	8	133	11	34	1	3	12	12	41	9	1	28	0
Rajgarh	10	867,521	1	12	101	12	28	1	8	12	12	27	12	1	22	0
Ratlam	6	824,742	1	11	93	6	21	1	1	7	7	24	11	1	21	0
Rewa	10	1,851,934	0	5	192	12	54	1	-1	12	12	54	5	1	40	0
Sagar	8	738,978	1	16	88	10	19	1	8	10	10	23	17	1	17	0
Satna	8	932,778	1	13	107	10	29	1	7	10	10	29	13	1	22	0
Sehore	7	816,265	1	9	96	8	26	1	2	8	8	26	10	1	22	0
Seoni	3	605,396	1	5	70	4	19	1	1	4	4	19	5	1	14	0
Shahdol	5	509,204	1	14	62	6	14	1	-5	6	6	17	14	1	9	0
Shajapur	8	578,777	1	11	70	10	18	1	7	10	10	18	11	1	16	0
Sheopur	3	382,177	1	5	46	4	12	1	1	4	4	13	5	1	11	0
Shivpuri	5	696,142	1	7	77	6	20	1	2	6	6	22	7	1	18	0
Sidhi	3	626,412	1	10	70	4	17	1	1	4	4	19	10	1	13	0
Singrauli	2	80,822	1	4	12	2	4	1	2	2	2	4	4	1	0	0
Tikamgarh	6	494,992	1	7	58	7	13	1	4	6	7	17	7	1	12	0
Ujjain	7	531,973	1	19	71	8	19	1	8	8	8	15	19	1	15	0
Umaria	3	279,450	1	5	29	4	4	1	1	4	4	8	5	1	3	0
Vidisha	5	790,213	1	10	94	6	22	1	4	6	6	25	11	1	16	0
West Nimar	7	920,626	1	4	98	8	25	1	-13	8	8	26	12	1	22	0
Total	**292**	**35,688,704**	**50**	**526**	**3998**	**348**	**964**	**57**	**67**	**314**	**352**	**1081**	**531**	**57**	**831**	**0**

Table 24-11: Specialized equipment gap in operational Fire Stations for ideal jurisdiction area (continued..)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Alirajpur	3	137,525	0	0	4	2	1	7	0	4	12	13	4	105
Anuppur	4	247,877	0	0	5	4	1	6	0	5	16	16	5	150
Ashoknagar	2	105,634	0	0	2	2	1	6	0	2	11	12	2	90
Balaghat	5	785,911	0	0	6	4	1	23	0	6	30	30	6	310
Barwani	7	630,494	0	0	8	6	1	14	0	8	25	28	8	271
Betul	8	1,042,224	0	0	10	5	1	23	0	10	35	36	10	358
Bhind	8	829,618	0	0	10	6	1	25	0	10	36	38	10	345
Bhopal	7	1,062,309	0	0	8	8	4	31	0	-1	31	40	8	405
Burhanpur	3	478,948	0	0	4	2	1	14	0	4	22	22	4	204
Chhatarpur	12	1,248,664	0	0	14	5	1	40	0	14	46	47	14	477
Chhindwara	12	1,761,014	0	0	14	5	1	45	0	14	60	62	14	626
Damoh	5	531,967	0	0	6	5	1	18	0	6	23	25	6	237
Datia	4	425,396	0	0	5	2	1	13	0	5	19	20	5	183
Dewas	7	1,373,471	0	0	8	4	1	41	0	8	47	48	8	471
Dhar	9	618,473	0	0	11	10	1	20	0	11	30	33	11	310
Dindori	1	87,495	0	0	1	1	1	5	0	1	10	10	1	67
East Nimar	4	856,144	0	0	5	2	1	23	0	5	31	32	5	302
Guna	3	267,904	0	0	4	4	1	10	0	4	14	16	4	148
Gwalior	5	1,183,336	0	0	6	5	4	30	0	6	46	46	6	446
Harda	3	430,000	0	0	4	2	1	16	0	4	20	21	4	189
Hoshangabad	6	621,084	0	0	7	6	1	16	0	7	26	28	7	272
Indore	8	973,964	0	0	10	10	2	16	0	-17	17	33	10	266
Jabalpur	6	1,021,160	0	0	7	5	1	18	0	5	35	38	7	361
Jhabua	4	458,549	0	0	5	4	1	12	0	5	22	22	5	206
Katni	4	534,746	0	0	5	2	1	12	0	5	22	22	5	196
Mandla	5	750,554	0	0	6	2	1	25	0	6	31	32	6	293
Mandsaur	7	778,473	0	0	8	6	1	21	0	8	32	36	8	327
Morena	8	831,485	0	0	10	8	1	26	0	10	32	34	10	375
Narsimhapur	5	446,899	0	0	6	5	1	15	0	6	20	22	6	220
Neemuch	5	484,218	0	0	6	5	1	15	0	6	22	24	6	232

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Panna	6	805,049	0	0	7	2	1	26	0	7	31	32	7	304
Raisen	10	1,349,717	0	0	12	6	1	37	0	12	47	48	12	469
Rajgarh	10	867,521	0	0	12	8	1	29	0	12	35	38	12	396
Ratlam	6	824,742	0	0	7	5	1	22	0	7	32	34	7	320
Rewa	10	1,851,934	0	0	12	1	1	51	0	12	61	61	12	598
Sagar	8	738,978	0	0	10	8	1	25	0	9	31	34	10	349
Satna	8	932,778	0	0	10	7	1	30	0	10	36	39	10	396
Sehore	7	816,265	0	0	8	5	1	27	0	8	32	34	8	341
Seoni	3	605,396	0	0	4	1	1	18	0	4	25	25	4	230
Shahdol	5	509,204	0	0	6	5	1	6	0	6	23	24	6	223
Shajapur	8	578,777	0	0	10	7	1	19	0	10	25	29	10	295
Sheopur	3	382,177	0	0	4	1	1	14	0	4	19	19	4	174
Shivpuri	5	696,142	0	0	6	2	1	23	0	6	29	29	6	276
Sidhi	3	626,412	0	0	4	1	1	18	0	4	25	25	4	237
Singrauli	2	80,822	0	0	2	2	1	3	0	2	10	10	2	71
Tikamgarh	6	494,992	0	0	7	4	1	18	0	7	24	26	7	235
Ujjain	7	531,973	0	0	8	8	1	19	0	8	26	30	8	301
Umaria	3	279,450	0	0	4	2	1	4	0	4	14	14	4	117
Vidisha	5	790,213	0	0	6	4	1	26	0	6	31	32	6	315
West Nimar	7	920,626	0	0	8	6	1	26	0	8	34	36	8	328
Total	**292**	**35,688,704**	**0**	**0**	**352**	**222**	**57**	**1027**	**0**	**313**	**1413**	**1505**	**352**	**14417**

Table 24-12: Total gap in specialized equipment for operational and new urban Fire Stations

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Alirajpur	3	137,525	1	4	19	4	5	1	0	4	4	6	4	1	5	0
Anuppur	6	405,825	1	12	53	7	14	1	6	7	7	15	12	1	8	0
Ashoknagar	5	159,298	1	9	31	6	11	1	6	6	6	9	9	1	7	0
Balaghat	5	785,911	1	12	89	6	22	1	4	6	6	24	12	1	20	0
Barwani	7	630,494	1	12	70	8	16	1	1	8	8	19	12	1	16	0
Betul	8	1,042,224	1	10	99	10	22	1	3	10	10	29	10	1	22	0
Bhind	9	848,133	1	13	106	11	17	1	-5	6	11	29	12	1	21	0
Bhopal	12	1,772,105	6	52	196	14	50	6	11	0	14	38	52	6	40	0
Burhanpur	3	478,948	1	6	58	4	16	1	-1	4	4	16	8	1	13	0
Chhatarpur	12	1,248,664	1	11	132	14	31	1	5	14	14	38	11	1	23	0
Chhindwara	12	1,761,014	1	11	190	14	54	1	5	14	14	53	11	1	42	0
Damoh	6	542,862	1	11	63	7	18	1	4	7	7	18	11	1	13	0
Datia	4	425,396	1	5	46	5	13	1	2	5	5	13	5	1	11	0
Dewas	8	1,432,447	1	13	151	9	35	1	5	9	9	41	13	1	33	0
Dhar	10	747,735	1	20	84	12	19	1	-2	12	12	21	20	1	19	0
Dindori	1	87,495	1	4	12	1	4	1	1	1	1	4	4	1	2	0
East Nimar	4	856,144	1	6	94	5	25	1	1	5	5	25	8	1	21	0
Guna	8	403,071	1	14	55	10	20	1	10	10	10	14	14	1	12	0
Gwalior	9	1,486,226	5	36	161	11	32	5	10	11	11	40	36	5	33	0
Harda	3	430,000	1	3	53	4	15	1	1	4	4	14	4	1	12	0
Hoshangabad	7	689,351	1	14	81	7	18	1	5	8	8	22	14	1	18	0
Indore	16	2,182,732	2	66	246	19	32	8	-28	3	20	61	59	8	46	0
Jabalpur	12	1,763,235	3	39	192	14	49	3	11	13	14	51	39	3	40	0
Jhabua	5	561,203	1	12	72	6	18	1	0	6	6	20	8	1	16	0
Katni	6	619,356	1	10	69	7	18	1	2	7	7	20	10	1	10	0

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Mandla	5	750,554	1	6	84	6	24	1	2	6	6	24	6	1	17	0
Mandsaur	7	778,473	1	11	92	8	24	1	-5	8	8	26	11	1	21	0
Morena	8	831,485	1	22	94	10	19	1	8	10	10	25	22	1	21	0
Narsimhapur	5	446,899	1	10	53	6	15	1	5	6	6	14	10	1	11	0
Neemuch	7	511,113	1	10	68	8	22	1	7	8	8	18	10	1	15	0
Panna	6	805,049	1	5	88	7	22	1	2	7	7	25	5	1	20	0
Raisen	10	1,349,717	1	8	133	11	34	1	3	12	12	41	9	1	28	0
Rajgarh	10	867,521	1	12	101	12	28	1	8	12	12	27	12	1	22	0
Ratlam	7	913,842	1	13	103	7	23	1	2	8	8	26	13	1	23	0
Rewa	11	1,941,278	0	7	202	13	56	1	0	13	13	56	7	1	42	0
Sagar	10	878,451	1	20	102	12	23	1	10	12	12	27	21	1	20	0
Satna	10	1,095,984	1	18	126	12	35	1	9	12	12	34	18	1	26	0
Sehore	7	816,265	1	9	96	8	26	1	2	8	8	26	10	1	22	0
Seoni	3	605,396	1	5	70	4	19	1	1	4	4	19	5	1	14	0
Shahdol	5	509,204	1	14	62	6	14	1	-5	6	6	17	14	1	9	0
Shajapur	8	578,777	1	11	70	10	18	1	7	10	10	18	11	1	16	0
Sheopur	3	382,177	1	5	46	4	12	1	1	4	4	13	5	1	11	0
Shivpuri	10	814,163	1	13	101	12	30	1	8	12	12	28	13	1	23	0
Sidhi	3	626,412	1	10	70	4	17	1	1	4	4	19	10	1	13	0
Singrauli	4	265,189	1	9	31	4	10	1	4	4	4	9	9	1	4	0
Tikamgarh	7	520,996	1	8	63	8	15	1	5	7	8	18	8	1	13	0
Ujjain	8	740,578	2	25	95	9	25	2	9	9	9	21	25	2	20	0
Umaria	3	279,450	1	5	29	4	4	1	1	4	4	8	5	1	3	0
Vidisha	5	790,213	1	10	94	6	22	1	4	6	6	25	11	1	16	0
West Nimar	7	920,626	1	4	98	8	25	1	-13	8	8	26	12	1	22	0
Total	**350**	**40,517,206**	**62**	**675**	**4593**	**414**	**1136**	**69**	**133**	**380**	**418**	**1230**	**680**	**69**	**955**	**0**

Table 24-13: Total gap in specialized equipment for operational and new urban Fire Stations (Continued….)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Alirajpur	3	137,525	0	0	4	2	1	7	0	4	12	13	4	593
Anuppur	6	405,825	0	0	7	6	1	12	0	7	22	23	7	189
Ashoknagar	5	159,298	0	0	6	6	1	10	0	6	15	18	6	306
Balaghat	5	785,911	0	0	6	4	1	23	0	6	30	30	6	787
Barwani	7	630,494	0	0	8	6	1	14	0	8	25	28	8	690
Betul	8	1,042,224	0	0	10	5	1	23	0	10	35	36	10	259
Bhind	9	848,133	0	0	11	7	1	26	0	11	37	40	11	257
Bhopal	12	1,772,105	0	0	14	14	6	53	0	5	53	62	14	293
Burhanpur	3	478,948	0	0	4	2	1	14	0	4	22	22	4	327
Chhatarpur	12	1,248,664	0	0	14	5	1	40	0	14	46	47	14	375
Chhindwara	12	1,761,014	0	0	14	5	1	45	0	14	60	62	14	220
Damoh	6	542,862	0	0	7	6	1	19	0	7	24	27	7	278
Datia	4	425,396	0	0	5	2	1	13	0	5	19	20	5	304
Dewas	8	1,432,447	0	0	9	5	1	43	0	9	49	50	9	469
Dhar	10	747,735	0	0	12	11	1	25	0	12	35	38	12	396
Dindori	1	87,495	0	0	1	1	1	5	0	1	10	10	1	354
East Nimar	4	856,144	0	0	5	2	1	23	0	5	31	32	5	632
Guna	8	403,071	0	0	10	10	1	17	0	10	21	26	10	410
Gwalior	9	1,486,226	0	0	11	10	5	38	0	11	54	57	11	477
Harda	3	430,000	0	0	4	2	1	16	0	4	20	21	4	341
Hoshangabad	7	689,351	0	0	8	7	1	18	0	8	28	30	8	230
Indore	16	2,182,732	0	0	20	20	8	53	0	-7	57	74	20	223
Jabalpur	12	1,763,235	0	0	14	12	3	42	0	12	59	63	14	295
Jhabua	5	561,203	0	0	6	5	1	16	0	6	26	26	6	174
Katni	6	619,356	0	0	7	4	1	16	0	7	26	26	7	403
Mandla	5	750,554	0	0	6	2	1	25	0	6	31	32	6	237
Mandsaur	7	778,473	0	0	8	6	1	21	0	8	32	36	8	147
Morena	8	831,485	0	0	10	8	1	26	0	10	32	34	10	258
Narsimhapur	5	446,899	0	0	6	5	1	15	0	6	20	22	6	389

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Neemuch	7	511,113	0	0	8	7	1	17	0	8	24	28	8	117
Panna	6	805,049	0	0	7	2	1	26	0	7	31	32	7	315
Raisen	10	1,349,717	0	0	12	6	1	37	0	12	47	48	12	328
Rajgarh	10	867,521	0	0	12	8	1	29	0	12	35	38	12	16849
Ratlam	7	913,842	0	0	8	6	1	24	0	8	34	36	8	593
Rewa	11	1,941,278	0	0	13	2	1	53	0	13	63	63	13	189
Sagar	10	878,451	0	0	12	10	1	29	0	11	35	38	12	306
Satna	10	1,095,984	0	0	12	9	1	36	0	12	43	47	12	787
Sehore	7	816,265	0	0	8	5	1	27	0	8	32	34	8	690
Seoni	3	605,396	0	0	4	1	1	18	0	4	25	25	4	259
Shahdol	5	509,204	0	0	6	5	1	6	0	6	23	24	6	257
Shajapur	8	578,777	0	0	10	7	1	19	0	10	25	29	10	293
Sheopur	3	382,177	0	0	4	1	1	14	0	4	19	19	4	327
Shivpuri	10	814,163	0	0	12	8	1	29	0	12	35	39	12	375
Sidhi	3	626,412	0	0	4	1	1	18	0	4	25	25	4	220
Singrauli	4	265,189	0	0	4	4	1	8	0	4	15	16	4	278
Tikamgarh	7	520,996	0	0	8	5	1	19	0	8	25	28	8	304
Ujjain	8	740,578	0	0	9	9	2	26	0	9	34	38	9	469
Umaria	3	279,450	0	0	4	2	1	4	0	4	14	14	4	396
Vidisha	5	790,213	0	0	6	4	1	26	0	6	31	32	6	354
West Nimar	7	920,626	0	0	8	6	1	26	0	8	34	36	8	632
Total	**350**	**40,517,206**	**0**	**0**	**418**	**288**	**69**	**1189**	**0**	**379**	**1580**	**1694**	**418**	**410**

Table 24-14: Additional specialized equipment required for new rural Fire Stations

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Alirajpur	3	697,028	0	0	70	4	19	0	0	4	4	19	0	0	16	0
Anuppur	4	406,681	0	0	38	5	12	0	0	5	5	12	0	0	10	0
Ashoknagar	3	631,371	0	0	65	4	18	0	0	4	4	18	0	0	15	0
Balaghat	5	821,415	0	0	89	6	25	0	0	6	6	25	0	0	21	0
Barwani	2	429,164	0	0	48	2	13	0	0	2	2	13	0	0	11	0
Betul	3	591,168	0	0	55	4	16	0	0	4	4	16	0	0	13	0
Bhind	7	951,333	0	0	98	8	29	0	0	8	8	29	0	0	24	0
Bhopal	3	613,405	0	0	60	4	17	0	0	4	4	17	0	0	14	0
Burhanpur	1	297,817	0	0	36	1	10	0	0	1	1	10	0	0	8	0
Chhatarpur	2	285,553	0	0	24	2	7	0	0	2	2	7	0	0	6	0
Chhindwara	3	388,632	0	0	41	4	12	0	0	4	4	12	0	0	10	0
Damoh	3	688,173	0	0	74	4	20	0	0	4	4	20	0	0	17	0
Datia	1	342,536	0	0	31	1	8	0	0	1	1	8	0	0	7	0
Dewas	1	262,137	0	0	31	1	8	0	0	1	1	8	0	0	7	0
Dhar	7	2,031,201	0	0	214	8	58	0	0	8	8	58	0	0	48	0
Dindori	3	583,957	0	0	65	4	18	0	0	4	4	18	0	0	15	0
East Nimar	2	466,287	0	0	48	2	13	0	0	2	2	13	0	0	11	0
Guna	4	701,432	0	0	72	5	20	0	0	5	5	20	0	0	17	0
Gwalior	5	702,391	0	0	74	6	22	0	0	6	6	22	0	0	18	0
Harda	1	347,900	0	0	36	1	10	0	0	1	1	10	0	0	8	0
Hoshangabad	2	360,074	0	0	38	2	11	0	0	2	2	11	0	0	9	0
Indore	4	1,278,164	0	0	134	5	36	0	0	5	5	36	0	0	30	0
Jabalpur	3	658,704	0	0	65	4	18	0	0	4	4	18	0	0	15	0
Jhabua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Katni	4	723,529	0	0	72	5	20	0	0	5	5	20	0	0	17	0

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Mandla	1	221,131	0	0	22	1	6	0	0	1	1	6	0	0	5	0
Mandsaur	4	655,983	0	0	62	5	18	0	0	5	5	18	0	0	15	0
Morena	6	1,028,801	0	0	106	7	30	0	0	7	7	30	0	0	25	0
Narsimhapur	2	516,650	0	0	58	2	16	0	0	2	2	16	0	0	13	0
Neemuch	2	390,866	0	0	38	2	11	0	0	2	2	11	0	0	9	0
Panna	2	320,156	0	0	29	2	8	0	0	2	2	8	0	0	7	0
Raisen	1	156,585	0	0	17	1	5	0	0	1	1	5	0	0	4	0
Rajgarh	3	733,532	0	0	79	4	22	0	0	4	4	22	0	0	18	0
Ratlam	2	349,165	0	0	34	2	10	0	0	2	2	10	0	0	8	0
Rewa	1	118,947	0	0	12	1	4	0	0	1	1	4	0	0	3	0
Sagar	8	1,730,755	0	0	182	10	50	0	0	10	10	50	0	0	42	0
Satna	5	1,178,027	0	0	127	6	35	0	0	6	6	35	0	0	29	0
Sehore	2	354,001	0	0	34	2	10	0	0	2	2	10	0	0	8	0
Seoni	4	829,058	0	0	96	5	26	0	0	5	5	26	0	0	22	0
Shahdol	4	673,557	0	0	72	5	20	0	0	5	5	20	0	0	17	0
Shajapur	4	825,584	0	0	82	5	23	0	0	5	5	23	0	0	19	0
Sheopur	3	369,415	0	0	36	4	11	0	0	4	4	11	0	0	9	0
Shivpuri	5	844,670	0	0	84	6	24	0	0	6	6	24	0	0	20	0
Sidhi	2	454,058	0	0	48	2	13	0	0	2	2	13	0	0	11	0
Singrauli	5	1,060,492	0	0	113	6	31	0	0	6	6	31	0	0	26	0
Tikamgarh	5	931,039	0	0	113	6	31	0	0	6	6	31	0	0	26	0
Ujjain	5	1,163,544	0	0	118	6	32	0	0	6	6	32	0	0	27	0
Umaria	2	248,658	0	0	24	2	7	0	0	2	2	7	0	0	6	0
Vidisha	4	684,952	0	0	67	5	19	0	0	5	5	19	0	0	16	0
West Nimar	5	981,086	0	0	98	6	28	0	0	6	6	28	0	0	23	0
Total	**163**	**32,080,764**	**0**	**0**	**3329**	**195**	**930**	**0**	**0**	**195**	**195**	**930**	**0**	**0**	**775**	**0**

Table 24-15: Additional specialized equipment required for new rural Fire Stations (continued…)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Alirajpur	3	697,028	0	0	4	0	0	19	0	4	19	19	4	205
Anuppur	4	406,681	0	0	5	0	0	12	0	5	12	12	5	138
Ashoknagar	3	631,371	0	0	4	0	0	18	0	4	18	18	4	194
Balaghat	5	821,415	0	0	6	0	0	25	0	6	25	25	6	271
Barwani	2	429,164	0	0	2	0	0	13	0	2	13	13	2	136
Betul	3	591,168	0	0	4	0	0	16	0	4	16	16	4	172
Bhind	7	951,333	0	0	8	0	0	29	0	8	29	29	8	315
Bhopal	3	613,405	0	0	4	0	0	17	0	4	17	17	4	183
Burhanpur	1	297,817	0	0	1	0	0	10	0	1	10	10	1	100
Chhatarpur	2	285,553	0	0	2	0	0	7	0	2	7	7	2	77
Chhindwara	3	388,632	0	0	4	0	0	12	0	4	12	12	4	135
Damoh	3	688,173	0	0	4	0	0	20	0	4	20	20	4	215
Datia	1	342,536	0	0	1	0	0	8	0	1	8	8	1	84
Dewas	1	262,137	0	0	1	0	0	8	0	1	8	8	1	84
Dhar	7	2,031,201	0	0	8	0	0	58	0	8	58	58	8	600
Dindori	3	583,957	0	0	4	0	0	18	0	4	18	18	4	194
East Nimar	2	466,287	0	0	2	0	0	13	0	2	13	13	2	136
Guna	4	701,432	0	0	5	0	0	20	0	5	20	20	5	219
Gwalior	5	702,391	0	0	6	0	0	23	0	6	23	23	6	241
Harda	1	347,900	0	0	1	0	0	10	0	1	10	10	1	100
Hoshangabad	2	360,074	0	0	2	0	0	11	0	2	11	11	2	114
Indore	4	1,278,164	0	0	5	0	0	37	0	5	37	37	5	377
Jabalpur	3	658,704	0	0	4	0	0	19	0	4	19	19	4	197
Jhabua	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Katni	4	723,529	0	0	5	0	0	20	0	5	20	20	5	219
Mandla	1	221,131	0	0	1	0	0	6	0	1	6	6	1	63
Mandsaur	4	655,983	0	0	5	0	0	18	0	5	18	18	5	197
Morena	6	1,028,801	0	0	7	0	0	30	0	7	30	30	7	323
Narsimhapur	2	516,650	0	0	2	0	0	16	0	2	16	16	2	163

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Neemuch	2	390,866	0	0	2	0	0	11	0	2	11	11	2	114
Panna	2	320,156	0	0	2	0	0	8	0	2	8	8	2	88
Raisen	1	156,585	0	0	1	0	0	5	0	1	5	5	1	52
Rajgarh	3	733,532	0	0	4	0	0	22	0	4	22	22	4	231
Ratlam	2	349,165	0	0	2	0	0	10	0	2	10	10	2	104
Rewa	1	118,947	0	0	1	0	0	4	0	1	4	4	1	41
Sagar	8	1,730,755	0	0	10	0	0	50	0	10	50	50	10	534
Satna	5	1,178,027	0	0	6	0	0	35	0	6	35	35	6	367
Sehore	2	354,001	0	0	2	0	0	10	0	2	10	10	2	104
Seoni	4	829,058	0	0	5	0	0	26	0	5	26	26	5	278
Shahdol	4	673,557	0	0	5	0	0	20	0	5	20	20	5	219
Shajapur	4	825,584	0	0	5	0	0	23	0	5	23	23	5	246
Sheopur	3	369,415	0	0	4	0	0	11	0	4	11	11	4	124
Shivpuri	5	844,670	0	0	6	0	0	24	0	6	24	24	6	260
Sidhi	2	454,058	0	0	2	0	0	13	0	2	13	13	2	136
Singrauli	5	1,060,492	0	0	6	0	0	31	0	6	31	31	6	330
Tikamgarh	5	931,039	0	0	6	0	0	31	0	6	31	31	6	330
Ujjain	5	1,163,544	0	0	6	0	0	32	0	6	32	32	6	341
Umaria	2	248,658	0	0	2	0	0	7	0	2	7	7	2	77
Vidisha	4	684,952	0	0	5	0	0	19	0	5	19	19	5	208
West Nimar	5	981,086	0	0	6	0	0	28	0	6	28	28	6	297
Total	**163**	**32,080,764**	**0**	**0**	**195**	**0**	**0**	**933**	**0**	**195**	**933**	**933**	**195**	**9933**

24.3.3 FIRE MANPOWER GAP

SFAC guidelines have suggested manpower, including reserve for duty off, training, leave for Station Officers, Sub-Officers (75%) and Leading Firemen and lower staff (25%). This has been further estimated for two shifts for Leading Firemen and lower staff (Table 24-16).

Table 24-16: Manpower requirement for Station officer and lower staff as per SFAC norm (2- shifts)

Sr No	Size of Station (Pumping Unit)	Station Officer	Sub-Officer*	Leading Firemen (L.F.)	Additional LFM	Total LFM	Drivers/ Operators	Fire men	Additional FM per FS (FAD,HID, DISP,WRO)	Total Fire men	Total
1	One	0	1.75	2.5	1.25	3.75	5	15	10	25	35.50
2	Two	1.75	1.75	5	1.25	6.25	7.5	30	10	40	57.25
3	Three	1.75	3.5	7.5	1.25	8.75	10	45	10	55	79.00
4	Four	3.5	3.5	10	1.25	11.25	15	60	10	70	103.25
5	Five	3.5	5.25	12.5	1.25	13.75	17.5	75	10	85	125.00
6	Six	3.5	7	15	1.25	16.25	22.5	90	10	100	149.25
7	Seven	5.25	7	17.5	1.25	18.75	25	105	10	115	171.00

However, Delhi Administrative Reform Department (ARD), Govt. of India has studied the fire manpower requirement, and optimized it further for two-shift duty pattern. From Table 24-16 and Table 24-17, it is quite clear that The Administrative Reform Department (ARD, Delhi), has already optimized the fire manpower requirement in comparison of what has been suggested in SFAC norms. It may be noted that total number of staff is coming in decimal places, as calculations are on pumping units including reserve staff, which has been rounded of in the fire manpower gap analysis at district and State levels (Table 24-17).

Table 24-17: Manpower requirement for Station officer and lower staffs as per ARD, Delhi (2-shifts)

Sr No	Fire Station (Pumping Unit)	Station Officer	Sub-Officer	LFM	Firemen-cum-Driver-cum Operator	Total Staff
1	One	0.00	2.50	2.50	15.63	20.60
2	Two	1.25	2.50	2.50	31.25	37.50
3	Three	1.25	3.75	7.50	46.88	59.40
4	Four	2.50	4.69	9.38	60.00	76.60
5	Five	2.50	5.63	11.25	73.13	92.50
6	Six	3.75	6.56	13.13	87.19	110.60
7	Seven	3.75	7.50	15.00	101.25	127.50

Thus for optimization on resources, following manpower criteria have been suggested for manpower gap analysis. Accordingly, total firefighting manpower gap in both urban and rural Fire Stations in Madhya Pradesh State has been estimated, which comes to 40,327 (Table 24-19 to 24-21) against the present strength of 964 (Table 24-18)

In addition to fire fighting staffs, there is an urgent need of senior level fire officers for making a well coordinated State level hierarchy and fire prevention wing for inspection, awareness generation and training, so that recurrence of the fire incidences, such as Advance Medical Research Institute (AMRI), Kolkata, in terms of their magnitude and frequency can be reduced. Accordingly, to support Commissioner, Urban Administration and Development Department, Madhya Pradesh Fire Services, additional officers at the levels of Director (Technical), Deputy Director (Technical), Chief Fire Officers (CFO), Dy Chief Fire Officers (Dy-CFO), Divisional Fire Officers (DFO), and Assistant Divisional Fire Officers (ADFO) have been recommended. To meet the ideal requirement of officials, following numbers of total officials have been proposed (including existing officials), which may be recruited in a phased manner approach:

- Director (Technical) : 1
- Joint Director (Technical) : 2
- Deputy Director (Technical) : 2
- Chief Fire Officer (CFO) : 6
- Deputy Chief Fire Officer (Dy CFO) : 12
- Divisional Fire Officer (DFO) : 64 (8 per Fire Station)
- Assistant Divisional Fire Officer (ADFO) :128 (4 per Fire Station)

It may be noted that for cleaning staff, we recommend hiring of Cleaners on contract basis. For computation in financial analysis, we have assumed a fixed salary of Rs 7,000/pm, and without any reserve over that.

Accordingly, existing fire manpower and gap analysis for all the districts in Madhya Pradesh State have been carried out and are shown Tables 24-18 to 24-21.

Table 24-18: List of manpower available for operational Fire Stations in Madhya Pradesh Fire Services (As on Aug, 2012)

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Alirajpur	3	0	1	0	0	0	0	0	0	0	6	0	7
Anuppur	4	0	0	0	0	0	0	0	0	0	1	0	1
Ashoknagar	2	0	0	0	0	0	0	0	0	0	2	0	2
Balaghat	5	0	0	0	0	0	0	0	0	1	2	0	3
Barwani	7	0	0	0	0	0	0	2	1	0	12	6	21
Betul	8	0	0	0	0	1	0	0	0	0	5	0	6
Bhind	8	0	0	0	0	0	0	1	2	2	38	0	43
Bhopal	7	1	0	0	0	1	2	1	3	7	110	3	128
Burhanpur	3	0	0	0	0	0	0	0	0	0	3	1	4
Chhatarpur	12	0	0	0	0	0	0	0	0	0	10	0	10
Chhindwara	12	0	0	0	0	0	0	1	1	0	13	0	15
Damoh	5	0	0	0	0	0	0	0	0	0	0	0	0
Datia	4	0	0	0	0	0	0	0	0	0	0	0	0
Dewas	7	0	0	0	0	0	0	0	1	0	14	0	15
Dhar	9	0	0	0	0	1	1	2	2	3	55	0	64
Dindori	1	0	0	0	0	0	0	0	0	0	0	0	0
East Nimar	4	0	0	0	0	0	0	0	0	0	14	0	14
Guna	3	0	0	0	0	0	0	0	0	1	15	0	16
Gwalior	5	0	0	0	0	1	1	0	0	7	71	1	81
Harda	3	0	0	0	0	0	0	0	0	0	3	0	3
Hoshangabad	6	0	0	0	0	0	0	0	0	0	12	0	12
Indore	8	0	1	2	0	1	0	2	7	20	150	1	184
Jabalpur	6	0	0	0	0	1	0	3	0	0	32	0	36
Jhabua	4	0	0	0	0	0	0	1	0	0	0	0	1
Katni	4	0	0	0	0	0	0	0	0	0	9	6	15
Mandla	5	0	0	0	0	0	0	0	0	2	4	0	6
Mandsaur	7	0	0	0	0	0	0	0	0	0	10	0	10
Morena	8	0	0	0	0	0	0	0	0	2	19	1	22
Narsimhapur	5	0	0	0	0	0	0	2	0	0	5	0	7
Neemuch	5	0	0	0	0	0	0	0	0	0	7	0	7
Panna	6	0	0	0	0	0	0	1	0	0	0	0	1

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Raisen	10	0	0	0	0	0	0	0	1	0	9	0	10
Rajgarh	10	0	0	0	0	0	0	0	0	0	10	0	10
Ratlam	6	0	0	0	0	0	0	1	0	2	24	3	30
Rewa	10	0	0	0	0	1	0	0	0	0	11	1	13
Sagar	8	0	0	0	0	1	0	0	1	1	11	0	14
Satna	8	0	0	0	0	0	0	1	0	1	15	0	17
Sehore	7	0	0	0	0	1	1	1	0	0	18	2	23
Seoni	3	0	0	0	0	0	0	0	0	1	1	0	2
Shahdol	5	0	0	0	0	0	0	0	0	1	7	0	8
Shajapur	8	0	0	0	0	0	0	0	0	0	5	0	5
Sheopur	3	0	0	0	0	0	0	0	0	0	3	0	3
Shivpuri	5	0	0	0	0	0	0	0	0	0	2	0	2
Sidhi	3	0	0	0	0	0	0	0	0	0	0	0	0
Singrauli	2	0	0	0	0	0	0	0	0	0	1	0	1
Tikamgarh	6	0	0	0	0	0	0	0	0	0	3	0	3
Ujjain	7	0	0	0	0	1	0	0	0	0	44	0	45
Umaria	3	0	0	0	0	0	0	0	0	0	1	0	1
Vidisha	5	0	0	0	0	0	0	1	0	1	17	0	19
West Nimar	7	0	0	0	0	0	0	0	0	0	23	1	24
Total	**292**	**1**	**2**	**2**	**0**	**10**	**5**	**20**	**19**	**52**	**827**	**26**	**964**

***Level 10**: Director General/Director/Joint Director; **Level 9**: CFO/CO/SP; **Level 8**: Deputy CFO/Dy SP; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/Inspector/EO/Fire Supervisor; **Level 5**: ADFO/ADO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Table 24-19: Manpower gap in operational Fire Stations for ideal jurisdiction area

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Alirajpur	3	0	-1	0	0	1	2	4	14	26	122	3	171
Anuppur	4	0	0	0	0	1	2	5	17	34	173	4	236
Ashoknagar	2	0	0	0	0	1	2	4	11	21	120	2	161
Balaghat	5	0	0	0	0	1	1	14	28	62	403	5	514
Barwani	7	0	0	0	0	1	2	7	27	49	274	1	361
Betul	8	0	0	0	0	0	2	11	37	81	436	8	575
Bhind	8	0	0	0	0	1	2	13	34	75	436	8	569
Bhopal	7	1	1	1	0	1	0	19	38	93	552	4	710
Burhanpur	3	0	0	0	0	1	2	9	21	52	305	2	392
Chhatarpur	12	0	0	0	0	2	3	11	52	113	535	12	728
Chhindwara	12	0	0	1	0	2	3	19	60	144	760	12	1001
Damoh	5	0	0	0	0	1	2	7	25	54	320	5	414
Datia	4	0	0	0	0	1	1	6	20	41	207	4	280
Dewas	7	0	0	0	0	1	2	19	43	103	585	7	760
Dhar	9	0	0	0	0	1	1	9	32	54	300	9	406
Dindori	1	0	0	0	0	1	1	4	8	19	106	1	140
East Nimar	4	0	0	0	0	1	2	14	29	71	400	4	521
Guna	3	0	0	1	0	1	1	5	15	35	211	3	272
Gwalior	5	0	1	1	0	0	2	20	41	96	582	4	747
Harda	3	0	0	0	0	1	2	9	20	49	281	3	365
Hoshangabad	6	0	0	1	0	1	1	11	27	56	350	6	453
Indore	8	3	0	-1	0	0	1	16	36	83	494	7	639
Jabalpur	6	0	1	1	0	0	2	12	37	82	484	6	625
Jhabua	4	0	0	0	0	1	2	8	20	39	247	4	321
Katni	4	0	0	1	0	1	1	9	21	51	284	-2	366
Mandla	5	0	0	0	0	1	2	12	30	68	395	5	513
Mandsaur	7	0	0	0	0	1	2	11	35	74	418	7	548
Morena	8	0	0	0	0	1	3	14	33	65	432	7	555
Narsimhapur	5	0	0	0	0	1	2	5	22	48	285	5	368
Neemuch	5	0	0	0	0	1	1	7	24	52	294	5	384
Panna	6	0	0	0	0	1	2	9	31	66	340	6	455
Raisen	10	0	0	0	0	1	1	16	46	96	517	10	687

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Rajgarh	10	0	0	0	0	2	3	11	39	73	392	10	530
Ratlam	6	0	0	0	0	1	2	13	32	70	410	3	531
Rewa	10	0	1	1	0	0	1	22	57	135	711	9	937
Sagar	8	0	1	1	0	0	2	10	35	71	432	8	560
Satna	8	0	0	1	0	2	2	13	38	78	463	8	605
Sehore	7	0	0	0	0	0	1	11	33	72	401	5	523
Seoni	3	0	0	0	0	1	2	11	22	63	387	3	489
Shahdol	5	0	0	0	0	1	2	7	24	54	318	5	411
Shajapur	8	0	0	0	0	2	2	7	30	59	337	8	445
Sheopur	3	0	0	0	0	1	1	7	18	47	261	3	338
Shivpuri	5	0	0	0	0	1	2	11	28	64	373	5	484
Sidhi	3	0	0	0	0	1	1	11	23	59	353	3	451
Singrauli	2	0	0	0	0	1	1	4	10	20	107	2	145
Tikamgarh	6	0	0	0	0	1	1	7	27	60	310	6	412
Ujjain	7	0	0	1	0	1	2	9	31	61	352	7	464
Umaria	3	0	0	0	0	1	2	6	14	26	159	3	211
Vidisha	5	0	0	0	0	1	2	11	30	71	398	5	518
West Nimar	7	0	0	0	0	2	2	12	35	77	423	6	557
Total	**292**	**4**	**4**	**10**	**0**	**49**	**86**	**522**	**1460**	**3212**	**18235**	**266**	**23848**

***Level 10**: Director General/Director/Joint Director; **Level 9**: CFO/CO/SP; **Level 8**: Deputy CFO/Dy SP; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/Inspector/EO/Fire Supervisor; **Level 5**: ADFO/ADO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Table 24-20: Total manpower gap for operational and new urban Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Alirajpur	3	0	-1	0	0	1	2	4	14	26	122	3	171
Anuppur	6	0	0	0	0	1	2	7	24	46	249	6	335
Ashoknagar	5	0	0	0	0	1	2	4	18	28	167	5	225
Balaghat	5	0	0	0	0	1	1	14	28	62	403	5	514
Barwani	7	0	0	0	0	1	2	7	27	49	274	1	361
Betul	8	0	0	0	0	0	2	11	37	81	436	8	575
Bhind	9	0	0	0	0	1	2	13	36	77	452	9	590
Bhopal	12	1	1	1	0	2	4	28	60	136	826	9	1068
Burhanpur	3	0	0	0	0	1	2	9	21	52	305	2	392
Chhatarpur	12	0	0	0	0	2	3	11	52	113	535	12	728
Chhindwara	12	0	0	1	0	2	3	19	60	144	760	12	1001
Damoh	6	0	0	0	0	1	2	7	27	56	336	6	435
Datia	4	0	0	0	0	1	1	6	20	41	207	4	280
Dewas	8	0	0	0	0	1	2	20	45	105	616	8	797
Dhar	10	0	0	0	0	1	2	11	37	63	360	10	484
Dindori	1	0	0	0	0	1	1	4	8	19	106	1	140
East Nimar	4	0	0	0	0	1	2	14	29	71	400	4	521
Guna	8	0	0	1	0	1	1	6	27	47	305	8	396
Gwalior	9	0	1	1	0	0	3	22	53	113	689	8	890
Harda	3	0	0	0	0	1	2	9	20	49	281	3	365
Hoshangabad	7	0	0	1	0	1	2	12	29	58	381	7	491
Indore	16	3	0	-1	0	1	4	35	75	162	1036	15	1330
Jabalpur	12	0	1	1	0	1	4	22	62	126	785	12	1014
Jhabua	5	0	0	0	0	1	2	9	24	46	294	5	381
Katni	6	0	0	1	0	1	2	10	26	56	331	0	427
Mandla	5	0	0	0	0	1	2	12	30	68	395	5	513
Mandsaur	7	0	0	0	0	1	2	11	35	74	418	7	548
Morena	8	0	0	0	0	1	3	14	33	65	432	7	555
Narsimhapur	5	0	0	0	0	1	2	5	22	48	285	5	368
Neemuch	7	0	0	0	0	1	1	7	29	57	325	7	427
Panna	6	0	0	0	0	1	2	9	31	66	340	6	455
Raisen	10	0	0	0	0	1	1	16	46	96	517	10	687

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Rajgarh	10	0	0	0	0	2	3	11	39	73	392	10	530
Ratlam	7	0	0	0	0	1	2	14	34	72	441	4	568
Rewa	11	0	1	1	0	0	2	23	59	137	742	10	975
Sagar	10	0	1	1	0	1	3	11	40	76	479	10	622
Satna	10	0	0	1	0	2	2	15	46	92	552	10	720
Sehore	7	0	0	0	0	0	1	11	33	72	401	5	523
Seoni	3	0	0	0	0	1	2	11	22	63	387	3	489
Shahdol	5	0	0	0	0	1	2	7	24	54	318	5	411
Shajapur	8	0	0	0	0	2	2	7	30	59	337	8	445
Sheopur	3	0	0	0	0	1	1	7	18	47	261	3	338
Shivpuri	10	0	0	0	0	2	3	11	40	76	451	10	593
Sidhi	3	0	0	0	0	1	1	11	23	59	353	3	451
Singrauli	4	0	0	0	0	1	2	5	16	30	169	4	227
Tikamgarh	7	0	0	0	0	1	1	7	29	62	326	7	433
Ujjain	8	0	0	1	0	1	3	13	38	76	453	8	593
Umaria	3	0	0	0	0	1	2	6	14	26	159	3	211
Vidisha	5	0	0	0	0	1	2	11	30	71	398	5	518
West Nimar	7	0	0	0	0	2	2	12	35	77	423	6	557
Total	**350**	**4**	**4**	**10**	**0**	**54**	**104**	**581**	**1655**	**3522**	**20410**	**324**	**26668**

***Level 10**: Director General/Director/Joint Director; **Level 9**: CFO/CO/SP; **Level 8**: Deputy CFO/Dy SP; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/Inspector/EO/Fire Supervisor; **Level 5**: ADFO/ADO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Table 24-21:Additional staff required for new rural Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Alirajpur	10	0	0	0	0	0	0	7	18	42	209	3	279
Anuppur	4	0	0	0	0	0	0	2	14	26	114	4	160
Ashoknagar	3	0	0	0	0	0	0	6	17	40	195	3	261
Balaghat	5	0	0	0	0	0	0	9	25	55	266	5	360
Barwani	2	0	0	0	0	0	0	5	12	29	144	2	192
Betul	3	0	0	0	0	0	0	5	15	36	169	3	228
Bhind	7	0	0	0	0	0	0	9	29	62	298	7	405
Bhopal	3	0	0	0	0	0	0	5	16	38	182	3	244
Burhanpur	1	0	0	0	0	0	0	4	8	19	106	1	138
Chhatarpur	2	0	0	0	0	0	1	1	8	18	72	2	102
Chhindwara	3	0	0	0	0	0	0	2	14	28	119	3	166
Damoh	3	0	0	0	0	0	0	7	19	44	222	3	295
Datia	1	0	0	0	0	0	1	4	8	17	92	1	123
Dewas	1	0	0	0	0	0	0	4	8	17	92	1	122
Dhar	7	0	0	0	0	0	1	24	52	126	690	7	900
Dindori	3	0	0	0	0	0	1	6	17	40	195	3	262
East Nimar	2	0	0	0	0	0	0	5	12	29	143	2	191
Guna	4	0	0	0	0	0	1	6	20	43	213	4	287
Gwalior	5	0	0	0	0	0	0	6	23	51	239	5	324
Harda	1	0	0	0	0	0	0	4	8	19	106	1	138
Hoshangabad	2	0	0	0	0	0	0	4	11	24	113	2	154
Indore	4	0	0	0	0	0	1	16	33	91	528	4	673
Jabalpur	3	0	0	0	0	0	0	7	18	42	209	3	279
Jhabua	0	0	0	0	0	0	0	0	0	0	0	0	0
Katni	4	0	0	0	0	0	0	7	20	45	218	4	294
Mandla	1	0	0	0	0	0	0	2	6	13	65	1	87
Mandsaur	4	0	0	0	0	0	0	6	17	38	189	4	254
Morena	6	0	0	0	0	0	0	10	29	65	319	6	429
Narsimhapur	2	0	0	0	0	0	0	6	14	32	170	2	224
Neemuch	2	0	0	0	0	0	1	4	11	24	113	2	155
Panna	2	0	0	0	0	0	0	2	8	18	88	2	118
Raisen	1	0	0	0	0	0	0	1	5	11	52	1	70

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Rajgarh	3	0	0	0	0	0	1	9	20	46	235	3	314
Ratlam	2	0	0	0	0	0	0	2	9	23	104	2	140
Rewa	1	0	0	0	0	0	0	1	3	6	36	1	47
Sagar	8	0	0	0	0	0	1	20	47	104	544	8	724
Satna	5	0	0	0	0	0	2	15	32	74	379	5	507
Sehore	2	0	0	0	0	0	0	4	9	20	101	2	136
Seoni	4	0	0	0	0	0	0	10	24	54	287	4	379
Shahdol	4	0	0	0	0	0	0	7	19	42	217	4	289
Shajapur	4	0	0	0	0	0	2	9	21	48	244	4	328
Sheopur	3	0	0	0	0	0	1	2	12	24	109	3	151
Shivpuri	5	0	0	0	0	0	1	7	24	53	252	5	342
Sidhi	2	0	0	0	0	0	1	5	12	29	144	2	193
Singrauli	5	0	0	0	0	0	0	11	30	67	335	5	448
Tikamgarh	5	0	0	0	0	0	1	12	30	67	335	5	450
Ujjain	5	0	0	0	0	0	1	12	30	71	352	5	471
Umaria	2	0	0	0	0	0	0	1	8	18	72	2	101
Vidisha	4	0	0	0	0	0	0	7	18	40	202	4	271
West Nimar	5	0	0	0	0	0	1	10	27	64	347	5	454
Total	**163**	**0**	**0**	**0**	**0**	**0**	**19**	**330**	**890**	**2032**	**10225**	**163**	**13659**

***Level 10**: Director General/Director/Joint Director; **Level 9**: CFO/CO/SP; **Level 8**: Deputy CFO/Dy SP; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/Inspector/EO/Fire Supervisor; **Level 5**: ADFO/ADO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

24.3.4 Fire Station Building Infrastructure Gap

Depending upon the number of pumping units, no. of bays in a Fire Station has been estimated. However, in order to consider future growth in population, a minimum two bay Fire Station has been proposed, even at a Fire Station having requirement of one pumping unit. Accordingly, gaps in operational Fire Stations, new urban and rural Fire Stations have been given in Table 24-22.

Table 24-22: Fire station building required for gap in operational ,new urban and new rural Fire Stations (no. of bays)

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay More Than 7
Alirajpur	6	2	0	1	1	0	2	0	0
Anuppur	10	5	2	0	2	1	0	0	0
Ashoknagar	8	4	-1	1	1	1	0	7	0
Balaghat	10	1	4	1	1	0	2	0	1
Barwani	9	2	2	1	1	0	1	7	0
Betul	11	3	1	4	1	1	0	0	1
Bhind	16	4	6	3	1	1	0	0	1
Bhopal	15	0	0	6	0	3	0	0	2
Burhanpur	4	0	-1	0	0	1	0	7	1
Chhatarpur	14	8	0	4	1	0	0	0	1
Chhindwara	15	5	1	3	1	2	0	0	2
Damoh	9	4	0	1	0	2	1	0	1
Datia	5	2	0	0	1	0	1	7	0
Dewas	9	1	2	1	0	2	2	0	1
Dhar	17	3	1	1	3	1	3	14	1
Dindori	4	0	0	1	1	1	0	7	0
East Nimar	6	0	0	0	1	1	2	0	1
Guna	12	6	2	0	0	2	0	0	1
Gwalior	14	4	1	2	1	1	1	7	1
Harda	4	0	0	0	0	0	1	7	1
Hoshangabad	9	2	3	-1	0	0	2	0	1
Indore	20	3	3	2	3	0	2	7	5
Jabalpur	15	4	2	3	1	1	2	7	1
Jhabua	5	-3	2	0	0	1	0	7	0
Katni	10	2	3	1	3	0	0	0	1
Mandla	6	1	1	0	2	0	0	6	1
Mandsaur	11	1	2	1	1	1	1	0	1
Morena	14	2	5	2	2	1	0	0	1
Narsimhapur	7	1	1	0	0	1	1	0	1
Neemuch	9	6	0	0	0	1	1	0	1
Panna	8	0	2	3	0	1	0	7	0
Raisen	11	0	1	4	0	1	1	7	0
Rajgarh	13	4	1	2	2	1	2	0	0
Ratlam	9	1	2	2	0	0	1	0	1
Rewa	12	-1	5	3	0	1	2	0	1
Sagar	18	5	3	1	1	2	3	0	1
Satna	15	3	1	0	3	1	3	0	1
Sehore	9	1	3	1	1	0	1	0	1
Seoni	7	0	2	1	0	0	1	7	2
Shahdol	9	2	2	3	0	0	1	0	1
Shajapur	12	5	2	1	2	1	0	0	1
Sheopur	6	1	2	2	0	0	0	0	1

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay More Than 7
Shivpuri	15	7	3	1	1	1	1	0	1
Sidhi	5	0	1	1	1	0	1	0	1
Singrauli	9	3	0	1	2	1	1	7	0
Tikamgarh	12	5	-2	0	3	0	2	0	1
Ujjain	13	3	-1	2	2	1	1	7	1
Umaria	5	1	1	1	0	0	1	0	0
Vidisha	9	-1	1	1	3	0	1	0	1
West Nimar	12	0	2	1	1	1	1	0	2
Total	**513**	**112**	**73**	**69**	**51**	**38**	**49**	**125**	**46**

24.4 Investment and Financial Analysis

24.4.1 Capital Cost

Building Infrastructure Cost:

Table 24-23 provides details of the Fire Station building infrastructure cost analysis in Madhya Pradesh State. The ideal requirement of land for a Fire Station is 2 ½ acres, however, a 2 bay Fire Station may be constructed in a one acre land. It may be noted that land cost will vary from time to time and place to place; hence it has not been added in cost estimates. The civil construction cost estimation involves cost of Fire Station building including stores, offices, residential quarters, static water tanks, which will vary in size depending upon the number of bays (garage) in a Fire Station. Accordingly, total cost estimates for one, two, three, five, and seven bay Fire Stations (based on the P.W.D. norms) is about 150 Lakhs, 300 Lakhs, 450 Lakhs, 700 Lakhs, 950 Lakhs.

Table 24-23: Cost (in Lakhs Rupees) of Fire Station building (no. of bays) required for gap in operational, new urban and new rural Fire Stations

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay More Than 7	Total Bay Cost
Alirajpur	6	300	0	450	575	0	1,650	0	0	2,975
Anuppur	10	750	600	0	1,150	700	0	0	0	3,200
Ashoknagar	8	600	-300	450	575	700	0	6,650	0	8,675
Balaghat	10	150	1,200	450	575	0	1,650	0	950	4,975
Barwani	9	300	600	450	575	0	825	6,650	0	9,400
Betul	11	450	300	1,800	575	700	0	0	950	4,775
Bhind	16	600	1,800	1,350	575	700	0	0	950	5,975
Bhopal	15	0	0	2,700	0	2,100	0	0	1,900	6,700
Burhanpur	4	0	-300	0	0	700	0	6,650	950	8,000
Chhatarpur	14	1,200	0	1,800	575	0	0	0	950	4,525
Chhindwara	15	750	300	1,350	575	1,400	0	0	1,900	6,275
Damoh	9	600	0	450	0	1,400	825	0	950	4,225
Datia	5	300	0	0	575	0	825	6,650	0	8,350
Dewas	9	150	600	450	0	1,400	1,650	0	950	5,200
Dhar	17	450	300	450	1,725	700	2,475	13,300	950	20,350
Dindori	4	0	0	450	575	700	0	6,650	0	8,375
East Nimar	6	0	0	0	575	700	1,650	0	950	3,875
Guna	12	900	600	0	0	1,400	0	0	950	3,850
Gwalior	14	600	300	900	575	700	825	6,650	950	11,500
Harda	4	0	0	0	0	0	825	6,650	950	8,425
Hoshangabad	9	300	900	-450	0	0	1,650	0	950	3,350
Indore	20	450	900	900	1,725	0	1,650	6,650	4,750	17,025
Jabalpur	15	600	600	1,350	575	700	1,650	6,650	950	13,075
Jhabua	5	-450	600	0	0	700	0	6,650	0	7,500
Katni	10	300	900	450	1,725	0	0	0	950	4,325
Mandla	6	150	300	0	1,150	0	0	5,700	950	8,250
Mandsaur	11	150	600	450	575	700	825	0	950	4,250
Morena	14	300	1,500	900	1,150	700	0	0	950	5,500
Narsimhapur	7	150	300	0	0	700	825	0	950	2,925
Neemuch	9	900	0	0	0	700	825	0	950	3,375
Panna	8	0	600	1,350	0	700	0	6,650	0	9,300
Raisen	11	0	300	1,800	0	700	825	6,650	0	10,275
Rajgarh	13	600	300	900	1,150	700	1,650	0	0	5,300
Ratlam	9	150	600	900	0	0	825	0	950	3,425

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay More Than 7	Total Bay Cost
Rewa	12	-150	1,500	1,350	0	700	1,650	0	950	6,000
Sagar	18	750	900	450	575	1,400	2,475	0	950	7,500
Satna	15	450	300	0	1,725	700	2,475	0	950	6,600
Sehore	9	150	900	450	575	0	825	0	950	3,850
Seoni	7	0	600	450	0	0	825	6,650	1,900	10,425
Shahdol	9	300	600	1,350	0	0	825	0	950	4,025
Shajapur	12	750	600	450	1,150	700	0	0	950	4,600
Sheopur	6	150	600	900	0	0	0	0	950	2,600
Shivpuri	15	1,050	900	450	575	700	825	0	950	5,450
Sidhi	5	0	300	450	575	0	825	0	950	3,100
Singrauli	9	450	0	450	1,150	700	825	6,650	0	10,225
Tikamgarh	12	750	-600	0	1,725	0	1,650	0	950	4,475
Ujjain	13	450	-300	900	1,150	700	825	6,650	950	11,325
Umaria	5	150	300	450	0	0	825	0	0	1,725
Vidisha	9	-150	300	450	1,725	0	825	0	950	4,100
West Nimar	12	0	600	450	575	700	825	0	1,900	5,050
Total	**513**	**16,800**	**21,900**	**31,050**	**29,325**	**26,600**	**40,425**	**118,750**	**43,700**	**328,550**

Thus, total estimated capital cost for the Fire Stations building development for gap in operational and all the proposed and new urban and rural Fire Stations is **Rs. 3,285.50 Crores** (Table 24-23).

Firefighting and Rescue Vehicles and Specialized Equipment Cost:

The costs of different fire fighting vehicles and specialized equipment including communication sets (static and mobile VHF sets) have been taken as approximate rates quoted by fire equipment suppliers. Accordingly, capital cost for fire fighting vehicles and equipment for all the districts in Madhya Pradesh State has been estimated (Tables 24-24 to 24-29).

Table 24-24: Cost estimates (in Lakhs Rupees) for gap in fire fighting vehicles for operational and new urban Fire Stations

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	QRT	Motor Cycle Mists	Education Vans	Total Vehicle cost
Alirajpur	3	-35.00	0.00	0.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	611.50
Anuppur	6	70.00	60.00	80.00	500.00	0.00	70.00	30.00	30.00	18.00	13.50	20.00	891.50
Ashoknagar	5	105.00	0.00	0.00	500.00	0.00	35.00	30.00	30.00	9.00	6.80	20.00	735.80
Balaghat	5	105.00	60.00	120.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	947.30
Barwani	7	35.00	0.00	80.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	777.30
Betul	8	70.00	90.00	160.00	500.00	0.00	35.00	30.00	30.00	45.00	33.80	20.00	1013.80
Bhind	9	35.00	60.00	120.00	500.00	0.00	0.00	60.00	30.00	36.00	27.00	20.00	888.00
Bhopal	12	0.00	180.00	280.00	500.00	500.00	105.00	60.00	30.00	9.00	6.80	20.00	1690.80
Burhanpur	3	105.00	60.00	80.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	891.50
Chhatarpur	12	35.00	120.00	200.00	500.00	0.00	35.00	60.00	30.00	81.00	60.80	20.00	1141.80
Chhindwara	12	280.00	210.00	200.00	-1000.00	0.00	35.00	60.00	30.00	81.00	60.80	20.00	-23.30
Damoh	6	140.00	60.00	80.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	926.50
Datia	4	70.00	30.00	0.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	762.30
Dewas	8	350.00	300.00	80.00	500.00	500.00	70.00	30.00	30.00	45.00	33.80	20.00	1958.80
Dhar	10	-70.00	30.00	160.00	-1000.00	-500.00	140.00	30.00	30.00	18.00	13.50	20.00	-1128.50
Dindori	1	0.00	0.00	40.00	500.00	0.00	35.00	30.00	30.00	9.00	6.80	20.00	670.80
East Nimar	4	140.00	120.00	80.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	1002.30
Guna	8	175.00	30.00	40.00	500.00	0.00	70.00	30.00	30.00	9.00	6.80	20.00	910.80
Gwalior	9	315.00	210.00	160.00	500.00	1000.00	35.00	60.00	30.00	27.00	20.30	20.00	2377.30
Harda	3	105.00	90.00	0.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	841.50
Hoshangabad	7	70.00	60.00	80.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	856.50
Indore	16	140.00	180.00	240.00	500.00	500.00	105.00	90.00	30.00	36.00	27.00	40.00	1888.00
Jabalpur	12	350.00	240.00	280.00	0.00	500.00	105.00	60.00	30.00	27.00	20.30	20.00	1632.30
Jhabua	5	35.00	120.00	120.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	921.50
Katni	6	140.00	30.00	80.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	912.30
Mandla	5	175.00	90.00	40.00	500.00	0.00	70.00	30.00	30.00	36.00	27.00	20.00	1018.00
Mandsaur	7	105.00	120.00	120.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	1007.30
Morena	8	70.00	120.00	120.00	500.00	0.00	35.00	60.00	30.00	18.00	13.50	20.00	986.50

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	QRT	Motor Cycle Mists	Education Vans	Total Vehicle cost
Narsimhapur	5	0.00	60.00	120.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	826.50
Neemuch	7	140.00	30.00	80.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	896.50
Panna	6	70.00	90.00	200.00	500.00	0.00	35.00	30.00	30.00	45.00	33.80	20.00	1053.80
Raisen	10	245.00	210.00	80.00	500.00	0.00	35.00	30.00	30.00	54.00	40.50	20.00	1244.50
Rajgarh	10	140.00	90.00	80.00	500.00	0.00	35.00	60.00	30.00	36.00	27.00	20.00	1018.00
Ratlam	7	210.00	90.00	120.00	500.00	500.00	35.00	30.00	30.00	27.00	20.30	20.00	1582.30
Rewa	11	490.00	270.00	160.00	500.00	500.00	35.00	30.00	30.00	90.00	67.50	20.00	2192.50
Sagar	10	105.00	120.00	120.00	500.00	500.00	35.00	30.00	30.00	18.00	13.50	20.00	1491.50
Satna	10	210.00	120.00	200.00	500.00	500.00	70.00	60.00	30.00	27.00	20.30	20.00	1757.30
Sehore	7	35.00	90.00	120.00	500.00	0.00	35.00	30.00	30.00	36.00	27.00	20.00	923.00
Seoni	3	175.00	90.00	40.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	967.30
Shahdol	5	0.00	90.00	120.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	856.50
Shajapur	8	35.00	60.00	0.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	757.30
Sheopur	3	70.00	30.00	40.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	802.30
Shivpuri	10	280.00	90.00	80.00	500.00	0.00	35.00	60.00	30.00	36.00	27.00	20.00	1158.00
Sidhi	3	70.00	120.00	120.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	972.30
Singrauli	4	35.00	30.00	40.00	500.00	0.00	35.00	30.00	30.00	9.00	6.80	20.00	735.80
Tikamgarh	7	35.00	60.00	80.00	500.00	0.00	35.00	60.00	30.00	36.00	27.00	20.00	883.00
Ujjain	8	70.00	90.00	120.00	500.00	500.00	70.00	60.00	30.00	9.00	6.80	20.00	1475.80
Umaria	3	-35.00	30.00	40.00	500.00	0.00	35.00	30.00	30.00	18.00	13.50	20.00	681.50
Vidisha	5	140.00	120.00	120.00	500.00	0.00	35.00	30.00	30.00	27.00	20.30	20.00	1042.30
West Nimar	7	70.00	90.00	120.00	500.00	0.00	35.00	60.00	30.00	27.00	20.30	20.00	972.30
Total	**350**	**5705.0**	**4740.0**	**5240.0**	**21500.0**	**5000.0**	**2240.0**	**1950.0**	**1500.0**	**1431.0**	**1073.3**	**1020.0**	**51399.3**

Table 24-25: Cost estimates (in Lakhs Rupees) for gap in fire vehicles for new rural Fire Stations

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	QRT	Motor Cycle Mists	Education Vans	Total Vehicle cost
Alirajpur	3	210.00	120.00	120.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	497.00
Anuppur	4	140.00	30.00	40.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	273.00
Ashoknagar	3	175.00	120.00	120.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	462.00
Balaghat	5	280.00	180.00	80.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	619.00
Barwani	2	175.00	90.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	337.00
Betul	3	175.00	90.00	80.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	392.00
Bhind	7	315.00	180.00	80.00	0.00	0.00	0.00	0.00	0.00	63.00	47.00	0.00	685.00
Bhopal	3	175.00	120.00	80.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	422.00
Burhanpur	1	140.00	90.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	246.00
Chhatarpur	2	70.00	30.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	172.00
Chhindwara	3	140.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	287.00
Damoh	3	210.00	150.00	120.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	527.00
Datia	1	105.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	221.00
Dewas	1	105.00	90.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	211.00
Dhar	7	735.00	450.00	200.00	0.00	0.00	0.00	0.00	0.00	63.00	47.00	0.00	1495.00
Dindori	3	210.00	150.00	40.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	447.00
East Nimar	2	140.00	120.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	332.00
Guna	4	210.00	120.00	120.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	513.00
Gwalior	5	245.00	90.00	120.00	0.00	0.00	35.00	0.00	0.00	45.00	34.00	0.00	569.00
Harda	1	140.00	90.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	246.00
Hoshangabad	2	140.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	272.00
Indore	4	455.00	270.00	160.00	0.00	0.00	35.00	0.00	0.00	36.00	27.00	0.00	983.00
Jabalpur	3	175.00	120.00	120.00	0.00	0.00	35.00	0.00	0.00	27.00	20.00	0.00	497.00
Jhabua	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Katni	4	210.00	90.00	160.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	523.00
Mandla	1	70.00	30.00	40.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	156.00
Mandsaur	4	175.00	60.00	160.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	458.00

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	QRT	Motor Cycle Mists	Education Vans	Total Vehicle cost
Morena	6	315.00	210.00	120.00	0.00	0.00	0.00	0.00	0.00	54.00	41.00	0.00	740.00
Narsimhapur	2	175.00	120.00	80.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	407.00
Neemuch	2	140.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	272.00
Panna	2	70.00	30.00	80.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	212.00
Raisen	1	35.00	30.00	40.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	121.00
Rajgarh	3	245.00	210.00	40.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	542.00
Ratlam	2	70.00	60.00	80.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	242.00
Rewa	1	35.00	0.00	40.00	0.00	0.00	0.00	0.00	0.00	9.00	7.00	0.00	91.00
Sagar	8	560.00	360.00	240.00	0.00	0.00	0.00	0.00	0.00	72.00	54.00	0.00	1286.00
Satna	5	420.00	210.00	200.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	909.00
Sehore	2	105.00	60.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	237.00
Seoni	4	315.00	210.00	80.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	668.00
Shahdol	4	210.00	150.00	80.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	503.00
Shajapur	4	245.00	180.00	80.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	568.00
Sheopur	3	140.00	30.00	40.00	0.00	0.00	0.00	0.00	0.00	27.00	20.00	0.00	257.00
Shivpuri	5	245.00	150.00	120.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	594.00
Sidhi	2	175.00	90.00	40.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	337.00
Singrauli	5	385.00	240.00	80.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	784.00
Tikamgarh	5	385.00	270.00	40.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	774.00
Ujjain	5	350.00	240.00	160.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	829.00
Umaria	2	105.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	18.00	14.00	0.00	167.00
Vidisha	4	210.00	90.00	120.00	0.00	0.00	0.00	0.00	0.00	36.00	27.00	0.00	483.00
West Nimar	5	315.00	180.00	120.00	0.00	0.00	0.00	0.00	0.00	45.00	34.00	0.00	694.00
Total	**163**	**10570.00**	**6270.00**	**4040.00**	**0.00**	**0.00**	**105.00**	**0.00**	**0.00**	**1467.00**	**1100.00**	**0.00**	**23552.00**

Table 24-26: Cost estimate (in Lakhs Rupees) for gap in fire fighting specialized equipment for operational and new urban Fire Stations

District	Fire Stations	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters / Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Alirajpur	3	15.00	10.00	7.60	6.00	0.50	10.00	0.00	2.00	1.20	15.00	1.20	6.50	10.00	0.00
Anuppur	6	15.00	30.00	21.20	10.50	1.40	10.00	4.80	3.50	2.10	37.50	3.60	6.50	16.00	0.00
Ashoknagar	5	15.00	22.50	12.40	9.00	1.10	10.00	4.80	3.00	1.80	22.50	2.70	6.50	14.00	0.00
Balaghat	5	15.00	30.00	35.60	9.00	2.20	10.00	3.20	3.00	1.80	60.00	3.60	6.50	40.00	0.00
Barwani	7	15.00	30.00	28.00	12.00	1.60	10.00	0.80	4.00	2.40	47.50	3.60	6.50	32.00	0.00
Betul	8	15.00	25.00	39.60	15.00	2.20	10.00	2.40	5.00	3.00	72.50	3.00	6.50	44.00	0.00
Bhind	9	15.00	32.50	42.40	16.50	1.70	10.00	-4.00	3.00	3.30	72.50	3.60	6.50	42.00	0.00
Bhopal	12	90.00	130.00	78.40	21.00	5.00	60.00	8.80	0.00	4.20	95.00	15.60	39.00	80.00	0.00
Burhanpur	3	15.00	15.00	23.20	6.00	1.60	10.00	-0.80	2.00	1.20	40.00	2.40	6.50	26.00	0.00
Chhatarpur	12	15.00	27.50	52.80	21.00	3.10	10.00	4.00	7.00	4.20	95.00	3.30	6.50	46.00	0.00
Chhindwara	12	15.00	27.50	76.00	21.00	5.40	10.00	4.00	7.00	4.20	132.50	3.30	6.50	84.00	0.00
Damoh	6	15.00	27.50	25.20	10.50	1.80	10.00	3.20	3.50	2.10	45.00	3.30	6.50	26.00	0.00
Datia	4	15.00	12.50	18.40	7.50	1.30	10.00	1.60	2.50	1.50	32.50	1.50	6.50	22.00	0.00
Dewas	8	15.00	32.50	60.40	13.50	3.50	10.00	4.00	4.50	2.70	102.50	3.90	6.50	66.00	0.00
Dhar	10	15.00	50.00	33.60	18.00	1.90	10.00	-1.60	6.00	3.60	52.50	6.00	6.50	38.00	0.00
Dindori	1	15.00	10.00	4.80	1.50	0.40	10.00	0.80	0.50	0.30	10.00	1.20	6.50	4.00	0.00
East Nimar	4	15.00	15.00	37.60	7.50	2.50	10.00	0.80	2.50	1.50	62.50	2.40	6.50	42.00	0.00
Guna	8	15.00	35.00	22.00	15.00	2.00	10.00	8.00	5.00	3.00	35.00	4.20	6.50	24.00	0.00
Gwalior	9	75.00	90.00	64.40	16.50	3.20	50.00	8.00	5.50	3.30	100.00	10.80	32.50	66.00	0.00
Harda	3	15.00	7.50	21.20	6.00	1.50	10.00	0.80	2.00	1.20	35.00	1.20	6.50	24.00	0.00
Hoshangabad	7	15.00	35.00	32.40	10.50	1.80	10.00	4.00	4.00	2.40	55.00	4.20	6.50	36.00	0.00
Indore	16	30.00	165.00	98.40	28.50	3.20	80.00	-22.40	1.50	6.00	152.50	17.70	52.00	92.00	0.00
Jabalpur	12	45.00	97.50	76.80	21.00	4.90	30.00	8.80	6.50	4.20	127.50	11.70	19.50	80.00	0.00
Jhabua	5	15.00	30.00	28.80	9.00	1.80	10.00	0.00	3.00	1.80	50.00	2.40	6.50	32.00	0.00
Katni	6	15.00	25.00	27.60	10.50	1.80	10.00	1.60	3.50	2.10	50.00	3.00	6.50	20.00	0.00

District	Fire Stations	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters / Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Mandla	5	15.00	15.00	33.60	9.00	2.40	10.00	1.60	3.00	1.80	60.00	1.80	6.50	34.00	0.00
Mandsaur	7	15.00	27.50	36.80	12.00	2.40	10.00	-4.00	4.00	2.40	65.00	3.30	6.50	42.00	0.00
Morena	8	15.00	55.00	37.60	15.00	1.90	10.00	6.40	5.00	3.00	62.50	6.60	6.50	42.00	0.00
Narsimhapur	5	15.00	25.00	21.20	9.00	1.50	10.00	4.00	3.00	1.80	35.00	3.00	6.50	22.00	0.00
Neemuch	7	15.00	25.00	27.20	12.00	2.20	10.00	5.60	4.00	2.40	45.00	3.00	6.50	30.00	0.00
Panna	6	15.00	12.50	35.20	10.50	2.20	10.00	1.60	3.50	2.10	62.50	1.50	6.50	40.00	0.00
Raisen	10	15.00	20.00	53.20	16.50	3.40	10.00	2.40	6.00	3.60	102.50	2.70	6.50	56.00	0.00
Rajgarh	10	15.00	30.00	40.40	18.00	2.80	10.00	6.40	6.00	3.60	67.50	3.60	6.50	44.00	0.00
Ratlam	7	15.00	32.50	41.20	10.50	2.30	10.00	1.60	4.00	2.40	65.00	3.90	6.50	46.00	0.00
Rewa	11	0.00	17.50	80.80	19.50	5.60	10.00	0.00	6.50	3.90	140.00	2.10	6.50	84.00	0.00
Sagar	10	15.00	50.00	40.80	18.00	2.30	10.00	8.00	6.00	3.60	67.50	6.30	6.50	40.00	0.00
Satna	10	15.00	45.00	50.40	18.00	3.50	10.00	7.20	6.00	3.60	85.00	5.40	6.50	52.00	0.00
Sehore	7	15.00	22.50	38.40	12.00	2.60	10.00	1.60	4.00	2.40	65.00	3.00	6.50	44.00	0.00
Seoni	3	15.00	12.50	28.00	6.00	1.90	10.00	0.80	2.00	1.20	47.50	1.50	6.50	28.00	0.00
Shahdol	5	15.00	35.00	24.80	9.00	1.40	10.00	-4.00	3.00	1.80	42.50	4.20	6.50	18.00	0.00
Shajapur	8	15.00	27.50	28.00	15.00	1.80	10.00	5.60	5.00	3.00	45.00	3.30	6.50	32.00	0.00
Sheopur	3	15.00	12.50	18.40	6.00	1.20	10.00	0.80	2.00	1.20	32.50	1.50	6.50	22.00	0.00
Shivpuri	10	15.00	32.50	40.40	18.00	3.00	10.00	6.40	6.00	3.60	70.00	3.90	6.50	46.00	0.00
Sidhi	3	15.00	25.00	28.00	6.00	1.70	10.00	0.80	2.00	1.20	47.50	3.00	6.50	26.00	0.00
Singrauli	4	15.00	22.50	12.40	6.00	1.00	10.00	3.20	2.00	1.20	22.50	2.70	6.50	8.00	0.00
Tikamgarh	7	15.00	20.00	25.20	12.00	1.50	10.00	4.00	3.50	2.40	45.00	2.40	6.50	26.00	0.00
Ujjain	8	30.00	62.50	38.00	13.50	2.50	20.00	7.20	4.50	2.70	52.50	7.50	13.00	40.00	0.00
Umaria	3	15.00	12.50	11.60	6.00	0.40	10.00	0.80	2.00	1.20	20.00	1.50	6.50	6.00	0.00
Vidisha	5	15.00	25.00	37.60	9.00	2.20	10.00	3.20	3.00	1.80	62.50	3.30	6.50	32.00	0.00
West Nimar	7	15.00	10.00	39.20	12.00	2.50	10.00	-10.40	4.00	2.40	65.00	3.60	6.50	44.00	0.00
Total	**350**	**930.00**	**1,687.50**	**1,837.20**	**621.00**	**113.60**	**690.00**	**106.40**	**190.00**	**125.40**	**3,075.00**	**204.00**	**448.50**	**1,910.00**	**0.00**

Table 24-27: Cost estimate (in Lakhs Rupees) for gap in fire fighting specialized equipment for operational and new urban Fire Stations (contd...)

District	Fire Stations	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Set	Mobile Wireless Set	Walky Talky	Mega Phone	Total
Alirajpur	3	0.00	0.00	8.40	2.00	5.00	2.80	0.00	1.08	2.04	1.56	1.20	109.08
Anuppur	6	0.00	0.00	14.70	6.00	5.00	4.80	0.00	1.89	3.74	2.76	2.10	203.09
Ashoknagar	5	0.00	0.00	12.60	6.00	5.00	4.00	0.00	1.62	2.55	2.16	1.80	161.03
Balaghat	5	0.00	0.00	12.60	4.00	5.00	9.20	0.00	1.62	5.10	3.60	1.80	262.82
Barwani	7	0.00	0.00	16.80	6.00	5.00	5.60	0.00	2.16	4.25	3.36	2.40	238.97
Betul	8	0.00	0.00	21.00	5.00	5.00	9.20	0.00	2.70	5.95	4.32	3.00	299.37
Bhind	9	0.00	0.00	23.10	7.00	5.00	10.40	0.00	2.97	6.29	4.80	3.30	307.86
Bhopal	12	0.00	0.00	29.40	14.00	30.00	21.20	0.00	1.35	9.01	7.44	4.20	743.6
Burhanpur	3	0.00	0.00	8.40	2.00	5.00	5.60	0.00	1.08	3.74	2.64	1.20	177.76
Chhatarpur	12	0.00	0.00	29.40	5.00	5.00	16.00	0.00	3.78	7.82	5.64	4.20	372.24
Chhindwara	12	0.00	0.00	29.40	5.00	5.00	18.00	0.00	3.78	10.20	7.44	4.20	479.42
Damoh	6	0.00	0.00	14.70	6.00	5.00	7.60	0.00	1.89	4.08	3.24	2.10	224.21
Datia	4	0.00	0.00	10.50	2.00	5.00	5.20	0.00	1.35	3.23	2.40	1.50	163.98
Dewas	8	0.00	0.00	18.90	5.00	5.00	17.20	0.00	2.43	8.33	6.00	2.70	390.56
Dhar	10	0.00	0.00	25.20	11.00	5.00	10.00	0.00	3.24	5.95	4.56	3.60	308.05
Dindori	1	0.00	0.00	2.10	1.00	5.00	2.00	0.00	0.27	1.70	1.20	0.30	78.57
East Nimar	4	0.00	0.00	10.50	2.00	5.00	9.20	0.00	1.35	5.27	3.84	1.50	244.46
Guna	8	0.00	0.00	21.00	10.00	5.00	6.80	0.00	2.70	3.57	3.12	3.00	239.89
Gwalior	9	0.00	0.00	23.10	10.00	25.00	15.20	0.00	2.97	9.18	6.84	3.30	620.79
Harda	3	0.00	0.00	8.40	2.00	5.00	6.40	0.00	1.08	3.40	2.52	1.20	161.9
Hoshangabad	7	0.00	0.00	16.80	7.00	5.00	7.20	0.00	2.16	4.76	3.60	2.40	265.72
Indore	16	0.00	0.00	42.00	20.00	40.00	21.20	0.00	-1.89	9.69	8.88	6.00	850.28
Jabalpur	12	0.00	0.00	29.40	12.00	15.00	16.80	0.00	3.24	10.03	7.56	4.20	631.63
Jhabua	5	0.00	0.00	12.60	5.00	5.00	6.40	0.00	1.62	4.42	3.12	1.80	230.26
Katni	6	0.00	0.00	14.70	4.00	5.00	6.40	0.00	1.89	4.42	3.12	2.10	218.23
Mandla	5	0.00	0.00	12.60	2.00	5.00	10.00	0.00	1.62	5.27	3.84	1.80	235.83
Mandsaur	7	0.00	0.00	16.80	6.00	5.00	8.40	0.00	2.16	5.44	4.32	2.40	273.42
Morena	8	0.00	0.00	21.00	8.00	5.00	10.40	0.00	2.70	5.44	4.08	3.00	326.12

District	Fire Stations	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Set	Mobile Wireless Set	Walky Talky	Mega Phone	Total
Narsimhapur	5	0.00	0.00	12.60	5.00	5.00	6.00	0.00	1.62	3.40	2.64	1.80	195.06
Neemuch	7	0.00	0.00	16.80	7.00	5.00	6.80	0.00	2.16	4.08	3.36	2.40	235.5
Panna	6	0.00	0.00	14.70	2.00	5.00	10.40	0.00	1.89	5.27	3.84	2.10	248.3
Raisen	10	0.00	0.00	25.20	6.00	5.00	14.80	0.00	3.24	7.99	5.76	3.60	369.39
Rajgarh	10	0.00	0.00	25.20	8.00	5.00	11.60	0.00	3.24	5.95	4.56	3.60	320.95
Ratlam	7	0.00	0.00	16.80	6.00	5.00	9.60	0.00	2.16	5.78	4.32	2.40	292.96
Rewa	11	0.00	0.00	27.30	2.00	5.00	21.20	0.00	3.51	10.71	7.56	3.90	457.58
Sagar	10	0.00	0.00	25.20	10.00	5.00	11.60	0.00	2.97	5.95	4.56	3.60	342.88
Satna	10	0.00	0.00	25.20	9.00	5.00	14.40	0.00	3.24	7.31	5.64	3.60	380.99
Sehore	7	0.00	0.00	16.80	5.00	5.00	10.80	0.00	2.16	5.44	4.08	2.40	278.68
Seoni	3	0.00	0.00	8.40	1.00	5.00	7.20	0.00	1.08	4.25	3.00	1.20	192.03
Shahdol	5	0.00	0.00	12.60	5.00	5.00	2.40	0.00	1.62	3.91	2.88	1.80	202.41
Shajapur	8	0.00	0.00	21.00	7.00	5.00	7.60	0.00	2.70	4.25	3.48	3.00	251.73
Sheopur	3	0.00	0.00	8.40	1.00	5.00	5.60	0.00	1.08	3.23	2.28	1.20	157.39
Shivpuri	10	0.00	0.00	25.20	8.00	5.00	11.60	0.00	3.24	5.95	4.68	3.60	328.57
Sidhi	3	0.00	0.00	8.40	1.00	5.00	7.20	0.00	1.08	4.25	3.00	1.20	203.83
Singrauli	4	0.00	0.00	8.40	4.00	5.00	3.20	0.00	1.08	2.55	1.92	1.20	140.35
Tikamgarh	7	0.00	0.00	16.80	5.00	5.00	7.60	0.00	2.16	4.25	3.36	2.40	220.07
Ujjain	8	0.00	0.00	18.90	9.00	10.00	10.40	0.00	2.43	5.78	4.56	2.70	357.67
Umaria	3	0.00	0.00	8.40	2.00	5.00	1.60	0.00	1.08	2.38	1.68	1.20	116.84
Vidisha	5	0.00	0.00	12.60	4.00	5.00	10.40	0.00	1.62	5.27	3.84	1.80	255.63
West Nimar	7	0.00	0.00	16.80	6.00	5.00	10.40	0.00	2.16	5.78	4.32	2.40	256.66
Total	**350**	**0.00**	**0.00**	**877.80**	**288.00**	**345.00**	**475.60**	**0.00**	**102.33**	**268.60**	**203.28**	**125.40**	**14624.61**

Table 24-28: Cost estimate (in Lakhs Rupees) for gap in specialized fire equipment for new rural Fire Stations

District	Fire Stations	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters / Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Alirajpur	3	0.00	0.00	28.00	6.00	1.90	0.00	0.00	2.00	1.20	47.50	0.00	0.00	32.00	0.00
Anuppur	4	0.00	0.00	15.20	7.50	1.20	0.00	0.00	2.50	1.50	30.00	0.00	0.00	20.00	0.00
Ashoknagar	3	0.00	0.00	26.00	6.00	1.80	0.00	0.00	2.00	1.20	45.00	0.00	0.00	30.00	0.00
Balaghat	5	0.00	0.00	35.60	9.00	2.50	0.00	0.00	3.00	1.80	62.50	0.00	0.00	42.00	0.00
Barwani	2	0.00	0.00	19.20	3.00	1.30	0.00	0.00	1.00	0.60	32.50	0.00	0.00	22.00	0.00
Betul	3	0.00	0.00	22.00	6.00	1.60	0.00	0.00	2.00	1.20	40.00	0.00	0.00	26.00	0.00
Bhind	7	0.00	0.00	39.20	12.00	2.90	0.00	0.00	4.00	2.40	72.50	0.00	0.00	48.00	0.00
Bhopal	3	0.00	0.00	24.00	6.00	1.70	0.00	0.00	2.00	1.20	42.50	0.00	0.00	28.00	0.00
Burhanpur	1	0.00	0.00	14.40	1.50	1.00	0.00	0.00	0.50	0.30	25.00	0.00	0.00	16.00	0.00
Chhatarpur	2	0.00	0.00	9.60	3.00	0.70	0.00	0.00	1.00	0.60	17.50	0.00	0.00	12.00	0.00
Chhindwara	3	0.00	0.00	16.40	6.00	1.20	0.00	0.00	2.00	1.20	30.00	0.00	0.00	20.00	0.00
Damoh	3	0.00	0.00	29.60	6.00	2.00	0.00	0.00	2.00	1.20	50.00	0.00	0.00	34.00	0.00
Datia	1	0.00	0.00	12.40	1.50	0.80	0.00	0.00	0.50	0.30	20.00	0.00	0.00	14.00	0.00
Dewas	1	0.00	0.00	12.40	1.50	0.80	0.00	0.00	0.50	0.30	20.00	0.00	0.00	14.00	0.00
Dhar	7	0.00	0.00	85.60	12.00	5.80	0.00	0.00	4.00	2.40	145.00	0.00	0.00	96.00	0.00
Dindori	3	0.00	0.00	26.00	6.00	1.80	0.00	0.00	2.00	1.20	45.00	0.00	0.00	30.00	0.00
East Nimar	2	0.00	0.00	19.20	3.00	1.30	0.00	0.00	1.00	0.60	32.50	0.00	0.00	22.00	0.00
Guna	4	0.00	0.00	28.80	7.50	2.00	0.00	0.00	2.50	1.50	50.00	0.00	0.00	34.00	0.00
Gwalior	5	0.00	0.00	29.60	9.00	2.20	0.00	0.00	3.00	1.80	55.00	0.00	0.00	36.00	0.00
Harda	1	0.00	0.00	14.40	1.50	1.00	0.00	0.00	0.50	0.30	25.00	0.00	0.00	16.00	0.00
Hoshangabad	2	0.00	0.00	15.20	3.00	1.10	0.00	0.00	1.00	0.60	27.50	0.00	0.00	18.00	0.00
Indore	4	0.00	0.00	53.60	7.50	3.60	0.00	0.00	2.50	1.50	90.00	0.00	0.00	60.00	0.00
Jabalpur	3	0.00	0.00	26.00	6.00	1.80	0.00	0.00	2.00	1.20	45.00	0.00	0.00	30.00	0.00
Jhabua	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Katni	4	0.00	0.00	28.80	7.50	2.00	0.00	0.00	2.50	1.50	50.00	0.00	0.00	34.00	0.00
Mandla	1	0.00	0.00	8.80	1.50	0.60	0.00	0.00	0.50	0.30	15.00	0.00	0.00	10.00	0.00

District	Fire Stations	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters / Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Mandsaur	4	0.00	0.00	24.80	7.50	1.80	0.00	0.00	2.50	1.50	45.00	0.00	0.00	30.00	0.00
Morena	6	0.00	0.00	42.40	10.50	3.00	0.00	0.00	3.50	2.10	75.00	0.00	0.00	50.00	0.00
Narsimhapur	2	0.00	0.00	23.20	3.00	1.60	0.00	0.00	1.00	0.60	40.00	0.00	0.00	26.00	0.00
Neemuch	2	0.00	0.00	15.20	3.00	1.10	0.00	0.00	1.00	0.60	27.50	0.00	0.00	18.00	0.00
Panna	2	0.00	0.00	11.60	3.00	0.80	0.00	0.00	1.00	0.60	20.00	0.00	0.00	14.00	0.00
Raisen	1	0.00	0.00	6.80	1.50	0.50	0.00	0.00	0.50	0.30	12.50	0.00	0.00	8.00	0.00
Rajgarh	3	0.00	0.00	31.60	6.00	2.20	0.00	0.00	2.00	1.20	55.00	0.00	0.00	36.00	0.00
Ratlam	2	0.00	0.00	13.60	3.00	1.00	0.00	0.00	1.00	0.60	25.00	0.00	0.00	16.00	0.00
Rewa	1	0.00	0.00	4.80	1.50	0.40	0.00	0.00	0.50	0.30	10.00	0.00	0.00	6.00	0.00
Sagar	8	0.00	0.00	72.80	15.00	5.00	0.00	0.00	5.00	3.00	125.00	0.00	0.00	84.00	0.00
Satna	5	0.00	0.00	50.80	9.00	3.50	0.00	0.00	3.00	1.80	87.50	0.00	0.00	58.00	0.00
Sehore	2	0.00	0.00	13.60	3.00	1.00	0.00	0.00	1.00	0.60	25.00	0.00	0.00	16.00	0.00
Seoni	4	0.00	0.00	38.40	7.50	2.60	0.00	0.00	2.50	1.50	65.00	0.00	0.00	44.00	0.00
Shahdol	4	0.00	0.00	28.80	7.50	2.00	0.00	0.00	2.50	1.50	50.00	0.00	0.00	34.00	0.00
Shajapur	4	0.00	0.00	32.80	7.50	2.30	0.00	0.00	2.50	1.50	57.50	0.00	0.00	38.00	0.00
Sheopur	3	0.00	0.00	14.40	6.00	1.10	0.00	0.00	2.00	1.20	27.50	0.00	0.00	18.00	0.00
Shivpuri	5	0.00	0.00	33.60	9.00	2.40	0.00	0.00	3.00	1.80	60.00	0.00	0.00	40.00	0.00
Sidhi	2	0.00	0.00	19.20	3.00	1.30	0.00	0.00	1.00	0.60	32.50	0.00	0.00	22.00	0.00
Singrauli	5	0.00	0.00	45.20	9.00	3.10	0.00	0.00	3.00	1.80	77.50	0.00	0.00	52.00	0.00
Tikamgarh	5	0.00	0.00	45.20	9.00	3.10	0.00	0.00	3.00	1.80	77.50	0.00	0.00	52.00	0.00
Ujjain	5	0.00	0.00	47.20	9.00	3.20	0.00	0.00	3.00	1.80	80.00	0.00	0.00	54.00	0.00
Umaria	2	0.00	0.00	9.60	3.00	0.70	0.00	0.00	1.00	0.60	17.50	0.00	0.00	12.00	0.00
Vidisha	4	0.00	0.00	26.80	7.50	1.90	0.00	0.00	2.50	1.50	47.50	0.00	0.00	32.00	0.00
West Nimar	5	0.00	0.00	39.20	9.00	2.80	0.00	0.00	3.00	1.80	70.00	0.00	0.00	46.00	0.00
Total	**163**	**0.00**	**0.00**	**1,331.60**	**292.50**	**93.00**	**0.00**	**0.00**	**97.50**	**58.50**	**2,325.00**	**0.00**	**0.00**	**1,550.00**	**0.00**

Table 24-29: Cost estimate (in Lakhs Rupees) for gap in specialized fire equipment for new rural Fire Stations (continued…)

District	Fire Stations	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Set	Mobile Wireless Set	Walky Talky	Mega Phone	Total
Alirajpur	3	0.00	0.00	8.40	0.00	0.00	7.60	0.00	1.08	3.23	2.28	1.20	142.39
Anuppur	4	0.00	0.00	10.50	0.00	0.00	4.80	0.00	1.35	2.04	1.44	1.50	99.53
Ashoknagar	3	0.00	0.00	8.40	0.00	0.00	7.20	0.00	1.08	3.06	2.16	1.20	135.1
Balaghat	5	0.00	0.00	12.60	0.00	0.00	10.00	0.00	1.62	4.25	3.00	1.80	189.67
Barwani	2	0.00	0.00	4.20	0.00	0.00	5.20	0.00	0.54	2.21	1.56	0.60	93.91
Betul	3	0.00	0.00	8.40	0.00	0.00	6.40	0.00	1.08	2.72	1.92	1.20	120.52
Bhind	7	0.00	0.00	16.80	0.00	0.00	11.60	0.00	2.16	4.93	3.48	2.40	222.37
Bhopal	3	0.00	0.00	8.40	0.00	0.00	6.80	0.00	1.08	2.89	2.04	1.20	127.81
Burhanpur	1	0.00	0.00	2.10	0.00	0.00	4.00	0.00	0.27	1.70	1.20	0.30	68.27
Chhatarpur	2	0.00	0.00	4.20	0.00	0.00	2.80	0.00	0.54	1.19	0.84	0.60	54.57
Chhindwara	3	0.00	0.00	8.40	0.00	0.00	4.80	0.00	1.08	2.04	1.44	1.20	95.76
Damoh	3	0.00	0.00	8.40	0.00	0.00	8.00	0.00	1.08	3.40	2.40	1.20	149.28
Datia	1	0.00	0.00	2.10	0.00	0.00	3.20	0.00	0.27	1.36	0.96	0.30	57.69
Dewas	1	0.00	0.00	2.10	0.00	0.00	3.20	0.00	0.27	1.36	0.96	0.30	57.69
Dhar	7	0.00	0.00	16.80	0.00	0.00	23.20	0.00	2.16	9.86	6.96	2.40	412.18
Dindori	3	0.00	0.00	8.40	0.00	0.00	7.20	0.00	1.08	3.06	2.16	1.20	135.1
East Nimar	2	0.00	0.00	4.20	0.00	0.00	5.20	0.00	0.54	2.21	1.56	0.60	93.91
Guna	4	0.00	0.00	10.50	0.00	0.00	8.00	0.00	1.35	3.40	2.40	1.50	153.45
Gwalior	5	0.00	0.00	12.60	0.00	0.00	9.20	0.00	1.62	3.91	2.76	1.80	168.49
Harda	1	0.00	0.00	2.10	0.00	0.00	4.00	0.00	0.27	1.70	1.20	0.30	68.27
Hoshangabad	2	0.00	0.00	4.20	0.00	0.00	4.40	0.00	0.54	1.87	1.32	0.60	79.33
Indore	4	0.00	0.00	10.50	0.00	0.00	14.80	0.00	1.35	6.29	4.44	1.50	257.58
Jabalpur	3	0.00	0.00	8.40	0.00	0.00	7.60	0.00	1.08	3.23	2.28	1.20	135.79
Jhabua	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Katni	4	0.00	0.00	10.50	0.00	0.00	8.00	0.00	1.35	3.40	2.40	1.50	153.45
Mandla	1	0.00	0.00	2.10	0.00	0.00	2.40	0.00	0.27	1.02	0.72	0.30	43.51
Mandsaur	4	0.00	0.00	10.50	0.00	0.00	7.20	0.00	1.35	3.06	2.16	1.50	138.87
Morena	6	0.00	0.00	14.70	0.00	0.00	12.00	0.00	1.89	5.10	3.60	2.10	225.89
Narsimhapur	2	0.00	0.00	4.20	0.00	0.00	6.40	0.00	0.54	2.72	1.92	0.60	111.78
Neemuch	2	0.00	0.00	4.20	0.00	0.00	4.40	0.00	0.54	1.87	1.32	0.60	79.33

District	Fire Stations	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Set	Mobile Wireless Set	Walky Talky	Mega Phone	Total
Panna	2	0.00	0.00	4.20	0.00	0.00	3.20	0.00	0.54	1.36	0.96	0.60	61.86
Raisen	1	0.00	0.00	2.10	0.00	0.00	2.00	0.00	0.27	0.85	0.60	0.30	36.22
Rajgarh	3	0.00	0.00	8.40	0.00	0.00	8.80	0.00	1.08	3.74	2.64	1.20	159.86
Ratlam	2	0.00	0.00	4.20	0.00	0.00	4.00	0.00	0.54	1.70	1.20	0.60	72.44
Rewa	1	0.00	0.00	2.10	0.00	0.00	1.60	0.00	0.27	0.68	0.48	0.30	28.93
Sagar	8	0.00	0.00	21.00	0.00	0.00	20.00	0.00	2.70	8.50	6.00	3.00	371
Satna	5	0.00	0.00	12.60	0.00	0.00	14.00	0.00	1.62	5.95	4.20	1.80	253.77
Sehore	2	0.00	0.00	4.20	0.00	0.00	4.00	0.00	0.54	1.70	1.20	0.60	72.44
Seoni	4	0.00	0.00	10.50	0.00	0.00	10.40	0.00	1.35	4.42	3.12	1.50	192.79
Shahdol	4	0.00	0.00	10.50	0.00	0.00	8.00	0.00	1.35	3.40	2.40	1.50	153.45
Shajapur	4	0.00	0.00	10.50	0.00	0.00	9.20	0.00	1.35	3.91	2.76	1.50	171.32
Sheopur	3	0.00	0.00	8.40	0.00	0.00	4.40	0.00	1.08	1.87	1.32	1.20	88.47
Shivpuri	5	0.00	0.00	12.60	0.00	0.00	9.60	0.00	1.62	4.08	2.88	1.80	182.38
Sidhi	2	0.00	0.00	4.20	0.00	0.00	5.20	0.00	0.54	2.21	1.56	0.60	93.91
Singrauli	5	0.00	0.00	12.60	0.00	0.00	12.40	0.00	1.62	5.27	3.72	1.80	229.01
Tikamgarh	5	0.00	0.00	12.60	0.00	0.00	12.40	0.00	1.62	5.27	3.72	1.80	229.01
Ujjain	5	0.00	0.00	12.60	0.00	0.00	12.80	0.00	1.62	5.44	3.84	1.80	236.3
Umaria	2	0.00	0.00	4.20	0.00	0.00	2.80	0.00	0.54	1.19	0.84	0.60	54.57
Vidisha	4	0.00	0.00	10.50	0.00	0.00	7.60	0.00	1.35	3.23	2.28	1.50	146.16
West Nimar	5	0.00	0.00	12.60	0.00	0.00	11.20	0.00	1.62	4.76	3.36	1.80	207.14
Total	**163**	**0.00**	**0.00**	**409.50**	**0.00**	**0.00**	**373.20**	**0.00**	**52.65**	**158.61**	**111.96**	**58.50**	**6912.52**

24.4.2 Recurring Cost

Manpower Cost

The manpower cost estimation per year has been carried out by considering pay-scale structure for different level of employees. Accordingly, cost estimates for manpower requirement at various levels by district is shown in Table 24-30 and Table 24-31. The total estimated annual manpower cost for existing and proposed staff will be **Rs. 892.5 Crores** after filling gap in operational and new urban Fire Stations and **Rs. 455.9 Crores only** for new rural Fire Stations (Table 24-30 and Table 24-31).

Table 24-30: Annual cost estimates (in Lakhs Rupees) for manpower for Madhya Pradesh after filling up the gap in operational and new urban Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Alirajpur	3	0.00	-13.75	0.00	0.00	6.40	11.44	20.20	60.20	86.06	395.28	2.52	568.35
Anuppur	6	0.00	0.00	0.00	0.00	6.40	11.44	35.35	103.20	152.26	806.76	5.04	1,120.45
Ashoknagar	5	0.00	0.00	0.00	0.00	6.40	11.44	20.20	77.40	92.68	541.08	4.20	753.40
Balaghat	5	0.00	0.00	0.00	0.00	6.40	5.72	70.70	120.40	205.22	1,305.72	4.20	1,718.36
Barwani	7	0.00	0.00	0.00	0.00	6.40	11.44	35.35	116.10	162.19	887.76	0.84	1,220.08
Betul	8	0.00	0.00	0.00	0.00	0.00	11.44	55.55	159.10	268.11	1,412.64	6.72	1,913.56
Bhind	9	0.00	0.00	0.00	0.00	6.40	11.44	65.65	154.80	254.87	1,464.48	7.56	1,965.20
Bhopal	12	14.76	13.75	8.61	0.00	12.80	22.88	141.40	258.00	450.16	2,676.24	7.56	3,606.16
Burhanpur	3	0.00	0.00	0.00	0.00	6.40	11.44	45.45	90.30	172.12	988.20	1.68	1,315.59
Chhatarpur	12	0.00	0.00	0.00	0.00	12.80	17.16	55.55	223.60	374.03	1,733.40	10.08	2,426.62
Chhindwara	12	0.00	0.00	8.61	0.00	12.80	17.16	95.95	258.00	476.64	2,462.40	10.08	3,341.64
Damoh	6	0.00	0.00	0.00	0.00	6.40	11.44	35.35	116.10	185.36	1,088.64	5.04	1,448.33
Datia	4	0.00	0.00	0.00	0.00	6.40	5.72	30.30	86.00	135.71	670.68	3.36	938.17
Dewas	8	0.00	0.00	0.00	0.00	6.40	11.44	101.00	193.50	347.55	1,995.84	6.72	2,662.45
Dhar	10	0.00	0.00	0.00	0.00	6.40	11.44	55.55	159.10	208.53	1,166.40	8.40	1,615.82
Dindori	1	0.00	0.00	0.00	0.00	6.40	5.72	20.20	34.40	62.89	343.44	0.84	473.89
East Nimar	4	0.00	0.00	0.00	0.00	6.40	11.44	70.70	124.70	235.01	1,296.00	3.36	1,747.61
Guna	8	0.00	0.00	8.61	0.00	6.40	5.72	30.30	116.10	155.57	988.20	6.72	1,317.62
Gwalior	9	0.00	13.75	8.61	0.00	0.00	17.16	111.10	227.90	374.03	2,232.36	6.72	2,991.63
Harda	3	0.00	0.00	0.00	0.00	6.40	11.44	45.45	86.00	162.19	910.44	2.52	1,224.44
Hoshangabad	7	0.00	0.00	8.61	0.00	6.40	11.44	60.60	124.70	191.98	1,234.44	5.88	1,644.05
Indore	16	44.28	0.00	-8.61	0.00	6.40	22.88	176.75	322.50	536.22	3,356.64	12.60	4,469.66
Jabalpur	12	0.00	13.75	8.61	0.00	6.40	22.88	111.10	266.60	417.06	2,543.40	10.08	3,399.88
Jhabua	5	0.00	0.00	0.00	0.00	6.40	11.44	45.45	103.20	152.26	952.56	4.20	1,275.51
Katni	6	0.00	0.00	8.61	0.00	6.40	11.44	50.50	111.80	185.36	1,072.44	0.00	1,446.55
Mandla	5	0.00	0.00	0.00	0.00	6.40	11.44	60.60	129.00	225.08	1,279.80	4.20	1,716.52
Mandsaur	7	0.00	0.00	0.00	0.00	6.40	11.44	55.55	150.50	244.94	1,354.32	5.88	1,829.03
Morena	8	0.00	0.00	0.00	0.00	6.40	17.16	70.70	141.90	215.15	1,399.68	5.88	1,856.87
Narsimhapur	5	0.00	0.00	0.00	0.00	6.40	11.44	25.25	94.60	158.88	923.40	4.20	1,224.17
Neemuch	7	0.00	0.00	0.00	0.00	6.40	5.72	35.35	124.70	188.67	1,053.00	5.88	1,419.72
Panna	6	0.00	0.00	0.00	0.00	6.40	11.44	45.45	133.30	218.46	1,101.60	5.04	1,521.69
Raisen	10	0.00	0.00	0.00	0.00	6.40	5.72	80.80	197.80	317.76	1,675.08	8.40	2,291.96
Rajgarh	10	0.00	0.00	0.00	0.00	12.80	17.16	55.55	167.70	241.63	1,270.08	8.40	1,773.32

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Ratlam	7	0.00	0.00	0.00	0.00	6.40	11.44	70.70	146.20	238.32	1,428.84	3.36	1,905.26
Rewa	11	0.00	13.75	8.61	0.00	0.00	11.44	116.15	253.70	453.47	2,404.08	8.40	3,269.60
Sagar	10	0.00	13.75	8.61	0.00	6.40	17.16	55.55	172.00	251.56	1,551.96	8.40	2,085.39
Satna	10	0.00	0.00	8.61	0.00	12.80	11.44	75.75	197.80	304.52	1,788.48	8.40	2,407.80
Sehore	7	0.00	0.00	0.00	0.00	0.00	5.72	55.55	141.90	238.32	1,299.24	4.20	1,744.93
Seoni	3	0.00	0.00	0.00	0.00	6.40	11.44	55.55	94.60	208.53	1,253.88	2.52	1,632.92
Shahdol	5	0.00	0.00	0.00	0.00	6.40	11.44	35.35	103.20	178.74	1,030.32	4.20	1,369.65
Shajapur	8	0.00	0.00	0.00	0.00	12.80	11.44	35.35	129.00	195.29	1,091.88	6.72	1,482.48
Sheopur	3	0.00	0.00	0.00	0.00	6.40	5.72	35.35	77.40	155.57	845.64	2.52	1,128.60
Shivpuri	10	0.00	0.00	0.00	0.00	12.80	17.16	55.55	172.00	251.56	1,461.24	8.40	1,978.71
Sidhi	3	0.00	0.00	0.00	0.00	6.40	5.72	55.55	98.90	195.29	1,143.72	2.52	1,508.10
Singrauli	4	0.00	0.00	0.00	0.00	6.40	11.44	25.25	68.80	99.30	547.56	3.36	762.11
Tikamgarh	7	0.00	0.00	0.00	0.00	6.40	5.72	35.35	124.70	205.22	1,056.24	5.88	1,439.51
Ujjain	8	0.00	0.00	8.61	0.00	6.40	17.16	65.65	163.40	251.56	1,467.72	6.72	1,987.22
Umaria	3	0.00	0.00	0.00	0.00	6.40	11.44	30.30	60.20	86.06	515.16	2.52	712.08
Vidisha	5	0.00	0.00	0.00	0.00	6.40	11.44	55.55	129.00	235.01	1,289.52	4.20	1,731.12
West Nimar	7	0.00	0.00	0.00	0.00	12.80	11.44	60.60	150.50	254.87	1,370.52	5.04	1,865.77
Total	**350**	**59.04**	**55.00**	**86.10**	**0.00**	**345.60**	**594.88**	**2,934.05**	**7,116.50**	**11,657.82**	**66,128.40**	**272.16**	**89,249.55**

***Level 10**: Director General/Director/Joint Director; **Level 9**: CFO/CO/SP; **Level 8**: Deputy CFO/Dy SP; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/Inspector/EO/Fire Supervisor; **Level 5**: ADFO/ADO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Table 24-31: Cost estimate (in Lakhs Rupees) manpower in Madhya Pradesh for new rural Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Alirajpur	3	0.00	0.00	0.00	0.00	0.00	0.00	35.35	77.40	139.02	677.16	2.52	931.45
Anuppur	4	0.00	0.00	0.00	0.00	0.00	0.00	10.10	60.20	86.06	369.36	3.36	529.08
Ashoknagar	3	0.00	0.00	0.00	0.00	0.00	0.00	30.30	73.10	132.40	631.80	2.52	870.12
Balaghat	5	0.00	0.00	0.00	0.00	0.00	0.00	45.45	107.50	182.05	861.84	4.20	1,201.04
Barwani	2	0.00	0.00	0.00	0.00	0.00	0.00	25.25	51.60	95.99	466.56	1.68	641.08
Betul	3	0.00	0.00	0.00	0.00	0.00	0.00	25.25	64.50	119.16	547.56	2.52	758.99
Bhind	7	0.00	0.00	0.00	0.00	0.00	0.00	45.45	124.70	205.22	965.52	5.88	1,346.77
Bhopal	3	0.00	0.00	0.00	0.00	0.00	0.00	25.25	68.80	125.78	589.68	2.52	812.03
Burhanpur	1	0.00	0.00	0.00	0.00	0.00	0.00	20.20	34.40	62.89	343.44	0.84	461.77
Chhatarpur	2	0.00	0.00	0.00	0.00	0.00	5.72	5.05	34.40	59.58	233.28	1.68	339.71
Chhindwara	3	0.00	0.00	0.00	0.00	0.00	0.00	10.10	60.20	92.68	385.56	2.52	551.06
Damoh	3	0.00	0.00	0.00	0.00	0.00	0.00	35.35	81.70	145.64	719.28	2.52	984.49
Datia	1	0.00	0.00	0.00	0.00	0.00	5.72	20.20	34.40	56.27	298.08	0.84	415.51
Dewas	1	0.00	0.00	0.00	0.00	0.00	0.00	20.20	34.40	56.27	298.08	0.84	409.79
Dhar	7	0.00	0.00	0.00	0.00	0.00	5.72	121.20	223.60	417.06	2,235.60	5.88	3,009.06
Dindori	3	0.00	0.00	0.00	0.00	0.00	5.72	30.30	73.10	132.40	631.80	2.52	875.84
East Nimar	2	0.00	0.00	0.00	0.00	0.00	0.00	25.25	51.60	95.99	463.32	1.68	637.84
Guna	4	0.00	0.00	0.00	0.00	0.00	5.72	30.30	86.00	142.33	690.12	3.36	957.83
Gwalior	5	0.00	0.00	0.00	0.00	0.00	0.00	30.30	98.90	168.81	774.36	4.20	1,076.57
Harda	1	0.00	0.00	0.00	0.00	0.00	0.00	20.20	34.40	62.89	343.44	0.84	461.77
Hoshangabad	2	0.00	0.00	0.00	0.00	0.00	0.00	20.20	47.30	79.44	366.12	1.68	514.74
Indore	4	0.00	0.00	0.00	0.00	0.00	5.72	80.80	141.90	301.21	1,710.72	3.36	2,243.71
Jabalpur	3	0.00	0.00	0.00	0.00	0.00	0.00	35.35	77.40	139.02	677.16	2.52	931.45
Jhabua	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Katni	4	0.00	0.00	0.00	0.00	0.00	0.00	35.35	86.00	148.95	706.32	3.36	979.98
Mandla	1	0.00	0.00	0.00	0.00	0.00	0.00	10.10	25.80	43.03	210.60	0.84	290.37
Mandsaur	4	0.00	0.00	0.00	0.00	0.00	0.00	30.30	73.10	125.78	612.36	3.36	844.90
Morena	6	0.00	0.00	0.00	0.00	0.00	0.00	50.50	124.70	215.15	1,033.56	5.04	1,428.95
Narsimhapur	2	0.00	0.00	0.00	0.00	0.00	0.00	30.30	60.20	105.92	550.80	1.68	748.90
Neemuch	2	0.00	0.00	0.00	0.00	0.00	5.72	20.20	47.30	79.44	366.12	1.68	520.46
Panna	2	0.00	0.00	0.00	0.00	0.00	0.00	10.10	34.40	59.58	285.12	1.68	390.88
Raisen	1	0.00	0.00	0.00	0.00	0.00	0.00	5.05	21.50	36.41	168.48	0.84	232.28
Rajgarh	3	0.00	0.00	0.00	0.00	0.00	5.72	45.45	86.00	152.26	761.40	2.52	1,053.35
Ratlam	2	0.00	0.00	0.00	0.00	0.00	0.00	10.10	38.70	76.13	336.96	1.68	463.57

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Rewa	1	0.00	0.00	0.00	0.00	0.00	0.00	5.05	12.90	19.86	116.64	0.84	155.29
Sagar	8	0.00	0.00	0.00	0.00	0.00	5.72	101.00	202.10	344.24	1,762.56	6.72	2,422.34
Satna	5	0.00	0.00	0.00	0.00	0.00	11.44	75.75	137.60	244.94	1,227.96	4.20	1,701.89
Sehore	2	0.00	0.00	0.00	0.00	0.00	0.00	20.20	38.70	66.20	327.24	1.68	454.02
Seoni	4	0.00	0.00	0.00	0.00	0.00	0.00	50.50	103.20	178.74	929.88	3.36	1,265.68
Shahdol	4	0.00	0.00	0.00	0.00	0.00	0.00	35.35	81.70	139.02	703.08	3.36	962.51
Shajapur	4	0.00	0.00	0.00	0.00	0.00	11.44	45.45	90.30	158.88	790.56	3.36	1,099.99
Sheopur	3	0.00	0.00	0.00	0.00	0.00	5.72	10.10	51.60	79.44	353.16	2.52	502.54
Shivpuri	5	0.00	0.00	0.00	0.00	0.00	5.72	35.35	103.20	175.43	816.48	4.20	1,140.38
Sidhi	2	0.00	0.00	0.00	0.00	0.00	5.72	25.25	51.60	95.99	466.56	1.68	646.80
Singrauli	5	0.00	0.00	0.00	0.00	0.00	0.00	55.55	129.00	221.77	1,085.40	4.20	1,495.92
Tikamgarh	5	0.00	0.00	0.00	0.00	0.00	5.72	60.60	129.00	221.77	1,085.40	4.20	1,506.69
Ujjain	5	0.00	0.00	0.00	0.00	0.00	5.72	60.60	129.00	235.01	1,140.48	4.20	1,575.01
Umaria	2	0.00	0.00	0.00	0.00	0.00	0.00	5.05	34.40	59.58	233.28	1.68	333.99
Vidisha	4	0.00	0.00	0.00	0.00	0.00	0.00	35.35	77.40	132.40	654.48	3.36	902.99
West Nimar	5	0.00	0.00	0.00	0.00	0.00	5.72	50.50	116.10	211.84	1,124.28	4.20	1,512.64
Total	**163**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**108.68**	**1,666.50**	**3,827.00**	**6,725.92**	**33,129.00**	**136.92**	**45,594.02**

***Level 10**: Director General/Director/Joint Director; **Level 9**: CFO/CO/SP; **Level 8**: Deputy CFO/Dy SP; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/Inspector/EO/Fire Supervisor; **Level 5**: ADFO/ADO/AFO/Fire In-charge; **Level 4**: St.O/Sub Inspector/Station In-charge/ASt O./AEO; **Level 3**: S O/Assistant Sub Inspector/ASO/Sub-Fire Officer/; **Level 2** : LFM/ Mechanic Driver/Head Constable/Store Superintendant; **Level 1** : FM/ FM Driver/Radio Technician/ SGFM/ Driver/ Police Constable/ Wireless Technician/ Radio Technician/ Asst FM/ Sanitary Inspector, FO/FO Driver/Driver Operator/Driver/Ambulance Driver/ Clerk; **Level 0:** Cleaner, Fire Coolie, Supporting Staff, Attendant, Labourer, Peon, Security Guard, Tindal.*

Annual Vehicle Maintenance & Repairs, and PDL Cost

For Gap analysis, vehicle maintenance, repairs and Petrol, Diesel & Lubricant (PDL) costs have been estimated based on average current expenditure to total vehicles cost (Table 24-32). The total estimated cost on vehicle maintenance & repairs, and PDL will be **Rs. 30.78 Crores** per year for filling the gap in operational and urban areas in Madhya Pradesh State. The annual specialized equipment, building maintenance, office expanses, and training expanses will be **Rs. 12.3 Crores, Rs. 44.9 Crores, Rs. 58.2 Crores** and **Rs. 10.2 Crores**, respectively.

Table 24-32: Annual recurring cost estimates (in Lakhs Rupees) for petrol, diesel, and lubricants after filling the gap in operational and new urban Fire Stations

District	Fire Stations	Annual Vehicle Maintenance	Annual PDL Cost	Annual Equipment Maintenance	Annual Building Maintenance	Office Expenses	Training Expenses
Alirajpur	3	18.04	13.53	8.87	22.50	37.90	6.62
Anuppur	6	24.52	18.39	17.14	46.00	70.79	12.36
Ashoknagar	5	20.18	15.13	12.89	145.00	47.87	8.36
Balaghat	5	30.41	22.81	21.11	53.50	108.87	19.01
Barwani	7	27.29	20.47	19.68	165.50	80.54	14.06
Betul	8	32.73	24.55	24.81	66.00	121.98	21.30
Bhind	9	35.11	26.33	26.60	69.00	132.84	23.19
Bhopal	12	92.30	69.22	65.93	150.50	254.44	44.43
Burhanpur	3	24.76	18.57	14.91	36.00	83.55	14.59
Chhatarpur	12	38.32	28.74	31.29	78.50	154.92	27.05
Chhindwara	12	48.04	36.03	38.96	108.50	213.77	37.32
Damoh	6	26.44	19.83	18.54	45.00	91.24	15.93
Datia	4	22.49	16.87	13.16	150.50	59.10	10.32
Dewas	8	52.89	39.67	31.46	87.50	170.86	29.83
Dhar	10	34.48	25.86	26.12	77.50	115.59	20.18
Dindori	1	16.94	12.70	6.45	133.00	29.86	5.21
East Nimar	4	30.65	22.99	20.12	55.00	112.96	19.72
Guna	8	25.22	18.91	19.19	43.00	86.28	15.06
Gwalior	9	68.93	51.70	51.77	214.00	205.24	35.84
Harda	3	23.80	17.85	13.22	38.50	77.75	13.58
Hoshangabad	7	29.68	22.26	22.10	62.50	106.02	18.51
Indore	16	101.35	76.01	83.94	277.50	321.32	56.10
Jabalpur	12	63.05	47.29	51.52	224.50	222.08	38.78
Jhabua	5	27.16	20.37	19.01	168.00	80.68	14.09
Katni	6	27.17	20.38	18.72	48.50	93.29	16.29
Mandla	5	30.43	22.82	19.45	172.50	109.37	19.10
Mandsaur	7	31.73	23.80	23.20	61.50	117.27	20.48
Morena	8	32.08	24.06	26.22	63.50	121.33	21.18
Narsimhapur	5	24.04	18.03	15.80	40.00	78.78	13.76
Neemuch	7	26.56	19.92	18.90	48.00	90.87	15.87
Panna	6	30.33	22.75	20.09	174.00	96.18	16.79
Raisen	10	39.95	29.96	31.98	208.50	146.50	25.58
Rajgarh	10	32.83	24.62	26.06	73.00	113.76	19.86
Ratlam	7	44.81	33.61	24.22	65.00	125.82	21.97
Rewa	11	61.02	45.76	38.86	117.00	208.69	36.44
Sagar	10	45.04	33.78	28.53	60.00	134.51	23.49
Satna	10	50.57	37.93	30.86	84.50	155.28	27.11
Sehore	7	31.27	23.45	22.73	62.50	114.79	20.04
Seoni	3	26.57	19.93	15.75	44.00	103.29	18.03
Shahdol	5	25.84	19.38	18.05	43.00	87.93	15.35
Shajapur	8	26.57	19.93	20.41	49.00	94.42	16.49
Sheopur	3	22.61	16.96	12.60	34.00	71.71	12.52

District	Fire Stations	Annual Vehicle Maintenance	Annual PDL Cost	Annual Equipment Maintenance	Annual Building Maintenance	Office Expenses	Training Expenses
Shivpuri	10	32.83	24.62	26.30	65.50	125.07	21.84
Sidhi	3	26.93	20.20	16.87	36.50	95.01	16.59
Singrauli	4	20.18	15.13	11.77	31.50	48.22	8.42
Tikamgarh	7	26.23	19.67	18.01	59.00	91.30	15.94
Ujjain	8	45.50	34.12	29.73	176.00	134.58	23.50
Umaria	3	19.72	14.79	10.28	28.50	45.07	7.87
Vidisha	5	30.89	23.17	21.48	59.00	113.06	19.74
West Nimar	7	32.45	24.34	23.44	68.00	122.29	21.35
Total	**350**	**1,758.94**	**1,319.21**	**1,229.11**	**4,490.00**	**5,824.84**	**1,017.04**

Table 24-33: State level summary of Capital Expenditure required for filling the gap (in Crores Rupees)

Capital Expenditure				
Operational Type	Fire Station Building Infrastructure	Vehicle Cost	Equipment Cost	Total Capital Cost
Operational Fire Stations	170.75	218.90	7.39	397.04
Gap in Operational Fire Stations	1,759.25	465.14	123.31	2,347.70
New Urban Fire Stations	315.00	48.85	22.94	386.79
Total Gap in New Urban and Operational Fire Stations	2,074.25	513.99	146.25	2,734.49
New Rural Fire Stations	1,211.25	235.52	69.13	1,515.90
Total Gap in New Urban ,New Rural and Operational Fire Stations	3,285.50	749.52	215.37	4,250.39

Table 24-34: State level summary of Recurring Expenditure required for filling the gap (in Crores Rupees)

Recurring Expenditure								
Operational Type	Annual Staff Salary	Annual Vehicle Maintenance	Annual Maintenance Contract (Specialized Equipment)	Annual Petrol diesel and Lubricant Cost	Annual Building Maintenance	Annual Office Expenses	Annual Training Expenses	Total Recurring Expenditure
Operational Fire Stations	32.08	5.25	0.59	3.94	3.42	2.02	0.35	47.66
Gap in Operational Fire Stations	798.56	11.16	9.86	8.37	35.19	50.31	8.78	922.24
New Urban Fire Stations	93.93	1.17	1.83	0.88	6.30	5.92	1.03	111.07
Total Gap in New Urban and Operational Fire Stations	892.50	12.34	11.70	9.25	41.49	56.23	9.82	1,033.31
New Rural Fire Stations	455.94	5.65	5.53	4.24	24.23	28.72	5.02	529.33
Total Gap in New Urban ,New Rural and Operational Fire Stations	1,348.44	17.99	17.23	13.49	65.71	84.95	14.83	1,562.64

24.5 Detailed Financial Investment Plan

All the above detailed capital and recurring expenses have been taken into consideration, while finalizing the detailed investment plan for next 10 years for Madhya Pradesh State (Table 24-35 and Table 24-36).

Table 24-35: State level 10 year investment plan for Madhya Pradesh Fire Services for filling gap in operational and new urban Fire Stations (in Crores Rupees)

	Capital Expenditure		Recurring Expenditure					
Year	Building Infrastructure	Vehicle and Equipment	Annual Vehicle Maintenance & PDL AMC	Annual Staff Salary	Annual Office Expenses	Annual Training Office Expenses	Annual Bldg. maintenance	Total
First Year	414.85	294.23	24.49	431.37	27.18	4.74	21.01	1,217.86
Second Year	460.48	308.94	42.32	930.32	58.61	9.59	38.99	1,849.26
Third Year	255.57	15.83	46.61	1,065.53	67.13	10.30	40.66	1,501.63
Fourth Year	283.67	16.62	51.32	1,219.79	76.85	11.06	42.37	1,701.67
Fifth Year	314.89	8.73	55.96	1,380.94	87.00	11.73	43.45	1,902.69
Sixth Year	349.53	9.16	61.00	1,563.21	98.48	12.45	44.54	2,138.38
Seventh Year	387.97	9.62	66.50	1,769.33	111.47	13.21	45.66	2,403.76
Eighth Year	430.66	10.10	72.49	2,002.42	126.15	14.02	46.79	2,702.62
Ninth Year	0.00	10.61	79.01	2,265.96	142.75	14.87	47.94	2,561.14
Tenth Year	0.00	11.14	86.10	2,563.93	161.53	15.78	49.11	2,887.58
Total	**2,897.62**	**694.97**	**585.80**	**15,192.79**	**957.14**	**117.77**	**420.51**	**20,866.61**

Table 24-36: State level 10 year investment plan for Madhya Pradesh Fire Services for filling gap in operational, new urban and new rural Fire Stations (in Crores Rupees)

	Capital Expenditure		Recurring Expenditure					
Year	Building Infrastructure	Vehicle and Equipment	Annual Vehicle Maintenance & PDL AMC	Annual Staff Salary	Annual Office Expenses	Annual Training Office Expenses	Annual Bldg. maintenance	Total
First Year	657.10	294.23	24.49	431.37	27.18	4.74	21.01	1,460.11
Second Year	729.38	308.94	42.32	930.32	58.61	9.59	38.99	2,118.16
Third Year	404.81	83.00	50.21	1,179.92	74.33	11.41	45.61	1,849.28
Forth Year	449.33	87.15	59.09	1,476.01	92.99	13.38	52.35	2,230.30
Fifth Year	498.77	45.76	66.45	1,739.65	109.60	14.78	56.05	2,531.06
Sixth Year	553.64	48.04	74.60	2,045.32	128.86	16.29	59.82	2,926.57
Seventh Year	614.52	50.45	83.63	2,399.29	151.16	17.92	63.66	3,380.62
Eighth Year	682.14	52.97	93.63	2,808.76	176.95	19.66	67.57	3,901.68
Ninth Year	0.00	55.62	104.70	3,281.96	206.76	21.54	71.55	3,742.13
Tenth Year	0.00	58.40	116.93	3,828.28	241.18	23.56	75.60	4,343.95
Total	**4,589.68**	**1,084.55**	**716.05**	**20,120.88**	**1,267.62**	**152.88**	**552.20**	**28,483.85**

24.6 Prioritization of new Fire Stations/Fire Posts

For prioritization of new Fire Stations/Fire Posts, the RMSI team has strictly followed risk categorization and estimated population density in the jurisdiction of new Fire Station/Fire Post as criteria. Accordingly, the priority for establishing new urban Fire Stations and rural Fire Stations/posts has been given in Tables 24-38 and 24-39, respectively.

However, It may be noted that actual implementation of priority depends upon a number of factors such as land availability, land possession, tackling any encroachment on available land, getting construction clearances from various authorities for implementation of construction work. Hence, Madhya Pradesh Fire Services may change the priority of a new Fire Station depending upon the local situation and requirements.

24.7 Avenues of Fund Generation

Madhya Pradesh State can generate new avenues for funds from the followings:

- Introduction of Fire Tax (1% of existing property tax)
- Introduction of Fire Cess, which can be collected for auditing and inspecting various occupancies for adoption of Fire Safety Measures besides training public manpower for use of first aid firefighting equipment
- Training programs at different levels and duration to private sector employee on chargeable basis once State Training Centre becomes operational
- Capitation fees for scrutiny of building plans
- Clearance of building plans from fire safety point of view
- Sale of condemned fire appliances, equipment, uniform articles and general store items
- Fee on deployment of members of MPFS along-with necessary equipment and appliances beyond the jurisdiction of the State Fire Services
- Standby charges on deployment of members of Fire Service along-with equipment and appliances in the area for stand by for a specific duration can be charged except the visits of Government authorities, or in public interest, if demanded by the district administration
- Training Charges from the external trainees sponsored by private industries for short and long duration courses.

24.8 Capacity Building and Training Facilities

Presently, Madhya Pradesh State Fire Services does not have any training institute and Firemen are being trained for a 6-months course at a private institute, named All India Institute of Local Self Government. A few senior officers (sub-officers and above) have got training in National Fire Service College (NFSC), Nagpur. Thus, there is an urgent need of a full – fledged State Fire Training Centre for training of Fireman, Leading Fireman and refresher courses to start with.

The roles of firefighter cannot be performed until and unless sufficient training is imparted to the fire service personnel. The types of training and duration depend upon the type of entry to the fire service department or change of responsibility on promotion. Broadly, there are two entry levels in fire services in India; 1) Fireman level and 2) Middle level (Sub Officer/ Asstt. Station Officer). Immediately after joining the Fire Service, it is mandatory that every fire personnel needs to undergo professional training.

In order to further strengthen the MPFS, the gap in training has been estimated for various levels of fire personnel. The Fire Station survey and gap analysis reveal that there is a huge gap in training need for existing staff. The previous section (section 24.3.3.) details about huge gap in manpower for operational Fire Stations and need of additional fire personnel for new urban and new rural Fire Stations. As per the guidelines of SFAC, immediately after recruitment, fire personnel should undertake professional trainings. Moreover, there should be refresher-training courses at an interval of 3 to 5 years for every fire personnel. The following sections detail about the estimation of training need at different levels (fireman, leading fireman, station officer, sub-officer etc.).

24.8.1 BASIC TRAINING FOR FIREMAN

The basic training course should provide practical experience of fire fighting to meet the challenge in fire fighting operations. Fire personnel should also be trained for operation and maintenance of fire fighting vehicles and equipment.

Estimated number of fire personnel who require basic training for fireman in operational Fire Stations (after filling the gap of manpower), and additional new recruitment for new urban and new rural Fire Stations is shown in Table 24-37. Additional requirement of Refresher Training Course for fireman after every 3-5 years of service is also shown the Table 24-37. Some of the special training for handling specialized equipment such as Breathing Apparatus, Global-positioning System etc. should also be part of the Refresher course. As a whole, Madhya Pradesh Fire Services would require to train 30,883 fire personnel in basic and 16,145 fire personnel in refresher training in next 10 years. Therefore, State training centre should have adequate capacity and infrastructure for meeting such training requirement.

24.8.2 TRAINING COURSE FOR LEADING FIREMAN

While promotion from fireman to leading fireman category, fire personnel should undertake training course designed for leading fireman. This training will provide both theoretical and practical training required for effective deployment of fire vehicles and fire equipment as well.

Estimated number of fire personnel who require training for leading fireman in operational Fire Stations (after filling the gap of manpower), and additional new recruitment for new urban and new rural Fire Stations is shown in Table 24-37. In total, MPFS would need to train at least 5,570 leading fireman for specialized courses in next 10 years.

24.8.3 OTHER SPECIALIZED TRAINING COURSES

Besides regular normal training course for leading fireman, every leading fireman should also undergo at least one special training for multi-tasking performance in due course of time. In many cases, the fire services need to face new challenges and play an important role in other emergencies. Therefore, fire personnel must be well trained to perform in all possible situations. Some of the other specialized trainings courses are mentioned below:

- Breathing Apparatus
- Collapsed structure – Search & Rescue
- Advanced Search & Rescue
- Flood Rescue
- Chemical Disaster
- Flood / Cyclone Disaster Response
- Earthquake Disaster Response
- Emergency Response to Rail Accidents
- Hazardous Material Emergency

The syllabi for above courses are already provided in SFAC guidelines. Number of leading fireman need to attend specialized course is also shown in Table 24-37. In total, MPFS would need to train at least 3,538 personnel in other specialized courses in next 10 years.

24.8.4 JUNIOR OFFICER TRAINING COURSE

While promotion from leading fireman to sub-officer/ station officer fire personnel should undertake a Junior Officer training course. This course should provide an understanding of Fire Station administration, fire safety management and leadership as to be able to command a Fire Station and command a fire crew in case of an emergency. Upon successful completion of the training, fire officers should be able to identify components of an effective fire service organization and planning requirement. The officials will be responsible for implementation of fire safety and prevention programs at their assigned Fire Station.

Estimated number of fire officers who need to participate in Junior Officer training course in operational Fire Stations (after filling the gap of manpower), and additional new recruitment for new urban and new rural Fire Stations is shown in Table 24-37. After filling gap in operational Fire Stations, new urban and rural Fire Stations, Madhya Pradesh Fire Service would require to train 3,468 junior officers in next 10 years.

Table 24-37: Estimated training requirements for fire personnel in Madhya Pradesh Fire Services

Basic Training for Fireman		
	Number of Fire Personnel in Operational Fire Stations	18483
	Number of Fire Personnel in New Urban Fire Stations	2175
	Number of Fire Personnel in New Rural Fire Stations	10225
	Total Number of Fire Personnel for Training	**30883**
Refresher Training for Fireman		
	Total Number of Fire Personnel	**16145**
Leading Fireman Training Course		
	Number of Fire Personnel in Operational Fire Stations	3228
	Number of Fire Personnel in New Urban Fire Stations	310
	Number of Fire Personnel in New Rural Fire Stations	2032
	Total Number of Fire Personnel for Training	**5570**
Other specialized Training Course		
	Total Number of Fire Personnel for Training	**3538**
Junior Officer Training Course		
	Number of Fire Personnel in Operational Fire Stations	1994
	Number of Fire Personnel in New Urban Fire Stations	254
	Number of Fire Personnel in New Rural Fire Stations	1220
	Total Number of Fire Personnel for Training	**3468**
Divisional Officer Training Course		
	Number of Fire Personnel in Operational Fire Stations	155

	Number of Fire Personnel in New Urban Fire Stations	23
	Number of Fire Personnel in New Rural Fire Stations	19
	Total Number of Fire Personnel for Training	**197**
Fire Prevention Course		
	Total Number of Fire Personnel for Training	**210**

24.8.5 DIVISIONAL FIRE OFFICER TRAINING COURSE

On promotion to divisional officer, every fire officer should undertake a Divisional Fire Officer (DFO) training course. This course should provide with theory, principles and practices in terms of Fire Station management, facilities, fire inspection as well as effective guidelines to command fire crew and control at an incident site. This course should be designed to promote them for their roles as senior fire officers. Upon successful completion of training, officers should be able to identify components of an effective fire service organization, and implementation of fire prevention and fire safety programs at their assigned area of jurisdiction.

Estimated number of fire officers who require Divisional Officer training course in operational and new Fire Stations (after filling the gap of manpower) is shown in Table 24-37. About 197 fire officers in MPFS would require this training in next 10 years.

24.8.6 AWARENESS GENERATION PROGRAMS

Besides attending regular fire and other rescue calls, the State fire services should also work on awareness generation programs, and it should conduct regular awareness programs in schools, colleges, residential areas, cinema halls, shopping malls, hospitals, NCC camps, industries, Govt.& private offices etc. However, there is an urgent need for Madhya Pradesh Fire Service to work on awareness generation programs in a more organized way, and should conduct regular awareness generation programs in schools, colleges, residential areas, cinema halls, shopping malls, hospitals, NCC camps, industries, Govt. and private offices etc.

For large scale public awareness generation, each district is recommended with an Education Van equipped with short video films as produced by MHA, distribution of pamphlets on “DO”s and “DON’T”s to prevent fire produced by MHA, live- demonstrations of how to use “portable extinguishers” and how to handle small kitchen fires.

24.9 Limitations of the Study

1. In fire hazard and risk analysis, fire-load of specific industry has not been taken into consideration. However, weightage has been given to the size of industrial area in the fire hazard and risk analysis of the base unit (district level). An attempt has been made even in the present assignment to go further down at lower levels. Providing special weightage of type of industry will require building level survey including estimation of fire-load for each industry, which is out of scope of present assignment.
2. Currently, Census (2011) has published only district level demographic data (the Tehsil/ Block level data is still unavailable), which has been used for further estimation and analysis purpose.
3. Floating population in cities has not been considered for distribution over the land use (built-up area); this may be attempted in future detailed studies.
4. Non-availability of a uniform level of fire statistics of all the fire events in the past 5 years.
5. Designation, rank structure and administrative control are very heterogeneous from State to State, which in the present State creates ambiguity while brining in at National level. For example, Director Position pay scale in one State may not be equal to that of Chief Fire Officer in another State. For the purpose of present assignment, we have divided the rank/designation structure into 11 levels (level 0 to level 10). For this, a system needs to be put in place through having a uniform administrative structure at national level to State level. This may require development and implementation of National Fire Act, which MHA is trying to develop in near future.
6. The fire fighting infrastructure of forest department, privately owned companies/ organizations, military cantonment and airbases, nuclear power plants, nuclear research reactors, heavy water plants, mines, ports, airports, oil exploration and oil refineries are out of scope of present study. However, RMSI has tried to get information about the fire-fighting infrastructure for these, and included whatever information made available, as there are limitations due to security concerns. This is more so, as result of this study may be made available in public domain with their spatial location. Studying fire infrastructure in above areas will require special MOU's with MHA and controlling agencies, and may be attempted in future studies to have a complete coverage of the country.

24.10 Recommendations for Madhya Pradesh Fire Services

1. At present, State does not have Madhya Pradesh Fire Act, however, the State has Municipal Corporation Act 1956, and Municipalities Act 1961, which were revised in 1984 and again amended in 2012. Both of these Acts contain one chapter on Fire Service. Moreover, building-bylaws in the State were amended in 2012 by incorporating the provisions of National Building Code (NBC, Part-IV). As per seismic zoning map of India, Madhya Pradesh State falls in Seismic Zone III & Zone II which is low to moderate seismic hazard prone area, however there is a need for Madhya Pradesh Fire Act and strict implementation of fire safety codes in building design and construction. National Building Code (NBC) should be strictly adhered to in high-rise buildings, schools, hospitals, industrial units, institutions and public and private buildings. Though majority of structures in Madhya Pradesh are low rise, however, keeping in mind the growth of high-rise buildings in present and future and State's low to moderate vulnerability to earthquakes, there is a need for strict implementation of building codes in various types of occupancies.
2. Madhya Pradesh State Fire Services lacks firefighting manpower significantly and there are large number of vacancies at all levels in the State in operational Fire Stations, which need to be filled up at the earliest.
3. The State do not have a State Fire Service Training Centre and presently Firemen are being trained for a 6 months duration course at a private train school (All India Institute of Local Self Government), Bhopal. There is an urgent need of a full-fledged State Fire Training Institute.
4. Instead of having fireman, driver, and operator separately, the State should recruit fireman-cum-driver-cum-operator. This will help in optimizing the huge manpower requirements. Since, these may not be readily available, the State should train the new recruit in a systematic manner, and encourage all the existing staff, specially, fireman and leading fireman to obtain heavy vehicle driving license. The State may offer some incentive towards this, as this will help in optimization of resources.
5. Based on prioritization of Fire Stations, State Fire Services needs to add new Fire Stations at a faster pace, as there is a large gap in number of Fire Stations.
6. To have a Computerization of Madhya Pradesh Fire Services, training of fire personnel in use of computers is required, which is very important from the modernization of point of view.
7. Online Vehicle tracking through GPS and development of a fully computerized response system is another area for improvement.
8. Though fire service in the State is creating public awareness programs for schools, hospitals, Govt. offices, etc. however, it is not up to the desired level due to lack of trained manpower. For that purpose sufficient manpower at senior officer levels have been recommended to have an effective State "*Fire Prevention Wing*". The fire prevention wing should have trained officials for fire inspection, awareness and training, so that fire incidences similar to that of AMRI, Kolkata should not occur in the State. The State should have a dedicated "*Education Van*" in each district for the purpose. The van should be well equipped with short video films as produced by MHA, distribution of pamphlets on "DO"s and "DON'T"s generated by MHA, and live demonstration of how to use "portable extinguishers" and handle small fires.
9. Periodic fire drills and fire-inspection of schools, colleges, hospitals, shopping complexes, cinema-halls, multi-storied buildings, and industrial centers should be taken care by the State fire services.

10. The Madhya Pradesh Fire Services should ensure that for operational duty, physically unfit firefighter should not be part of team, and he/she should be allowed to work in the areas, other than fire response.
11. For congested areas, and by-lanes where movement of Water Tender and Water Bowser is difficult, QRTs and motorcycle with mist sets should be used for the fastest response, supplemented by the Water Tenders and Water Bowsers by laying the large hose pipelines. Additionally, State Fire Service should identify congested areas and request district administration to decongest such areas with the help of police. The congestion could be in terms of illegal extension of residential buildings, shops, unauthorized parking on roads. For unauthorized parking, State traffic department can also play an important role. Here role of fire prevention officials is important as such, exercises are not one time exercise and should be carried out regularly.
12. Although State fire service does have some promotional avenues for their staff, however, there is an urgent need to have merit-based promotion, so that deserving employees remain motivated and do not leave the organization at midst of their career.
13. The Fire Service in the State should have audit by a central authority to ensure good finance mechanism for capital, and O&M expenditures.

Table 24-38: Details of operational and new proposed urban Fire Stations with their estimated ideally served population under their jurisdiction, population density, and priority ranking for new Fire Stations

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Alirajpur	MP3113	Alirajpur Fire Station	Operational Urban	1458	
Alirajpur	MP3114	Jobet Fire Station	Operational Urban	1351	
Anuppur	MP_New_Urban_34	Dahangaon	New Urban	2335	44
Anuppur	MP_New_Urban_33	Vivek Nagar	New Urban	2292	46
Anuppur	MP3078	Pasan Fire Brigade	Operational Urban	2452	
Anuppur	MP3079	Kotma Fire station	Operational Urban	1868	
Anuppur	MP3080	Anuppur Fire Station	Operational Urban	1179	
Ashoknagar	MP_New_Urban_4	Mungaoli	New Urban	2150	47
Ashoknagar	MP_New_Urban_8	Pipraigaon	New Urban	1542	49
Ashoknagar	MP_New_Urban_1	Isagarh	New Urban	856	55
Ashoknagar	MP2957	Chanderi Fire Station	Operational Urban	2196	
Ashoknagar	MP2958	Ashoknagar Fire Station	Operational Urban	1736	
Balaghat	MP2331	Baiher Fire Station	Operational Urban	2137	
Balaghat	MP2334	Balaghat Fire Station	Operational Urban	4535	
Balaghat	MP2335	Waraseoni Fire Station	Operational Urban	2569	
Barwani	MP2557	Rajpur Fire Station	Operational Urban	1815	
Barwani	MP2598	Sendhwa Fire Station	Operational Urban	3580	
Barwani	MP2653	Anjad Fire Station	Operational Urban	2345	
Barwani	MP2658	Barwani Fire Station	Operational Urban	4254	
Barwani	MP2660	Khetya Fire Station	Operational Urban	6269	
Betul	MP2417	Amla Fire Station	Operational Urban	1807	
Betul	MP2426	Multai Fire Station	Operational Urban	1672	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Betul	MP3057	Sarni Fire Station	Operational Urban	4526	
Betul	MP3083	Betul Fire station	Operational Urban	3076	
Bhind	MP_New_Urban_9	Nonera	New Urban	2303	45
Bhind	MP2780	Mau Fire Brigade	Operational Urban	1051	
Bhind	MP2788	City Kotwali Bhind Fire Brigade	Operational Urban	6480	
Bhind	MP2792	Gauhad Nagar Palik Parishad Fire Brigade	Operational Urban	2048	
Bhind	MP2796	Lahar Nagar Parisad Fire Brigade	Operational Urban	1831	
Bhind	MP3241	Malanpur Police Fire Station	Operational Urban	1012	
Bhopal	MP_New_Urban_55	Kolar Rd	New Urban	5926	11
Bhopal	MP_New_Urban_54	Laharpur	New Urban	5252	13
Bhopal	MP_New_Urban_53	Patel Nagar	New Urban	4998	15
Bhopal	MP_New_Urban_52	Kamla Nagar	New Urban	4876	16
Bhopal	MP_New_Urban_51	Bhanpur	New Urban	4050	20
Bhopal	MP2485	Govindpura Fire Station	Operational Urban	6341	
Bhopal	MP2905	Fategarh Fire Station	Operational Urban	13975	
Bhopal	MP2944	Chhola Sub Fire Station	Operational Urban	10419	
Bhopal	MP3064	Sant Hridayram Nagar Fire Station(Bairagarh)	Operational Urban	7274	
Bhopal	MP3066	Pulboghda Fire Station	Operational Urban	16996	
Bhopal	MP3068	Link Road No.3 Sub-Fire Station	Operational Urban	10390	
Bhopal	MP3112	Police Fire Station Mantralaya Bhopal	Operational Urban	9272	
Burhanpur	MP2743	Burhanpru Municipal Corporation	Operational Urban	7051	
Burhanpur	MP2761	Nepa Nagar Fire Station	Operational Urban	2905	
Chhatarpur	MP2908	Badamalehra Fire Station	Operational Urban	1505	
Chhatarpur	MP2925	Chhatarpur Fire Station	Operational Urban	3658	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Chhatarpur	MP2933	Nowgong Fire Station	Operational Urban	2470	
Chhatarpur	MP2937	Maharajpur Fire Station	Operational Urban	800	
Chhindwara	MP2264	Pandhurna Fire Station	Operational Urban	1794	
Chhindwara	MP2275	Sausar Fire Station	Operational Urban	2219	
Chhindwara	MP2279	Chhindwara Fire Station	Operational Urban	5526	
Chhindwara	MP2281	Dongar Parasia Fire Station	Operational Urban	4072	
Damoh	MP_New_Urban_11	Narsinghgarh	New Urban	1355	51
Damoh	MP2618	Patharia Fire Station	Operational Urban	807	
Damoh	MP2626	Damoh Fire Station	Operational Urban	3438	
Damoh	MP2629	Hindoria Fire Station	Operational Urban	1937	
Damoh	MP2877	Hatta Fire Station	Operational Urban	2256	
Datia	MP2987	Bhandar Nagar Parishad Fire Brigade	Operational Urban	1603	
Datia	MP2994	Datia Fire Brigade	Operational Urban	5586	
Dewas	MP_New_Urban_31	Dewas	New Urban	2582	43
Dewas	MP2999	Hat pipalay Fire brigade	Operational Urban	1433	
Dewas	MP3004	Dewas Fire Brigade	Operational Urban	7224	
Dewas	MP3010	Khategaon Nagar Parishad Fire Brigade	Operational Urban	2329	
Dhar	MP_New_Urban_41	Pithampur	New Urban	4818	6
Dhar	MP2563	Dhar Fire Station	Operational Urban	5769	
Dhar	MP2582	Pithampur Police Fire station	Operational Urban	1481	
Dhar	MP2608	Dhamnod Fire Station	Operational Urban	2693	
Dhar	MP2611	kukshi Fire Station	Operational Urban	2489	
Dhar	MP2612	Dharampuri Fire Station	Operational Urban	1689	
Dhar	MP2634	Rajgarh Fire Station	Operational Urban	4314	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Dhar	MP2647	Manawar Fire Station	Operational Urban	3692	
Dhar	MP3041	Badnawar Municipal Counicil Fire Brigade	Operational Urban	3527	
Dindori	MP3062	Dindori Fire Station	Operational Urban	2670	
East Nimar	MP2731	Khandwa Fire Station	Operational Urban	4429	
East Nimar	MP2748	Mundhi Fire Station	Operational Urban	546	
Guna	MP_New_Urban_13	Miana	New Urban	2652	41
Guna	MP_New_Urban_2	Kumbhraj	New Urban	2634	42
Guna	MP_New_Urban_12	Binaganj	New Urban	2110	48
Guna	MP_New_Urban_26	Todi	New Urban	1308	52
Guna	MP_New_Urban_14	Ruthiyai	New Urban	931	54
Guna	MP2799	Aroun Nagar Parisad (Fire Brigade)	Operational Urban	1725	
Guna	MP2805	Guna Fire Station	Operational Urban	4261	
Guna	MP2986	Raghogarh Vijayapur Nagar Palika Fire Brigade	Operational Urban	1270	
Gwalior	MP_New_Urban_57	Hathiyapaur	New Urban	9419	10
Gwalior	MP_New_Urban_17	Bilaua	New Urban	4624	18
Gwalior	MP_New_Urban_58	Vayu Nagar	New Urban	4344	19
Gwalior	MP_New_Urban_15	Mohana	New Urban	3704	22
Gwalior	MP2521	Roop singh stadium Fire brigade Gwalior(HQ)	Operational Urban	13496	
Gwalior	MP2527	Sub Fire station Givaji chowk Wada	Operational Urban	15731	
Gwalior	MP2533	Sub Fire station Trikoniya Murar	Operational Urban	10526	
Gwalior	MP2759	Dabra Fire Station	Operational Urban	3314	
Harda	MP2724	Harda Fire Station	Operational Urban	1230	
Harda	MP2727	Khirkiyan Fire Station	Operational Urban	2048	
Hoshangabad	MP_New_Urban_16	Pachmarhi	New Urban	4491	56

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Hoshangabad	MP2432	Itarsi Fire Station	Operational Urban	6678	
Hoshangabad	MP2433	Seoni Malwa Fire Station	Operational Urban	1177	
Hoshangabad	MP2435	Hoshangabad Fire Station	Operational Urban	5185	
Hoshangabad	MP2446	Sohagpur Fire Station	Operational Urban	2005	
Hoshangabad	MP2452	Piparia Fire Station	Operational Urban	2700	
Indore	MP_New_Urban_40	Aranya Nagar	New Urban	11117	1
Indore	MP_New_Urban_37	Bijli Nagar	New Urban	9827	2
Indore	MP_New_Urban_35	Dhanvantri Nagar	New Urban	8397	3
Indore	MP_New_Urban_39	Narwal	New Urban	6369	4
Indore	MP_New_Urban_36	New Rani Bagh	New Urban	5984	5
Indore	MP_New_Urban_18	Goutampura	New Urban	3199	7
Indore	MP_New_Urban_42	Betma	New Urban	2750	8
Indore	MP_New_Urban_38	Nainod Village	New Urban	2350	9
Indore	MP2988	Rau Fire Brigade	Operational Urban	3946	
Indore	MP3002	Mahu Cantonment Fire Brigade	Operational Urban	4323	
Indore	MP3007	Dipal pur Fire Brigade(Nagar parishad office)	Operational Urban	1743	
Indore	MP3009	Indore Municipal Corporation Fire Brigade	Operational Urban	14597	
Indore	MP3106	Laxmibai Nagar Police Fire Station	Operational Urban	22108	
Indore	MP3108	Moti Tabela police Fire station	Operational Urban	15244	
Indore	MP3110	G.N.T. Market Police Fire Brigade	Operational Urban	15738	
Indore	MP3111	Gandhi Hall Police Fire Station	Operational Urban	16554	
Jabalpur	MP_New_Urban_47	Suhagi	New Urban	5011	14
Jabalpur	MP_New_Urban_46	Ranjhi Bazzar	New Urban	4632	17
Jabalpur	MP_New_Urban_50	Bilhari	New Urban	3779	21

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Jabalpur	MP_New_Urban_49	Shastri Nagar	New Urban	3602	23
Jabalpur	MP_New_Urban_48	Kanchan Vihar	New Urban	2984	24
Jabalpur	MP_New_Urban_45	Tighra	New Urban	1205	25
Jabalpur	MP2321	Jabalpur Fire Station	Operational Urban	15835	
Jabalpur	MP2322	Patan Fire Station	Operational Urban	854	
Jabalpur	MP2324	Sihora Fire Station	Operational Urban	1449	
Jabalpur	MP2325	Panagar Fire Station	Operational Urban	1475	
Jhabua	MP_New_Urban_3	Meghnagar	New Urban	13835	26
Jhabua	MP2547	Petalawad Fire Station	Operational Urban	1795	
Jhabua	MP2645	Jhabua Fire Station	Operational Urban	3201	
Jhabua	MP2894	Thandla Fire Station	Operational Urban	3176	
Katni	MP_New_Urban_32	Madhav Nagar	New Urban	3971	35
Katni	MP_New_Urban_19	Umaria Pan	New Urban	3311	37
Katni	MP3059	Kymore Fire Station	Operational Urban	3248	
Katni	MP3061	Katni Fire Station	Operational Urban	5429	
Mandla	MP2327	Mandla Fire Station	Operational Urban	5495	
Mandla	MP2330	Nainpur Fire Station	Operational Urban	2095	
Mandsaur	MP2885	Mandsaur Fire Station	Operational Urban	5159	
Mandsaur	MP2892	Garoth Fire Station	Operational Urban	1454	
Mandsaur	MP2899	Bhanpura Fire Station	Operational Urban	1078	
Mandsaur	MP2901	Pipliamandi Fire Station	Operational Urban	1028	
Mandsaur	MP2903	Shamgarh Fire Station	Operational Urban	2037	
Morena	MP2768	Morena Fire Station	Operational Urban	7169	
Morena	MP2769	Jaura Muncipal Council (Fire Brigade)	Operational Urban	5994	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Morena	MP2774	Banmore Fire Station	Operational Urban	2230	
Morena	MP2776	Kailaras Fire Station	Operational Urban	2089	
Morena	MP2778	Sabalgarh Fire Brigade	Operational Urban	7065	
Morena	MP2781	Ambah Municipal Fire Brigade	Operational Urban	2604	
Morena	MP2787	Porsa Fire Station	Operational Urban	4257	
Narsimhapur	MP2309	Narsinghpur Fire Station	Operational Urban	4746	
Narsimhapur	MP2310	Kareli Fire Station	Operational Urban	2329	
Narsimhapur	MP2313	Gadarwara Fire Station	Operational Urban	4288	
Narsimhapur	MP2316	Gotegaon Fire Station	Operational Urban	2262	
Neemuch	MP_New_Urban_6	Kukdeshwar	New Urban	3290	38
Neemuch	MP_New_Urban_7	Khor	New Urban	1182	53
Neemuch	MP2875	Manasa Fire Station	Operational Urban	1134	
Neemuch	MP2879	Neemuch Fire Station	Operational Urban	3490	
Neemuch	MP2881	Rampura Fire Station	Operational Urban	2139	
Neemuch	MP2883	Jawad Fire Station	Operational Urban	580	
Panna	MP2668	Panna Fire Station	Operational Urban	2512	
Panna	MP2904	Devendranagar Fire Station	Operational Urban	812	
Raisen	MP2453	Mandideep Fire Station	Operational Urban	1635	
Raisen	MP2455	Obeidulla Ganj Fire Station	Operational Urban	636	
Raisen	MP2457	Bareili Fire Station	Operational Urban	3762	
Raisen	MP2471	Beghamganj Fire Station	Operational Urban	1367	
Raisen	MP2479	Raisen Fire Station	Operational Urban	2512	
Rajgarh	MP2806	Biaora Nagar Parisad(Fire Brigade)	Operational Urban	2616	
Rajgarh	MP3018	Sarangpur Nagar Parishad Fire Brigade	Operational Urban	1158	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Rajgarh	MP3024	Pachor Nagar Parishad Fire brigade	Operational Urban	856	
Rajgarh	MP3025	Narsinghgarh Nagar Parishad Fire Brigade	Operational Urban	1277	
Rajgarh	MP3042	Khilchipur Fire Brigade	Operational Urban	976	
Rajgarh	MP3049	Rajgarh Fire Brigade	Operational Urban	1907	
Rajgarh	MP3054	Zirapur Fire Brigade	Operational Urban	1929	
Ratlam	MP_New_Urban_30	Ratlam	New Urban	6162	28
Ratlam	MP2896	Ratlam Fire Staion	Operational Urban	12956	
Ratlam	MP3021	Jaora Fire Brigade	Operational Urban	2338	
Ratlam	MP3028	Alot Fire Brigade	Operational Urban	909	
Ratlam	MP3032	Tal Fire Brigade	Operational Urban	917	
Rewa	MP_New_Urban_29	Rewa	New Urban	4363	32
Rewa	MP2669	Rewa Fire Station	Operational Urban	5219	
Sagar	MP_New_Urban_10	Shahgarh	New Urban	3808	36
Sagar	MP_New_Urban_28	Makronia	New Urban	2998	40
Sagar	MP2572	Rahatgarh Fire Station	Operational Urban	858	
Sagar	MP2579	Khurai Fire Station	Operational Urban	1194	
Sagar	MP2601	Deori Fire Station	Operational Urban	1337	
Sagar	MP2606	Garhakota Fire Station	Operational Urban	994	
Sagar	MP2609	Raheli Fire Station	Operational Urban	1241	
Sagar	MP2610	Beena Fire Station	Operational Urban	1247	
Sagar	MP2614	Sagar Fire Station	Operational Urban	7073	
Satna	MP_New_Urban_27	South Pateri	New Urban	6102	29
Satna	MP_New_Urban_25	Raigaon	New Urban	4748	31
Satna	MP2590	Amarpatan Fire Station	Operational Urban	973	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Satna	MP2594	Maihar Fire Station	Operational Urban	3487	
Satna	MP2597	Satna Fire Station	Operational Urban	5698	
Satna	MP2603	Chitrakoot Fire Station	Operational Urban	1403	
Satna	MP2678	Nagod Fire Station	Operational Urban	1326	
Satna	MP2715	Birsinghpur Fire Station	Operational Urban	945	
Sehore	MP2486	Astha Fire Station	Operational Urban	1181	
Sehore	MP2488	Nasrullaganj Fire Station	Operational Urban	1248	
Sehore	MP2491	Sehore Fire Station	Operational Urban	3103	
Sehore	MP2495	Budhani Fire Station	Operational Urban	402	
Seoni	MP2289	Seoni Fire Station	Operational Urban	2467	
Shahdol	MP2712	Beuhari Fire Station	Operational Urban	493	
Shahdol	MP2717	Shahdol Fire Station	Operational Urban	4233	
Shahdol	MP3082	Budhar Fire Station	Operational Urban	4428	
Shahdol	MP3144	Dhanpuri Fire Station	Operational Urban	3570	
Shajapur	MP3033	Nalkheda Fire Brigade	Operational Urban	1232	
Shajapur	MP3036	Makshi Fire Brigade	Operational Urban	2188	
Shajapur	MP3047	Shajapur Fire Brigade	Operational Urban	3917	
Shajapur	MP3055	Sunser Nagar Parishad Fire Brigade	Operational Urban	1106	
Shajapur	MP3058	Agar Fire Brigade	Operational Urban	656	
Shajapur	MP3135	Shujalpur Fire Brigade	Operational Urban	2667	
Sheopur	MP2992	Sheopur Fire Station	Operational Urban	3787	
Shivpuri	MP_New_Urban_20	Ranod	New Urban	4788	30
Shivpuri	MP_New_Urban_21	Badarwas	New Urban	4125	33
Shivpuri	MP_New_Urban_23	Ganj Dinara	New Urban	4047	34

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Shivpuri	MP_New_Urban_5	Bhatnawar	New Urban	3145	39
Shivpuri	MP_New_Urban_22	Aichwara	New Urban	1464	50
Shivpuri	MP2991	Shivpuri Fire Station	Operational Urban	5788	
Shivpuri	MP3019	Karera Nagar Parishad Fire Brigade	Operational Urban	3986	
Sidhi	MP2691	Sidhi Fire Sstation	Operational Urban	8791	
Singrauli	MP_New_Urban_43	Vindhya Nagar	New Urban	3462	57
Singrauli	MP_New_Urban_44	Waidhan	New Urban	1570	58
Singrauli	MP2726	Singroli Fire Station	Operational Urban	1996	
Singrauli	MP2728	Morwa Fire Station	Operational Urban	3168	
Tikamgarh	MP_New_Urban_24	Khargapur	New Urban	8582	27
Tikamgarh	MP2888	Prithivipur Fire Station	Operational Urban	897	
Tikamgarh	MP2900	Tikamgarh Fire Station	Operational Urban	4814	
Tikamgarh	MP2902	Niwai Fire Station	Operational Urban	1800	
Ujjain	MP_New_Urban_56	Vikramnagar	New Urban	5353	12
Ujjain	MP2995	Badnagar Fire Brigade	Operational Urban	1007	
Ujjain	MP3014	Tarana Fire Brigade	Operational Urban	1432	
Ujjain	MP3034	Ujjain Municipal Corparation Fire Brigade(Fire Station)	Operational Urban	8960	
Ujjain	MP3043	Mahindpur Nagar Parishd (Fire Brigade)	Operational Urban	992	
Ujjain	MP3045	Nagda Fire Brigade	Operational Urban	3484	
Ujjain	MP3048	Kachrod Fier Brigade	Operational Urban	3061	
Ujjain	MP3052	Unhel Fire Bergade	Operational Urban	802	
Umaria	MP2858	Umaria Fire Station	Operational Urban	2849	
Umaria	MP2860	Pali Fire Station	Operational Urban	2607	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Vidisha	MP2542	Vidisha Fire Station	Operational Urban	4893	
Vidisha	MP2545	Sironj Fire Station	Operational Urban	1449	
Vidisha	MP2565	Ganj Basoda Fire Station	Operational Urban	3054	
West Nimar	MP2737	Khargon Fire Station	Operational Urban	4214	
West Nimar	MP2751	Bhikargaon Fire Station	Operational Urban	1383	
West Nimar	MP2754	Sanawad Fire Station	Operational Urban	1475	
West Nimar	MP2757	Barwah Fire Station	Operational Urban	3380	
West Nimar	MP2764	Maheshwar Fire Station	Operational Urban	1838	

Table 24-39: Details of operational and new proposed rural Fire Stations with their estimated ideally served population under their jurisdiction, population density and priority ranking for new Fire Stations

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Alirajpur	MP_New_Rural_64	Fulmal	New Rural	275	46
Alirajpur	MP_New_Rural_65	Nanpur	New Rural	271	48
Alirajpur	MP_New_Rural_66	Bori	New Rural	143	101
Alirajpur	MP2575	Chandrasekhar Azad Nagar (BHABRA)	Operational Rural	78	
Anuppur	MP_New_Rural_69	Anuppur	New Rural	271	49
Anuppur	MP_New_Rural_67	Nigwani	New Rural	245	57
Anuppur	MP_New_Rural_70	Jaithari	New Rural	169	87
Anuppur	MP_New_Rural_44	Rajendragram	New Rural	49	126
Anuppur	MP3081	Bijuri Fire Brigade	Operational Rural	193	
Ashoknagar	MP_New_Rural_94	Nai Sarai	New Rural	209	68
Ashoknagar	MP_New_Rural_100	Bahadurpur	New Rural	154	93
Ashoknagar	MP_New_Rural_96	Bhatoli	New Rural	137	103
Balaghat	MP_New_Rural_24	Khairlanji	New Rural	241	128
Balaghat	MP_New_Rural_26	Kirnapur	New Rural	240	129
Balaghat	MP_New_Rural_29	Lalbarra	New Rural	234	130
Balaghat	MP_New_Rural_141	Ukwa	New Rural	90	155
Balaghat	MP_New_Rural_30	Lanji	New Rural	29	162
Balaghat	MP2333	Malajkhand Fire Station	Operational Rural	77	
Balaghat	MP2336	Katangi Fire Station	Operational Rural	322	
Barwani	MP_New_Rural_162	Khajuri	New Rural	422	32
Barwani	MP_New_Rural_40	Borghat	New Rural	151	96
Barwani	MP2661	Pansemal Fire Station	Operational Rural	136	
Barwani	MP2733	Palsudh Fire Station	Operational Rural	107	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Betul	MP_New_Rural_153	Prabhat Pattan	New Rural	215	132
Betul	MP_New_Rural_120	Chhindi	New Rural	175	137
Betul	MP_New_Rural_52	Shahpur	New Rural	96	153
Betul	MP2397	Chincholi Fire Brigade	Operational Rural	93	
Betul	MP2404	Athner Fire Station	Operational Rural	145	
Betul	MP2405	Bhainsdehi Fire Station	Operational Rural	104	
Betul	MP2414	Betul Bazar Fire Station	Operational Rural	153	
Bhind	MP_New_Rural_77	Chhareta	New Rural	442	29
Bhind	MP_New_Rural_32	Mihona	New Rural	299	42
Bhind	MP_New_Rural_82	Amayan	New Rural	290	45
Bhind	MP_New_Rural_81	Umri	New Rural	266	50
Bhind	MP_New_Rural_1	Ater	New Rural	232	60
Bhind	MP_New_Rural_83	Nirpura	New Rural	220	64
Bhind	MP_New_Rural_47	Gorai	New Rural	207	69
Bhind	MP2789	Mehgaon Nagar Parisad Fire Brigade	Operational Rural	424	
Bhind	MP2795	Daboh Nagar Prishad Fire Brigade	Operational Rural	341	
Bhind	MP2797	Alampur Nagar Parisad (Fire Brigade)	Operational Rural	291	
Bhopal	MP_New_Rural_154	Barkheda Bondar	New Rural	427	12
Bhopal	MP_New_Rural_122	Neelbad	New Rural	247	17
Bhopal	MP_New_Rural_124	Nazirabad	New Rural	145	24
Burhanpur	MP_New_Rural_25	Khaknar	New Rural	168	88
Burhanpur	MP2755	Sahapur Fire Station	Operational Rural	209	
Chhatarpur	MP_New_Rural_106	Pahra	New Rural	250	54
Chhatarpur	MP_New_Rural_105	Dhouri	New Rural	199	74
Chhatarpur	MP2907	Barigarh Fire Station	Operational Rural	231	
Chhatarpur	MP2909	Chandla Fire Station	Operational Rural	127	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Chhatarpur	MP2910	Luvkush Nagar Fire Station	Operational Rural	183	
Chhatarpur	MP2924	Grimalhera Fire Station	Operational Rural	229	
Chhatarpur	MP2926	Bijawar Fire Station	Operational Rural	109	
Chhatarpur	MP2928	Rajnagar Fire Station	Operational Rural	174	
Chhatarpur	MP2930	Khajuraho Fire Station	Operational Rural	163	
Chhatarpur	MP2935	Harpalpur Fire Station	Operational Rural	412	
Chhindwara	MP_New_Rural_9	Bichhua	New Rural	154	94
Chhindwara	MP_New_Rural_140	Chhindi	New Rural	70	120
Chhindwara	MP_New_Rural_57	Delakhari	New Rural	66	123
Chhindwara	MP2267	Mohgaon Fire Station	Operational Rural	101	
Chhindwara	MP2273	Lodhikheda Fire Station	Operational Rural	112	
Chhindwara	MP2285	Junnardeo Fire Station	Operational Rural	265	
Chhindwara	MP2286	Damua Fire Station	Operational Rural	181	
Chhindwara	MP2288	Chaurai Fire Station	Operational Rural	272	
Chhindwara	MP2298	Amarwada Fire Station	Operational Rural	153	
Chhindwara	MP2303	Harrai Fire Station	Operational Rural	56	
Chhindwara	MP3109	Newton Chikhli Fire Station	Operational Rural	239	
Damoh	MP_New_Rural_8	Batiagarh	New Rural	136	104
Damoh	MP_New_Rural_42	Patera	New Rural	130	108
Damoh	MP_New_Rural_18	Jabera	New Rural	120	112
Damoh	MP2622	Tendukheda Fire Station	Operational Rural	196	
Datia	MP_New_Rural_88	Parasari	New Rural	309	40
Datia	MP2800	Indergarh Nagar Parisad	Operational Rural	227	
Datia	MP2807	Sevda Nagar Parisad (Fire Brigade)	Operational Rural	182	
Dewas	MP_New_Rural_58	Amona	New Rural	257	52
Dewas	MP2996	Kannod Nagar Parishad Fire Brigade	Operational Rural	145	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Dewas	MP3008	Loharda Nagar Parishad Fire Brigade	Operational Rural	150	
Dewas	MP3015	Sonkachh Fire Brigade	Operational Rural	164	
Dewas	MP3039	Bhoransa Fire Brigade	Operational Rural	188	
Dhar	MP_New_Rural_143	Singaga	New Rural	451	1
Dhar	MP_New_Rural_158	Bakaner	New Rural	430	2
Dhar	MP_New_Rural_132	Labriya	New Rural	260	6
Dhar	MP_New_Rural_130	Dasai	New Rural	230	7
Dhar	MP_New_Rural_156	Tilgara	New Rural	167	8
Dhar	MP_New_Rural_13	Kharbardi	New Rural	147	10
Dhar	MP_New_Rural_131	Nalchha	New Rural	147	11
Dhar	MP2581	Dahi Fire Station	Operational Rural	94	
Dindori	MP_New_Rural_53	Shahpura	New Rural	119	147
Dindori	MP_New_Rural_115	Mahadwani	New Rural	103	152
Dindori	MP_New_Rural_113	Gadasarai	New Rural	73	157
East Nimar	MP_New_Rural_146	Khalwa	New Rural	126	146
East Nimar	MP_New_Rural_133	Mohana	New Rural	109	150
East Nimar	MP2734	Chanera Fire Station	Operational Rural	223	
East Nimar	MP3105	Pandhana Fire Station	Operational Rural	157	
Guna	MP_New_Rural_92	Baneh	New Rural	188	77
Guna	MP_New_Rural_95	Bhadaur	New Rural	168	89
Guna	MP_New_Rural_98	Barkhedi Mafi	New Rural	96	117
Guna	MP_New_Rural_93	Patan	New Rural	67	122
Gwalior	MP_New_Rural_74	Susera	New Rural	410	13
Gwalior	MP_New_Rural_85	Sonsa	New Rural	325	14
Gwalior	MP_New_Rural_86	Bhageh	New Rural	215	21
Gwalior	MP_New_Rural_84	Banwar	New Rural	176	23

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Gwalior	MP_New_Rural_87	Ghatigaon	New Rural	57	27
Gwalior	MP2765	Bhitarwar Fire Brigade Muncipality	Operational Rural	244	
Harda	MP_New_Rural_137	Sirali	New Rural	127	110
Harda	MP2729	Timarhi Fire Station	Operational Rural	169	
Hoshangabad	MP_New_Rural_5	Bankheri	New Rural	183	133
Hoshangabad	MP_New_Rural_142	Dhain	New Rural	23	163
Hoshangabad	MP2444	Babai Fire Station	Operational Rural	172	
Indore	MP_New_Rural_48	Sanwer	New Rural	352	3
Indore	MP_New_Rural_134	Datoda	New Rural	300	4
Indore	MP_New_Rural_161	Bhil Balodi	New Rural	265	5
Indore	MP_New_Rural_157	Kampel	New Rural	166	9
Jabalpur	MP_New_Rural_33	Majholi	New Rural	259	16
Jabalpur	MP_New_Rural_27	Kundam	New Rural	210	22
Jabalpur	MP_New_Rural_116	Bargi Nagar	New Rural	133	25
Jabalpur	MP2318	Shahpura Fire Station	Operational Rural	296	
Jabalpur	MP2323	Katangi Fire Station	Operational Rural	183	
Jhabua	MP2642	Ranapur Fire Station (Jhabua)	Operational Rural	178	
Katni	MP_New_Rural_2	Bahoriband	New Rural	206	70
Katni	MP_New_Rural_46	Imlaj	New Rural	186	78
Katni	MP_New_Rural_6	Banvara	New Rural	177	83
Katni	MP_New_Rural_12	Dheemarkheda	New Rural	163	91
Katni	MP3098	Barhi Fire brigade	Operational Rural	151	
Katni	MP3099	Vijayraghavgarh fire brigade	Operational Rural	183	
Mandla	MP_New_Rural_114	Chandwara	New Rural	171	86
Mandla	MP2326	Niwas Fire Station	Operational Rural	150	
Mandla	MP2328	Bhua Bichhia Fire Station	Operational Rural	42	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Mandla	MP2329	Bahmnibanjar Fire Station	Operational Rural	196	
Mandsaur	MP_New_Rural_129	Budha Village	New Rural	245	56
Mandsaur	MP_New_Rural_145	Chandwasa	New Rural	194	76
Mandsaur	MP_New_Rural_56	Suwasra	New Rural	174	84
Mandsaur	MP_New_Rural_60	Bhawani Ganj	New Rural	148	98
Mandsaur	MP2876	Sitamau Fire Station	Operational Rural	235	
Mandsaur	MP2884	Nagari Fire Station	Operational Rural	241	
Morena	MP_New_Rural_75	Datahara	New Rural	391	34
Morena	MP_New_Rural_72	Budhara	New Rural	329	37
Morena	MP_New_Rural_71	Kasmada	New Rural	317	38
Morena	MP_New_Rural_78	Mainabasai	New Rural	299	43
Morena	MP_New_Rural_73	Chakrauda	New Rural	274	47
Morena	MP_New_Rural_79	Arroda	New Rural	145	100
Morena	MP2771	Jhundpura Fire Station	Operational Rural	222	
Narsimhapur	MP_New_Rural_118	Shrinagar	New Rural	178	81
Narsimhapur	MP_New_Rural_119	Karapgoan	New Rural	137	102
Narsimhapur	MP2315	Tendukheda Fire Station	Operational Rural	158	
Neemuch	MP_New_Rural_155	Jiran	New Rural	291	44
Neemuch	MP_New_Rural_144	Besla	New Rural	63	124
Neemuch	MP2882	Deeken Fire Station	Operational Rural	124	
Panna	MP_New_Rural_136	Saleha	New Rural	152	95
Panna	MP_New_Rural_51	Bori	New Rural	124	111
Panna	MP2664	Ajaygarh Fire Station	Operational Rural	127	
Panna	MP2667	Pawai Fire Station	Operational Rural	129	
Panna	MP2675	Amanganj Fire Station	Operational Rural	148	
Panna	MP2893	Kakrahti Fire Station	Operational Rural	175	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Raisen	MP_New_Rural_121	Chicklod	New Rural	113	115
Raisen	MP2460	Udaipura Fire Station	Operational Rural	281	
Raisen	MP2463	Bari Fire Station	Operational Rural	172	
Raisen	MP2465	Gairatganj Fire Station	Operational Rural	137	
Raisen	MP2473	Silwani Fire Station	Operational Rural	101	
Raisen	MP2475	Sanchi Fire Station	Operational Rural	88	
Rajgarh	MP_New_Rural_125	Jhadla	New Rural	260	51
Rajgarh	MP_New_Rural_127	Chhapera	New Rural	178	82
Rajgarh	MP_New_Rural_126	Kachri	New Rural	172	85
Rajgarh	MP3013	Khujner Nagar Parishad Fire Brigade	Operational Rural	173	
Rajgarh	MP3035	Talen Nagar Parishad Fire Brigade	Operational Rural	248	
Rajgarh	MP3040	Machalpur Fire Brigade	Operational Rural	223	
Ratlam	MP_New_Rural_43	Dhamedi	New Rural	338	36
Ratlam	MP_New_Rural_3	Bajna	New Rural	117	113
Ratlam	MP2889	Barawada Fire Station	Operational Rural	240	
Ratlam	MP2897	Sailana Fire station	Operational Rural	149	
Rewa	MP_New_Rural_45	Navagaon	New Rural	429	31
Rewa	MP2673	Naigarhi Fire Station	Operational Rural	264	
Rewa	MP2680	Gurh Fire Station	Operational Rural	694	
Rewa	MP2688	Hanumana Fire Station	Operational Rural	256	
Rewa	MP2692	Teothar Fire Station	Operational Rural	182	
Rewa	MP2698	Baikunthpur Fire Station	Operational Rural	543	
Rewa	MP2701	Semariya Fire Station	Operational Rural	400	
Rewa	MP2705	Mauganj Fair Station	Operational Rural	243	
Rewa	MP2718	Managawan Fire Station	Operational Rural	325	
Rewa	MP3060	Sirmour Fire Station	Operational Rural	139	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Sagar	MP_New_Rural_148	Tal Semara	New Rural	316	39
Sagar	MP_New_Rural_101	Baroda Village	New Rural	214	65
Sagar	MP_New_Rural_59	Kesli	New Rural	213	66
Sagar	MP_New_Rural_102	Deori	New Rural	179	80
Sagar	MP_New_Rural_104	Hirapur	New Rural	161	92
Sagar	MP_New_Rural_99	Khimlasa	New Rural	147	99
Sagar	MP_New_Rural_139	Pithoriya	New Rural	98	116
Sagar	MP_New_Rural_103	Sihora	New Rural	80	119
Sagar	MP2583	Banda Fire Station	Operational Rural	159	
Satna	MP_New_Rural_108	Bela	New Rural	469	28
Satna	MP_New_Rural_150	Amin	New Rural	440	30
Satna	MP_New_Rural_109	Doli	New Rural	246	55
Satna	MP_New_Rural_149	Raipur	New Rural	233	59
Satna	MP_New_Rural_107	Kothi	New Rural	180	79
Satna	MP2566	Unchehara Fire Station	Operational Rural	216	
Satna	MP2586	Kotar Fire Station	Operational Rural	367	
Sehore	MP_New_Rural_123	Barkheda Hasan	New Rural	163	141
Sehore	MP_New_Rural_37	Rehti	New Rural	110	149
Sehore	MP2490	Ichhowar Fire Station	Operational Rural	178	
Sehore	MP2492	Reheti Fire Station	Operational Rural	127	
Sehore	MP2496	Sahaganj Fire Station	Operational Rural	114	
Seoni	MP_New_Rural_14	Ghansaur	New Rural	172	139
Seoni	MP_New_Rural_117	Ugli	New Rural	167	140
Seoni	MP_New_Rural_61	Seoni Chhapara	New Rural	117	148
Seoni	MP_New_Rural_28	Kurai	New Rural	82	156
Seoni	MP2294	Barghat Fire Station	Operational Rural	289	

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Seoni	MP2296	Lakhnadon Fire Station	Operational Rural	102	
Shahdol	MP_New_Rural_111	Singhpur	New Rural	166	90
Shahdol	MP_New_Rural_19	Belbahara	New Rural	150	97
Shahdol	MP_New_Rural_62	Bansagar	New Rural	130	109
Shahdol	MP_New_Rural_68	Chhohari	New Rural	117	114
Shahdol	MP2682	Jaysinghnagar Fire Station	Operational Rural	63	
Shajapur	MP_New_Rural_22	Kalapipal	New Rural	204	71
Shajapur	MP_New_Rural_16	Gulana	New Rural	202	72
Shajapur	MP_New_Rural_35	Moman Babodiya	New Rural	201	73
Shajapur	MP_New_Rural_7	Barod	New Rural	199	75
Shajapur	MP3046	Akolia Fire Brigade	Operational Rural	200	
Shajapur	MP3051	Soyatkalan Fire Brigade	Operational Rural	253	
Sheopur	MP_New_Rural_76	Sheopur	New Rural	177	136
Sheopur	MP_New_Rural_23	Karahal	New Rural	66	159
Sheopur	MP_New_Rural_80	Pathako	New Rural	54	160
Sheopur	MP2803	Vijaypur Nagar Parisad (Fire Brigade)	Operational Rural	51	
Sheopur	MP3029	Baroda Nagar Parishad Fire Brigade	Operational Rural	162	
Shivpuri	MP_New_Rural_163	Vijroni	New Rural	251	53
Shivpuri	MP_New_Rural_89	Jhiri	New Rural	134	105
Shivpuri	MP_New_Rural_36	Narwar	New Rural	133	106
Shivpuri	MP_New_Rural_91	Mohammadpur	New Rural	131	107
Shivpuri	MP_New_Rural_90	Amola	New Rural	68	121
Shivpuri	MP2808	Pichore Nagar Parishad Fire Station	Operational Rural	41	
Shivpuri	MP2809	Khaniyadhana Nagar Parisad Fire Brigade	Operational Rural	97	
Shivpuri	MP3000	Kolaras Fire brigade	Operational Rural	224	
Sidhi	MP_New_Rural_54	Patpara	New Rural	177	135

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Sidhi	MP_New_Rural_31	Majholi	New Rural	106	151
Sidhi	MP2686	Churrahat Fire Station	Operational Rural	130	
Sidhi	MP2711	Rampur Naiki Fire Station	Operational Rural	329	
Singrauli	MP_New_Rural_151	Amhatola	New Rural	328	127
Singrauli	MP_New_Rural_110	Bargawa	New Rural	230	131
Singrauli	MP_New_Rural_11	Deosar	New Rural	178	134
Singrauli	MP_New_Rural_152	Khutar	New Rural	162	142
Singrauli	MP_New_Rural_10	Chitranji	New Rural	40	161
Tikamgarh	MP_New_Rural_160	Bandha	New Rural	410	33
Tikamgarh	MP_New_Rural_20	Vaidau	New Rural	342	35
Tikamgarh	MP_New_Rural_41	Palera	New Rural	238	58
Tikamgarh	MP_New_Rural_39	Jijora	New Rural	227	62
Tikamgarh	MP_New_Rural_4	Baldeogarh	New Rural	211	67
Tikamgarh	MP2850	Orchha Fire Station	Operational Rural	145	
Tikamgarh	MP2886	Kari Fire Station	Operational Rural	291	
Tikamgarh	MP2890	Tarichar Kalan Fire Station	Operational Rural	102	
Ujjain	MP_New_Rural_15	Jaithal	New Rural	286	15
Ujjain	MP_New_Rural_147	Dhanasuta	New Rural	234	18
Ujjain	MP_New_Rural_159	Ruie	New Rural	231	19
Ujjain	MP_New_Rural_63	Jharda	New Rural	231	20
Ujjain	MP_New_Rural_128	Makdon	New Rural	128	26
Umaria	MP_New_Rural_112	Karkeli	New Rural	94	154
Umaria	MP_New_Rural_34	Manpur	New Rural	68	158
Umaria	MP2855	Chandia Fire Station	Operational Rural	164	
Vidisha	MP_New_Rural_97	Jhandwa	New Rural	173	138
Vidisha	MP_New_Rural_17	Gyaraspur	New Rural	129	143

District	FSRefNo	Fire Station Name	Operational Type	Population Density	Priority Ranking of New FS
Vidisha	MP_New_Rural_38	Wardha	New Rural	126	144
Vidisha	MP_New_Rural_55	Pairwasa	New Rural	126	145
Vidisha	MP2555	Lateri Fire Station	Operational Rural	160	
Vidisha	MP2560	Kurwai Fire Station	Operational Rural	223	
West Nimar	MP_New_Rural_49	Gaonsan	New Rural	301	41
West Nimar	MP_New_Rural_50	Segaon	New Rural	229	61
West Nimar	MP_New_Rural_138	Rodia	New Rural	221	63
West Nimar	MP_New_Rural_135	Dhulkot	New Rural	85	118
West Nimar	MP_New_Rural_21	Bhikangaon	New Rural	61	125
West Nimar	MP2746	Mandleshwar Fire Station	Operational Rural	206	
West Nimar	MP2749	Kasrawad Fire Station	Operational Rural	370	

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