Directorate General NDRF & Civil Defence (Fire)
Ministry of Home Affairs
East Block 7, Level 7,
NEW DELHI, 110066,

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 Pilot States (Delhi, Rajasthan, Maharashtra, Jammu & Kashmir, Puducherry, and Andaman & Nicobar Islands)

December 2011

Submitted by

RMSI
A-8, Sector 16
Noida 201301, INDIA
Tel: +91-120-251-1102, 2101
Fax: +91-120-251-1109, 0963
www.rmsi.com

Contact: **Sushil Gupta**
General Manager, Risk Modeling and Insurance
Email:Sushil.Gupta@rmsi.com

RMSI
Delivering a world of solutions

Table of Contents

List of Figures

List of Tables

Acknowledgements

The assistance of Shri Rajiv, Director General (DG), NDRF & CD, Shri Mukul Goel, IG, NDRF & CD, Shri Om Prakash, Fire Adviser, Shri D. K. Shami, Dy. Fire Adviser, Shri Chandrasekhar, Director (Fire Project Cell), Shri Nakul Kumar Tarun, Dy. Director (Fire Project Cell), Shri Santosh Gupta, Assistant Director (Fire Project Cell), Shri Santosh J. Thomas, Assistant Director, (Fire Project Cell), NDRF & CD and other staff members of the Directorate of NDRF & CD is gratefully appreciated for giving this opportunity.

In addition, the support and valuable assistance of Dr. G. A. Bhat, DG, Fire and Emergency Services, J&K, Shri R. S. Sodhi, Director, Fire and Emergency Services, J&K; Shri M. V. Deshmukh, Director, Maharashtra Fire Service; Shri A. K. Sharma, Director, Delhi Fire Service, Shri G.C. Mishra, CFO, Delhi Fire Service; Shri S.B. Deol, DGP, Andaman & Nicobar Islands, Shri Surendra Sharma, Dy. S.P. and Shri Anyesh Roy, CFO Andaman & Nicobar Islands; Shri Balla Kristaya, Divisional Fire Officer, Puducherry; Shri Sudhakar, ADG, Civil Defence & Home Guard, Rajasthan, Jaipur, Shri Tarachand Meena, Director and Shri Manish Goel, Additional Director, Local Body Directorate, Rajasthan, Shri Ishwar Jat, CFO, Jaipur and various other officials and staff is gratefully acknowledged.

Our special thanks are due to Shri R. K. Srivastava, Joint-Secretary (DM), MHA, Shri Sanjay Agrawal, Director (DM), MHA and the project reviewing and monitoring committee consisting of Shri Rajiv, Director DG, NDRF & CD, (Chairman), Dr G. A. Bhat (member), Lt. Col (retd.) P.K. Pathak, Consultant, NIDM (member), Shri Om Prakash (member), and Shri Chandrasekhar (member – secretary), for sparing their valuable time in review of this report.

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 one 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 Station s 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 Station s, 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, majority 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 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 this initial phase, the pilot study comprises of 6 States and UTs (Jammu & Kashmir, Rajasthan, Maharashtra, Delhi, Andaman & Nicobar Island, and Puducherry).

Field Surveys for Fire Infrastructure Data

To collect and collate the information on Fire Infrastructure of these Pilot 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. All this information for each 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

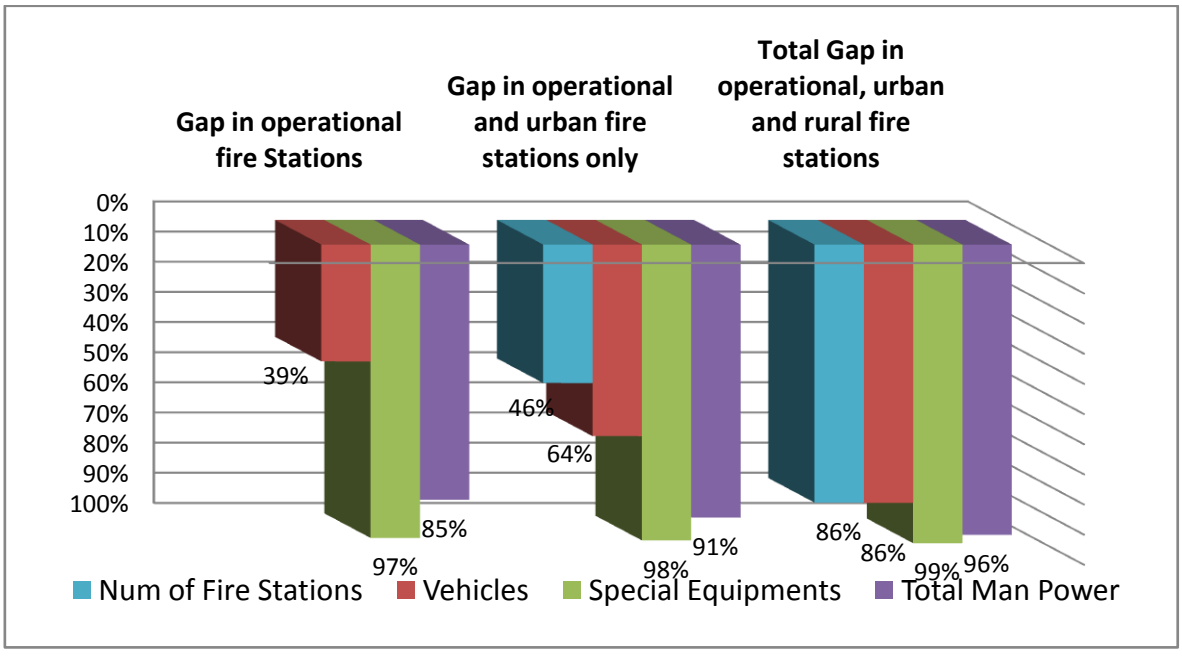
Summary of Findings for Rajasthan State

Presently, Rajasthan State Fire Services has 126 operational Fire Stations in urban area.

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 ports, airports, military cantonments, power plants etc. The remaining areas, not covered under ideal jurisdiction of operational Fire Stations were 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 within ideal jurisdiction boundary and built-up industrial areas.

Fire Station Gap Analysis

As per detailed GIS based analysis, the State would require additional 107 Fire Stations in urban areas and 641 Fire Stations in rural areas. Thus, this study proposes a further addition of 107 urban Fire Stations and 641 rural Fire Stations, which is an overall deficiency of 86% in terms of number of Fire Stations in Rajasthan (for details, please refer to section 8.3.1).



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 8.3.2. Thus, this study finds an overall gap of about 86% in fire fighting and rescues vehicles and about 99% 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 double-shift, and triple shift duty pattern as ARD has already optimized the fire manpower requirement in comparison to what has been suggested in SFAC norms. The current duty pattern in Rajasthan is triple shift, hence RMSI team estimated the fire manpower requirement for double shift and triple shift respectively (for details, please refer to section 8.3.3).Thus, this study finds an overall gap of about 96% in fire personnel for 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, hospitals, high-rise buildings, 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, Rajasthan Fire Services, additional officers at the levels of Joint Directors (JD), Chief Fire Officers (CFO), Dy Chief Fire Officers (Dy-CFO), Division Officers (DO), and Assistant Divisional Officer (ADO) have been recommended (for details, please refer to section 8.3.3).

Fire Station, District and State Levels Report Generation

The detailed report of Operational Fire Station, district and State levels for fire infrastructure and gap analysis is also available through Fire Decision Support System (FDSS), which can generate report for each Operational Fire Station, district, and State level reports 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 dynamic web-based Fire Decision Support System (FDSS). As detailed in section 8.4, 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 for investment plan (section 8.5) for the next 10-years includes both capital and recurring expenditures. Thus, RMSI analysis estimates a total investment of about **Rs. 19,162 Crores** spread over a period of 10 years for Rajasthan State 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 Rajasthan State for both rural and urban areas has been detailed in section 8.6. Accordingly, separate priority ranking for both urban and rural areas are given in Tables 8-44 and 8-45, respectively.

Avenues for Fund Generation

Rajasthan 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 types of occupancies (residential, commercial, and industrial) for adoption of fire safety measures besides training public for use of first aid firefighting equipment
- Training programs at different levels and duration to private sector employee on chargeable basis
- Capitation fees can be charged for scrutiny of building plans
- Fire service charges on clearance of building plans from fire safety point of view
- Sale of condemned fire appliances, equipment, uniform articles and general store items
- The fee on deployment of members of fire services along-with necessary equipment and appliances beyond the jurisdiction of the State fire services
- Standby charges on deployment of members of fire services along-with equipment and appliances in the area to stand by for a specific duration, which can be made exceptional for the visits of government authorities or in public interest asked by the district administration

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 Rajasthan State. The detailed Capacity building and training need assessment for various levels have been discussed in section 8.8. Additionally, RMSI team has made a separate report of Capacity Building and Training Infrastructure for all States/UTs in the country

Limitations of Study

Limitations of study have been given in section 8.9.

Recommendations

The report concludes with the recommendations for the Rajasthan State Fire Services and is detailed in section 8.10. In short, Rajasthan State Fire Services can be revamped in the next 10 years to desired level, if sufficient funds and trained resources are made available.

Report Structure

This report for Pilot States/UTs is divided in two parts:

Part A: This part comprises of chapters 1-6, which are common for all the pilot States/UTs- Delhi, Jammu & Kashmir, Rajasthan, Puducherry, Maharashtra, and Andaman & Nicobar Islands.

- 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 7-12, which are prepared for pilot State/UT specific.

- Chapter 7 provides detailed analysis for the Delhi State
- Chapter 8 provides detailed analysis for the Rajasthan State
- Chapter 9 provides detailed analysis for the Maharashtra State
- Chapter 10 provides detailed analysis for the Jammu & Kashmir State
- Chapter 11 provides detailed analysis for the Puducherry UT
- Chapter 12 provides detailed analysis for the A&N Islands UT

For Part-B, this report consists of Chapter 8, which is for the Rajasthan 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).

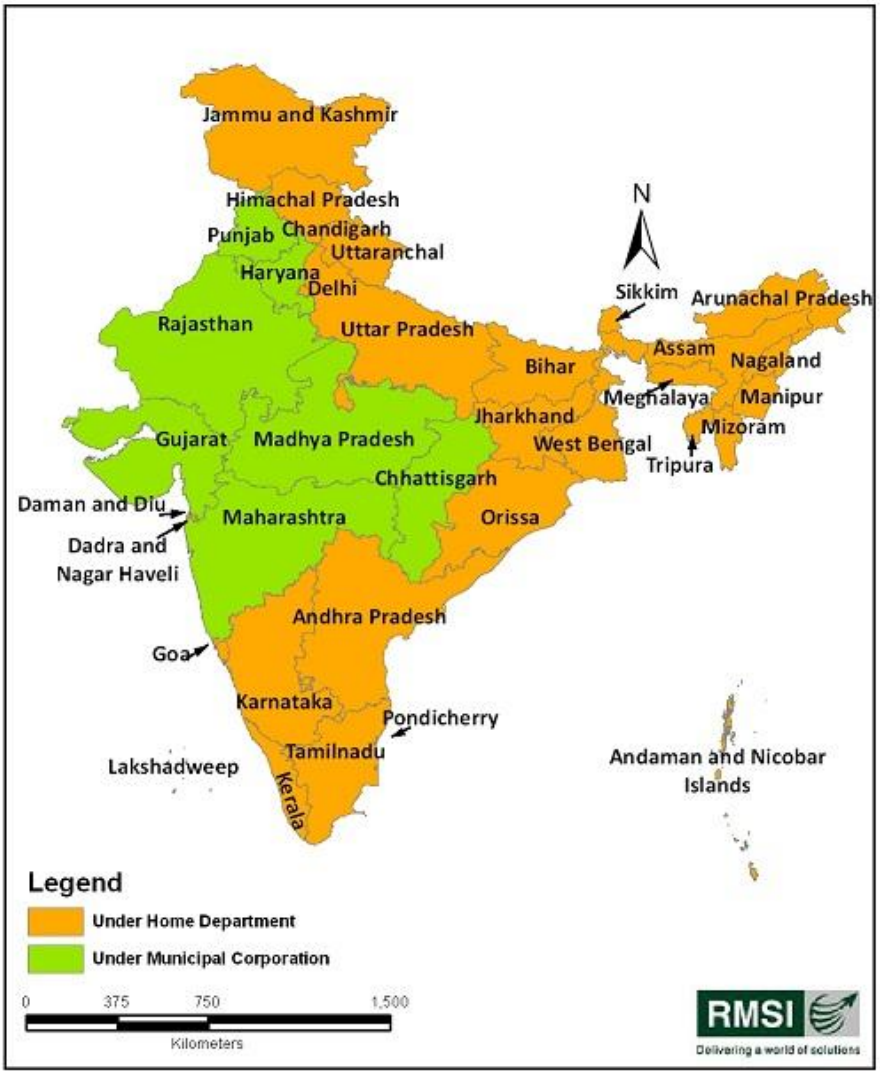


Figure 1-1: Distribution of fire services by various States/UTs by administrative organization

1.2 Role & Growth 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 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 fighter 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.

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 up-gradation/ 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 State/UTs Fire Services. ***However, it may please be noted that RMSI team has also made 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 are 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.

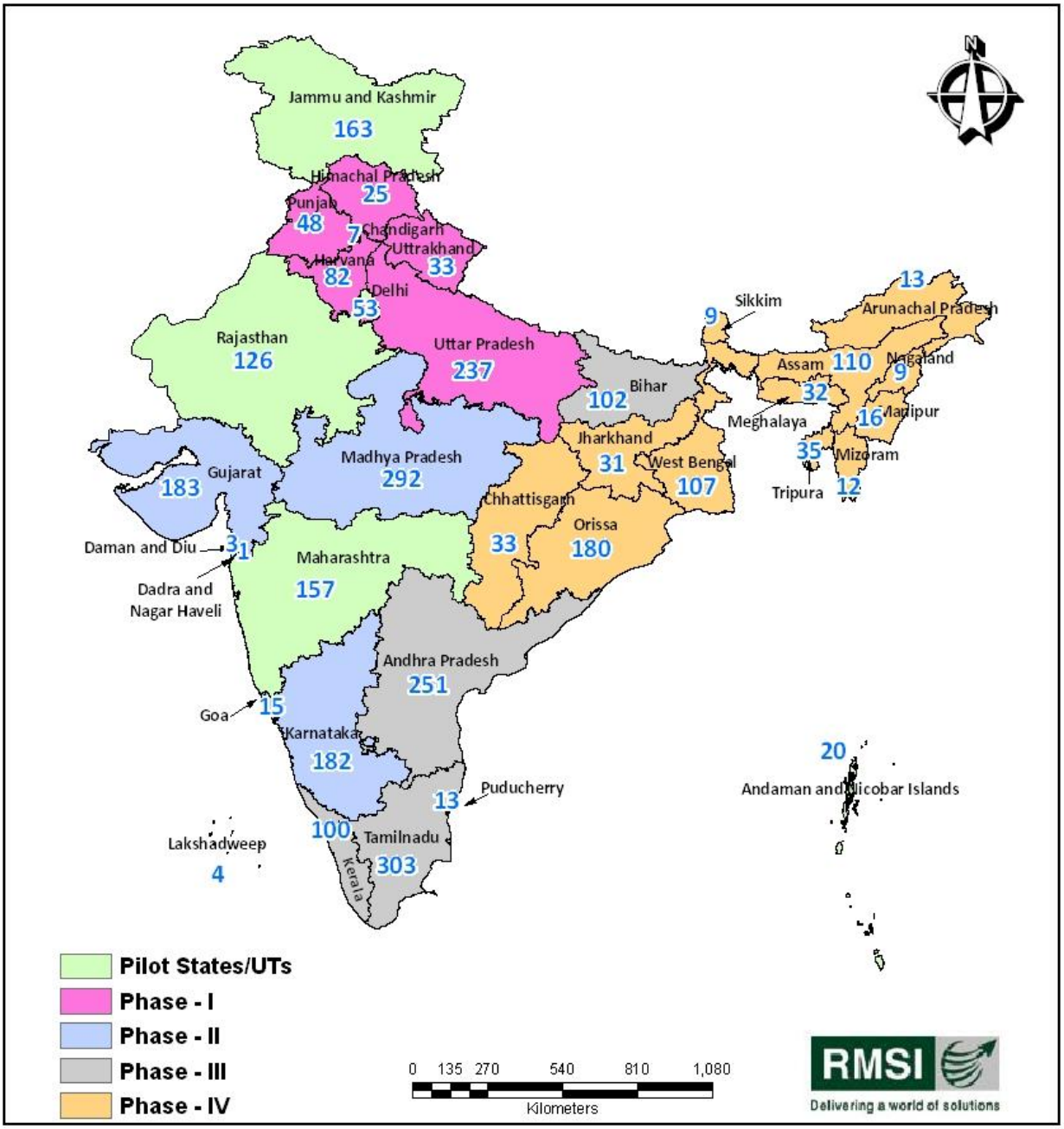


Figure 2-1: State/UT wise distribution of fire service stations in India

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). In the initial phase, pilot study comprises of six States and UTs - **Jammu & Kashmir, Rajasthan, Puducherry, Maharashtra, Andaman & Nicobar Island, and Delhi**. Remaining States/UTs have 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 all other States/ UTs in a phased manner (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 firefighting 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).

Although this report discusses the country as a whole, in general, however, it has been prepared for the Pilot States/UTs in particular.

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

States/UTs	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
Dadra & Nagar Haveli	1	1	1

States/UTs	No of Districts (Census 2011)	No of Talukas/ Tehsils/ Mandals (Census 2001)	No of Fire Stations
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 has adpoted 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

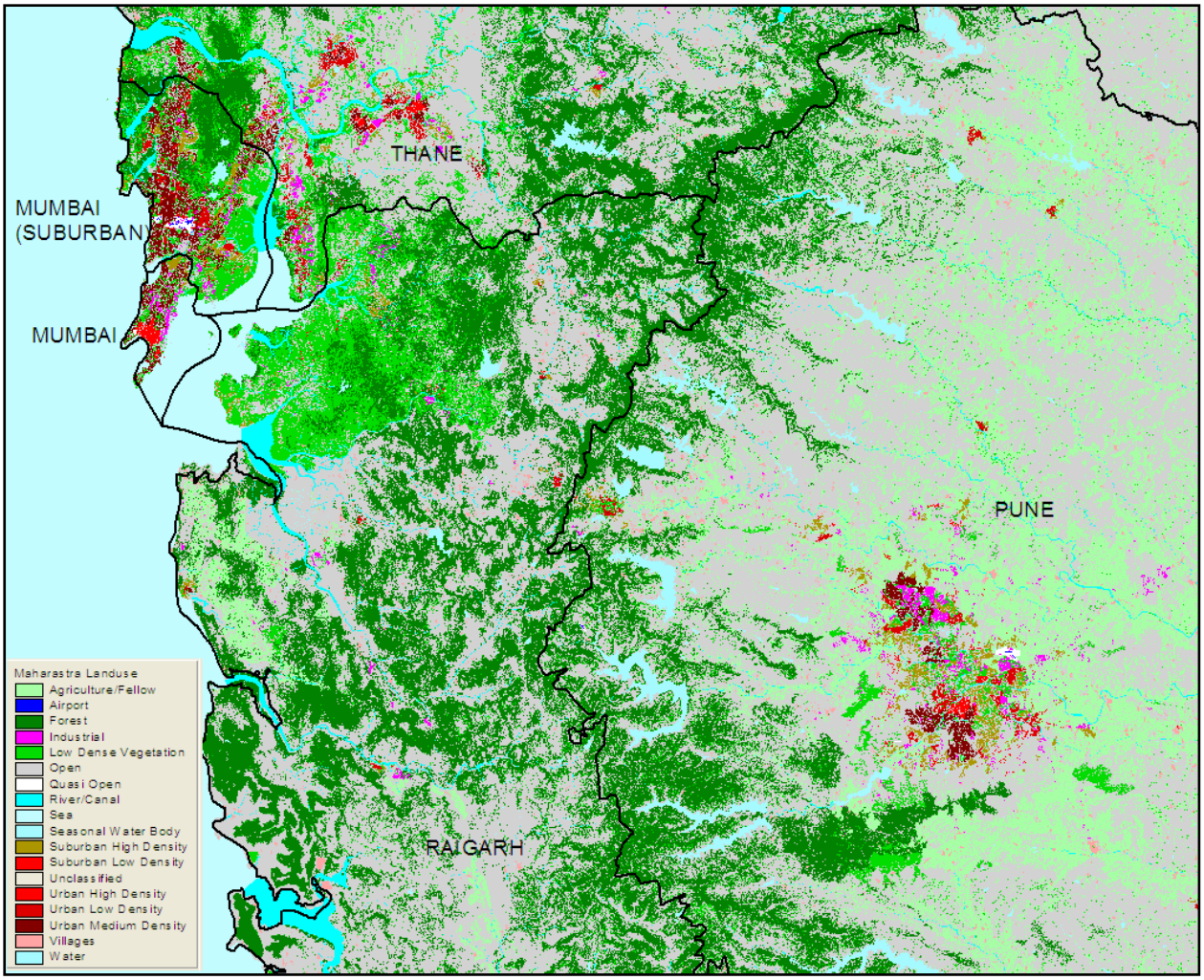


Figure 3-1 : Land use classification at 25m pixel for parts of Western Maharashtra (districts – Mumbai, Mumbai sub-urban, Thane, Pune and Raigarh)

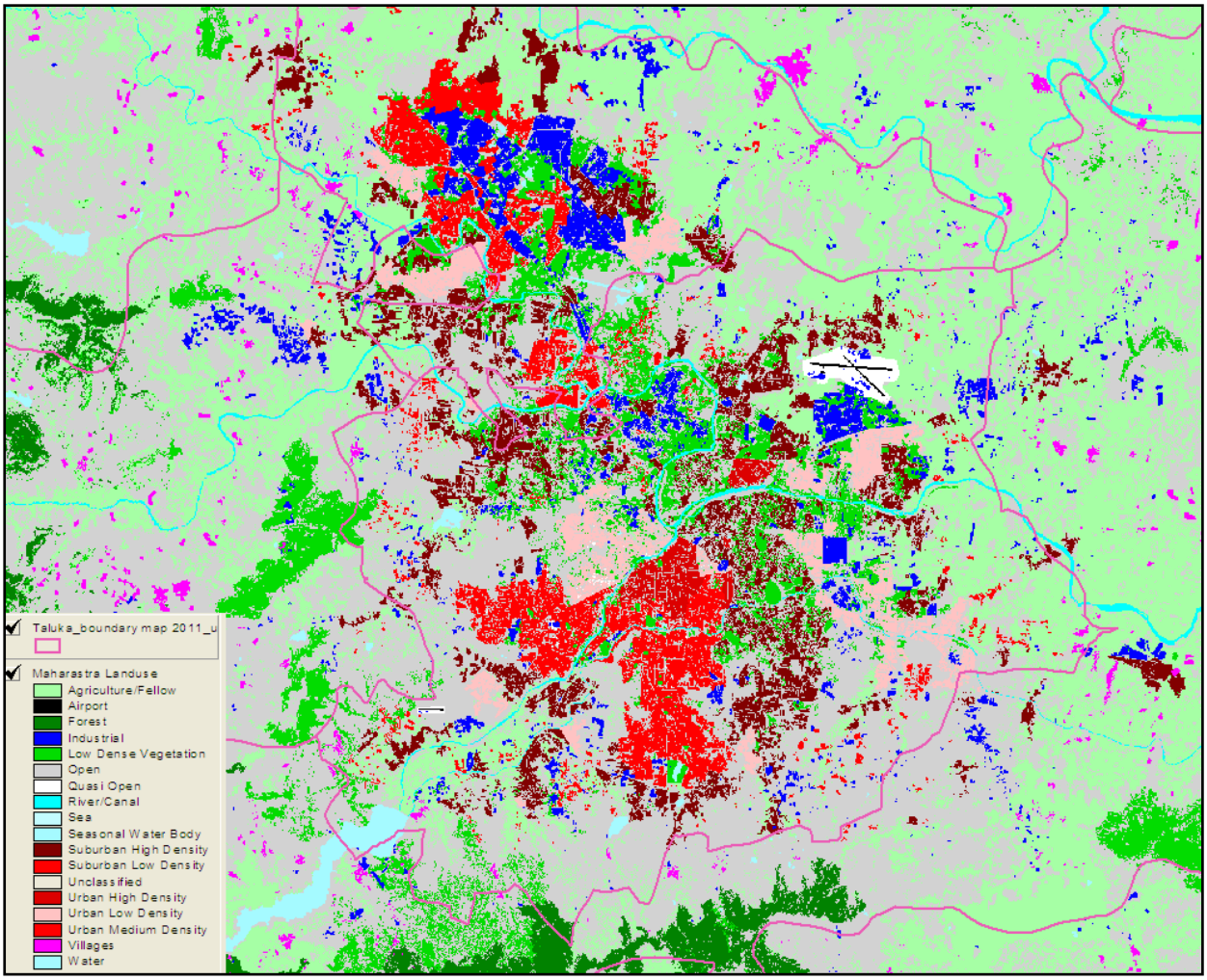


Figure 3-2 : An enlarged view of classified urban agglomeration in Pune city areas

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.

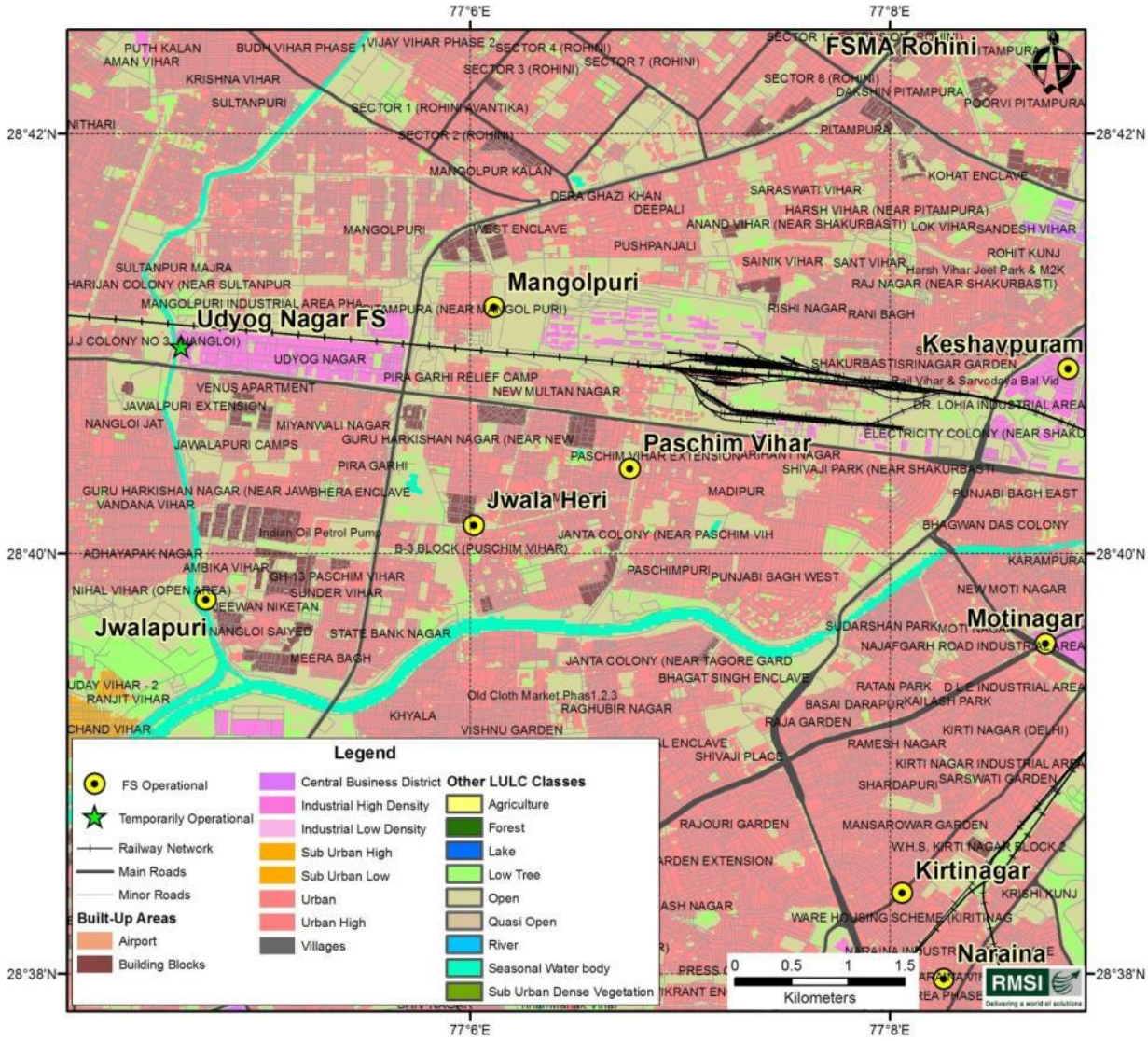


Figure 3-3 : Detailed classified urban agglomerate areas in parts of Delhi with overlay of GPS location of Fire Stations

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.

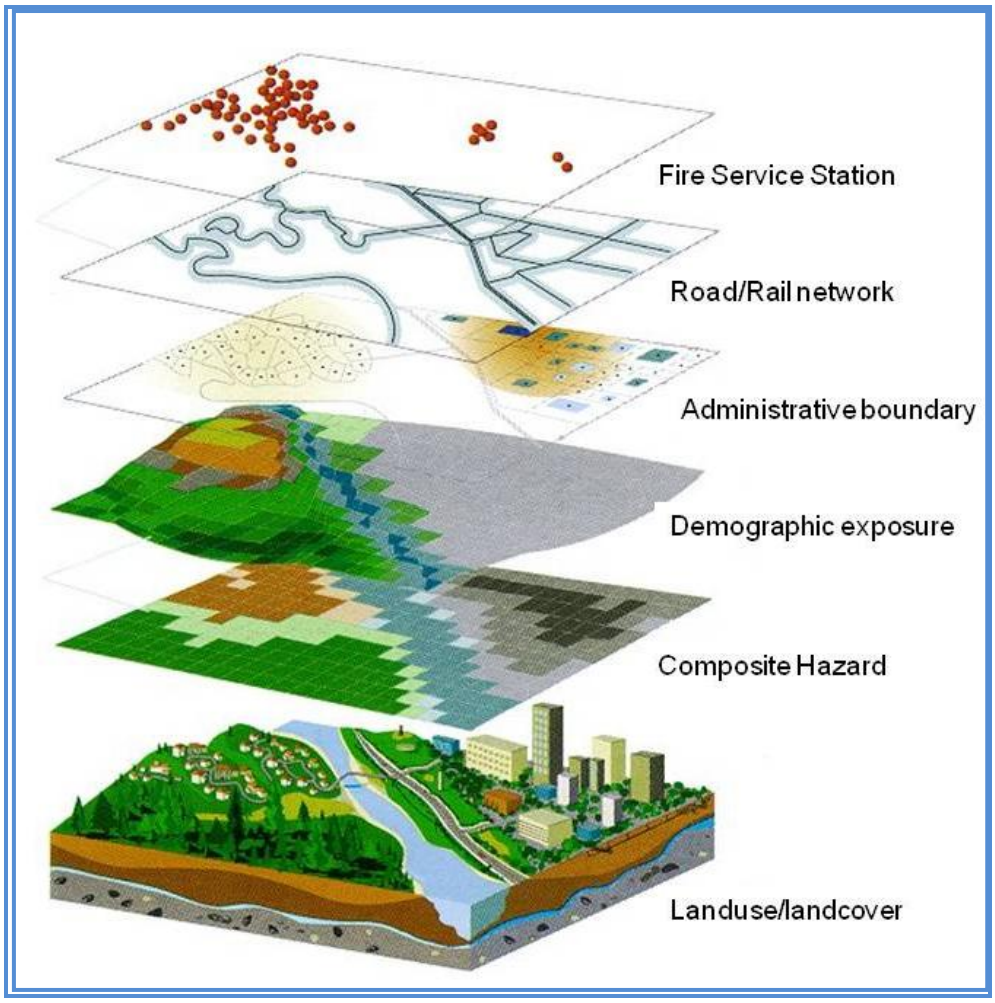


Figure 3-4 : Overlay analysis for Fire Risk Assessment

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, **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.

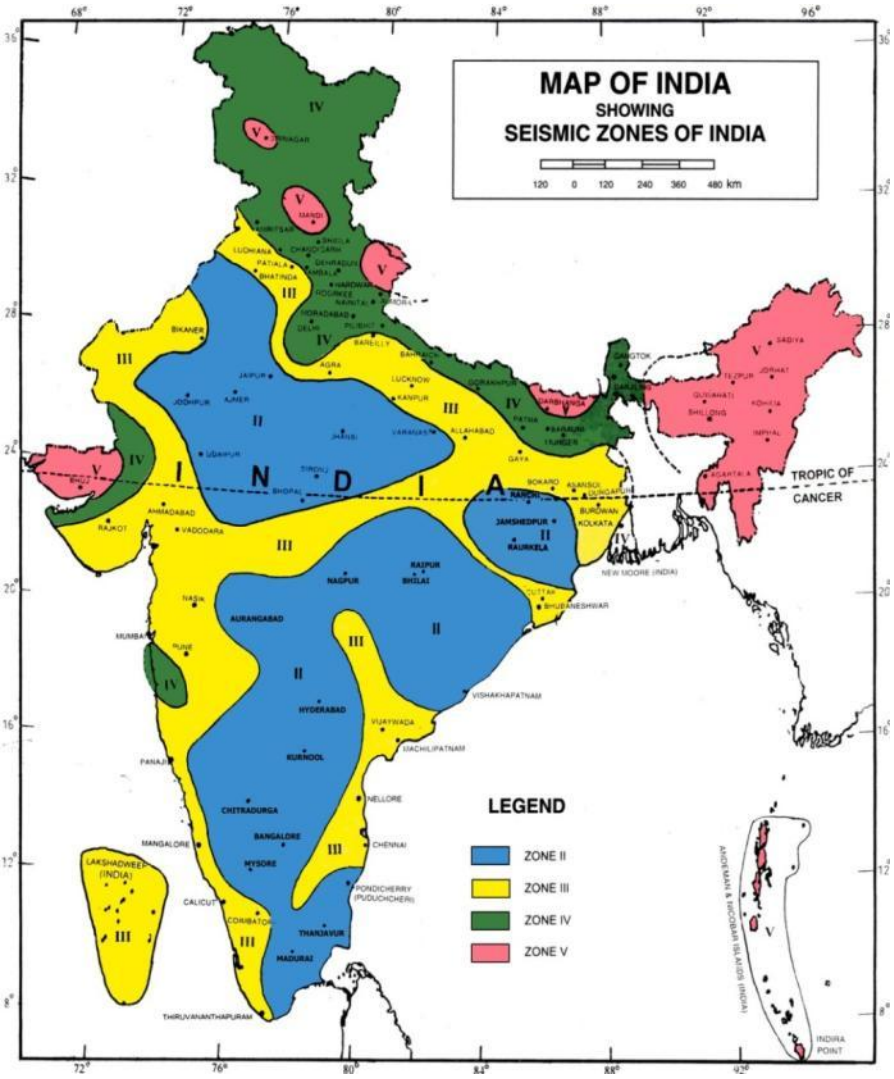


Figure 3-5 : Seismic zones of India

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/ Weight age	**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%**

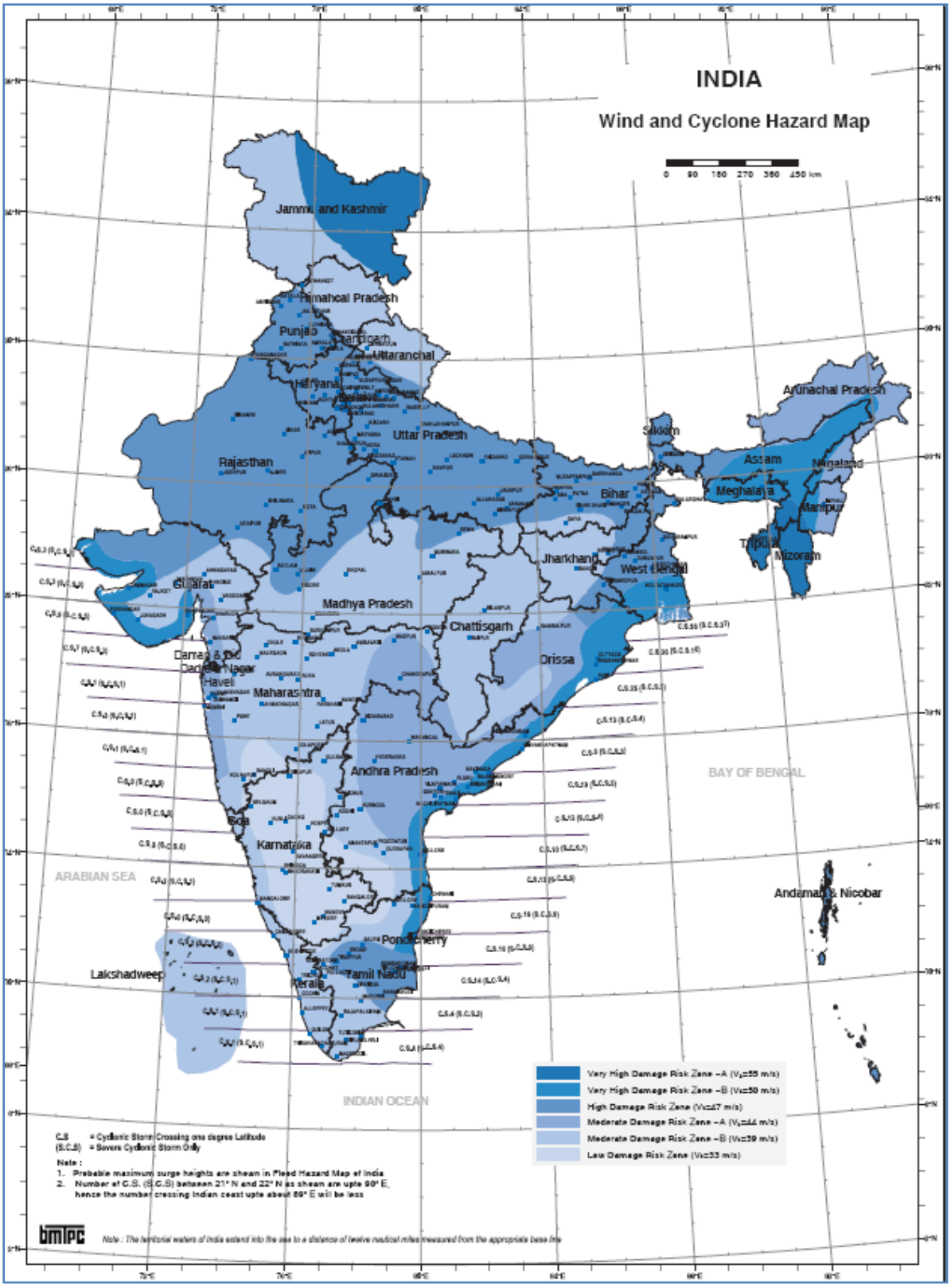


Figure 3-6 : Wind zone map of India (BMTPC, 2006)

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.

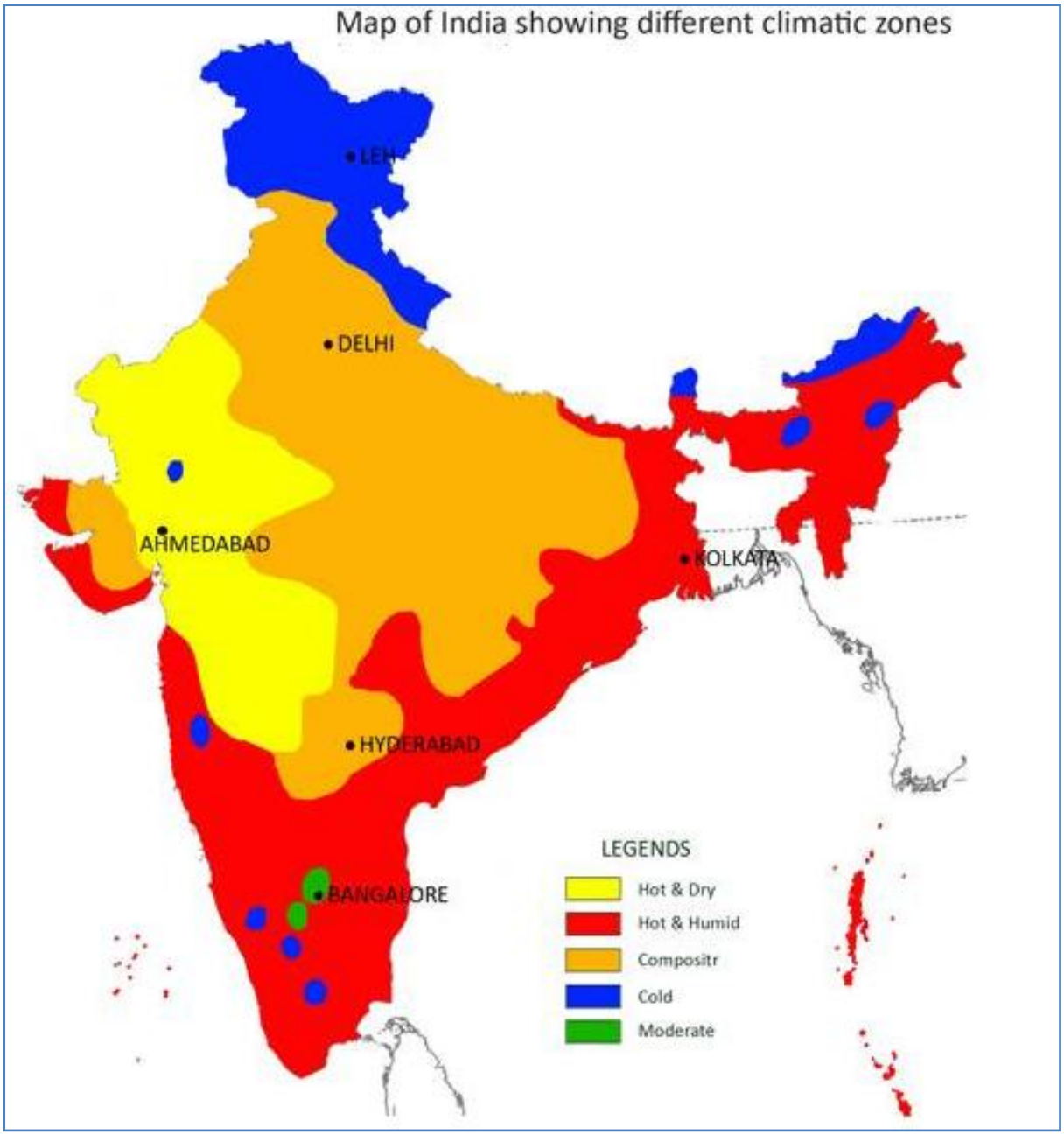


Figure 3-7 : Climatic Zones of India

Table 3-3: District level ranking for individual (earthquake, wind and climatic) hazard and integrated hazards

Importance Factor			20%	20%	20%	40%	Integrated Hazard Zoning
State/ UT	District	Geographical Area (Sq km)	Wind Zoning	Seismic Zoning	Climate zoning	Hill zoning	
Jammu & Kashmir							
	Kupwara	2,857	3.0	3.0	1.0	5.0	3.4
	Badgam	1,163	3.0	3.4	1.0	5.0	3.5
	Leh (Ladakh)	80,271	1.1	3.0	1.0	5.0	3.0
	Kargil	14,847	2.2	3.0	1.0	5.0	3.2
	Punch	1,725	3.0	3.0	1.0	5.0	3.4
	Rajouri	2,415	3.0	3.0	1.0	5.0	3.4
	Kathua	2,731	3.0	3.0	2.0	4.0	3.2
	Baramula	2,045	3.0	3.0	1.0	5.0	3.4
	Bandipore	2,889	3.0	3.0	1.0	5.0	3.4
	Srinagar	463	3.0	4.0	1.0	5.0	3.6
	Ganderbal	1,449	3.0	3.4	1.0	5.0	3.5
	Pulwama	839	3.0	4.0	1.0	5.0	3.6
	Shupiyan	459	3.0	3.3	1.0	5.0	3.6
	Anantnag	2,743	3.0	3.8	1.0	5.0	3.6
	Kulgam	1,203	3.0	3.2	1.0	5.0	3.4
	Doda	2,360	3.0	3.0	0.2	5.0	3.2
	Ramban	1,021	3.0	3.0	1.0	5.0	3.4
	Kishtwar	7,916	3.0	3.3	1.0	5.0	3.5
	Udhampur	2,361	3.0	3.0	1.5	4.0	3.1
	Reasi	2,094	3.0	3.0	1.0	5.0	3.5
	Jammu	2,112	3.0	3.0	1.2	4.5	3.2
	Samba	854	2.9	3.0	2.0	4.0	3.2
Delhi							
	North West	449	4.5	2.4	2.0	1.0	2.2
	North	63	4.5	3.0	2.0	1.0	2.3
	North East	72	4.5	3.0	2.0	1.0	2.3
	East	66	4.5	3.0	2.0	1.0	2.3
	New Delhi	35	4.5	3.0	2.0	1.0	2.3
	Central	16	4.5	3.0	2.0	1.0	2.3
	West	116	4.5	2.7	2.0	1.0	2.2
	South West	411	4.5	2.7	2.0	1.0	2.2
	South	256	4.5	3.0	2.0	1.0	2.3
Rajasthan							
	Ganganagar	10,629	4.5	1.2	2.2	1.0	2.0
	Hanumangarh	9,992	4.5	1.0	2.0	1.0	1.9
	Bikaner	27,043	4.5	1.9	3.0	1.0	2.3
	Churu	17,098	4.5	1.1	2.4	1.0	2.0
	Jhunjhunun	5,904	4.5	1.0	2.0	1.0	1.9
	Alwar	8,317	4.5	1.9	2.0	1.0	2.1
	Bharatpur	5,082	4.5	2.4	2.0	1.0	2.2
	Dhaulpur	3,032	4.5	1.3	2.0	1.0	2.0
	Karauli	4,874	4.5	1.0	2.0	1.0	1.9
	Sawai Madhopur	5,024	4.5	1.0	2.0	1.0	1.9
	Dausa	3,555	4.5	1.2	2.0	1.0	1.9

Importance Factor			20%	20%	20%	40%	Integrated Hazard Zoning
State/ UT	District	Geographical Area (Sq km)	Wind Zoning	Seismic Zoning	Climate zoning	Hill zoning	
	Jaipur	11,309	4.5	1.0	2.0	1.0	1.9
	Sikar	7,692	4.5	1.0	2.0	1.0	1.9
	Nagaur	17,710	4.5	1.0	2.6	1.0	2.0
	Jodhpur	22,903	4.5	1.2	3.0	1.0	2.1
	Jaisalmer	38,501	4.5	2.0	3.0	1.0	2.3
	Barmer	28,469	4.5	2.1	3.0	1.0	2.3
	Jalor	10,752	4.5	2.3	3.0	1.0	2.4
	Sirohi	5,169	4.5	2.1	1.7	1.0	2.0
	Pali	12,377	4.5	1.1	3.0	1.0	2.1
	Ajmer	8,537	4.5	1.0	2.6	1.0	2.0
	Tonk	7,256	4.5	1.0	2.3	1.0	2.0
	Bundi	5,825	4.5	1.0	2.9	1.0	2.1
	Bhilwara	10,477	4.5	1.0	3.0	1.0	2.1
	Rajsamand	4,683	4.5	1.0	3.0	1.0	2.1
	Dungarpur	3,794	3.0	1.8	3.0	1.0	1.9
	Banswara	4,315	3.0	1.2	3.0	1.0	1.8
	Chittaurgarh	7,882	4.5	1.0	3.0	1.0	2.1
	Kota	5,286	4.5	1.0	2.9	1.0	2.1
	Baran	6,834	4.5	1.0	2.9	1.0	2.1
	Jhalawar	6,270	4.5	1.0	3.0	1.0	2.1
	Udaipur	12,047	4.1	1.5	3.0	1.0	2.1
	Pratapgarh	4,259	4.2	1.0	3.0	1.0	2.0
Maharashtra							
	Nandurbar	5,915	3.0	2.0	3.0	1.0	2.0
	Dhule	7,197	3.0	2.0	3.0	1.0	2.0
	Jalgaon	11,805	3.0	1.5	3.0	1.0	1.9
	Buldana	9,775	3.0	1.1	3.0	1.0	1.8
	Akola	5,421	3.0	1.1	3.0	1.0	1.8
	Washim	5,212	3.0	1.0	3.0	1.0	1.8
	Amravati	12,244	3.0	1.6	2.7	1.0	1.9
	Wardha	6,326	3.6	1.0	2.0	1.0	1.7
	Nagpur	9,951	3.6	1.0	1.8	1.0	1.7
	Bhandara	4,090	3.7	1.0	1.3	1.0	1.6
	Gondiya	5,265	3.2	1.0	1.6	1.0	1.6
	Gadchiroli	14,486	3.9	1.4	1.1	1.0	1.7
	Chandrapur	11,334	4.0	1.5	1.0	1.0	1.7
	Yavatmal	13,566	3.4	1.0	2.2	1.0	1.7
	Nanded	10,623	3.1	1.0	2.5	1.0	1.7
	Hingoli	4,654	3.0	1.0	3.0	1.0	1.8
	Parbhani	6,406	3.0	1.0	3.0	1.0	1.8
	Jalna	7,706	3.0	1.0	3.0	1.0	1.8
	Aurangabad	10,234	3.0	1.3	3.0	1.0	1.8
	Nashik	15,599	3.0	2.0	2.8	1.0	2.0
	Thane	9,548	3.7	2.0	1.0	1.0	1.7
	Mumbai (Suburban)	454	4.0	2.0	1.0	1.0	1.8
	Mumbai	150	4.0	2.0	1.0	1.0	1.8
	Raigarh	7,060	3.9	2.8	1.0	1.0	1.9

Importance Factor			20%	20%	20%	40%	Integrated Hazard Zoning
State/ UT	District	Geographical Area (Sq km)	Wind Zoning	Seismic Zoning	Climate zoning	Hill zoning	
	Pune	15,700	3.0	2.1	1.9	1.0	1.8
	Ahmadnagar	17,102	3.0	2.0	3.0	1.0	2.0
	Bid	10,597	3.0	1.6	3.0	1.0	1.9
	Latur	7,254	3.0	1.3	2.8	1.0	1.8
	Osmanabad	7,588	3.0	1.8	3.0	1.0	2.0
	Solapur	14,919	2.9	1.9	2.8	1.0	1.9
	Satara	10,605	2.8	2.5	0.7	3.0	2.4
	Ratnagiri	8,325	3.8	2.5	1.0	1.0	1.9
	Sindhudurg	5,107	3.0	2.0	1.0	1.0	1.6
	Kolhapur	7,683	2.8	2.0	1.0	1.0	1.6
	Sangli	8,527	2.5	2.0	1.0	1.0	1.5
Andaman & Nicobar Islands							
	Nicobars	1,579	4.0	4.0	1.0	1.0	2.2
	North & Middle Andaman	3,401	4.0	4.0	1.0	1.0	2.2
	South Andaman	2,425	4.0	4.0	1.0	1.0	2.2
Puducherry							
	Yanam	20.9	5.0	3.0	1.0	1.0	2.0
	Puducherry	312.8	5.0	2.0	1.0	1.0	1.8
	Mahe	8.6	3.0	2.0	1.0	1.0	2.2

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 in percentage.

Table 3-4: District level geographical area, population, population density, residential built-up area, residential built-up area in percentage, and industrial area for States from Pilot Phase

District		Geographical Area (sq km)	Population 2011	Population Density	Residential Built--Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in percentage)
Jammu & Kashmir							
	Kupwara	2,857	875,564	306.42	41.29	0.099	1.4%

District		Geographical Area (sq km)	Population 2011	Population Density	Residential Built--Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in percentage)
	Badgam	1,163	735,753	632.74	59.91	0.374	5.2%
	Leh (Ladakh)	80,271	147,104	1.83	34.96	0.011	0.0%
	Kargil	14,847	143,388	9.66	6.52	0	0.0%
	Punch	1,725	476,820	276.42	5.84	0	0.3%
	Rajouri	2,415	619,266	256.4	8.42	0.167	0.3%
	Kathua	2,731	615,711	225.49	32.82	1.033	1.2%
	Baramula	2,045	1,015,503	496.55	73.73	0.247	3.6%
	Bandipore	2,889	385,099	133.28	19.95	0.026	0.7%
	Srinagar	463	1,269,751	2,743.04	67.39	1.056	14.6%
	Ganderbal	1,449	297,003	205.01	26.12	0.054	1.8%
	Pulwama	839	570,060	679.69	37.73	0.783	4.5%
	Shupiyan	459	265,960	579.56	13.9	0	3.0%
	Anantnag	2,743	1,070,144	390.19	21.36	0.011	0.8%
	Kulgam	1,203	422,786	351.47	13.39	0	1.1%
	Doda	2,360	409,576	173.57	8.14	0	0.3%
	Ramban	1,021	283,313	277.49	4.33	0.058	0.4%
	Kishtwar	7,916	231,037	29.19	8.65	0	0.1%
	Udhampur	2,361	555,357	235.19	25.17	0.211	1.1%
	Reasi	2,094	314,714	150.27	5.98	0.017	0.3%
	Jammu	2,112	1,526,406	722.87	127.78	1.767	6.1%
	Samba	854	318,611	373.04	23	4.203	2.7%
Delhi							
	North West	449	3,651,261	8,133.80	84.34	14.051	18.8%
	North	63	883,418	14,044.80	27.8	1.065	44.2%
	North East	72	2,240,749	31,208.20	29.75	1.387	41.4%
	East	66	1,707,725	25,913.88	28.8	1.167	43.7%
	New Delhi	35	133,713	3,798.66	12.48	0.941	35.4%
	Central	16	578,671	35,720.43	9.13	0.732	56.3%
	West	116	2,531,583	21,918.47	54.96	2.999	47.6%
	South West	411	2,292,363	5,574.81	75.15	5.497	18.3%
	South	256	2,733,752	10,682.89	67.47	5.073	26.4%
Rajasthan							
	Ganganagar	10,629	1,969,520	185.3	225.55	5.248	2.1%

District		Geographical Area (sq km)	Population 2011	Population Density	Residential Built--Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in percentage)
	Hanumangarh	9,992	1,779,650	178.11	210.24	2.394	2.1%
	Bikaner	27,043	2,367,745	87.56	256.36	6.163	0.9%
	Churu	17,098	2,041,172	119.38	222.78	0.9	1.3%
	Jhunjhunun	5,904	2,139,658	362.38	113.58	1.49	1.9%
	Alwar	8,317	3,671,999	441.53	141.81	16.816	1.7%
	Bharatpur	5,082	2,549,121	501.56	77.61	1.504	1.5%
	Dhaulpur	3,032	1,207,293	398.13	34.28	0.851	1.1%
	Karauli	4,874	1,458,459	299.24	41.35	0.941	0.8%
	Sawai Madhopur	5,024	1,338,114	266.32	63.89	0.257	1.3%
	Dausa	3,555	1,637,226	460.61	38.67	1.565	1.1%
	Jaipur	11,309	6,663,971	589.28	321.85	24.65	2.8%
	Sikar	7,692	2,677,737	348.12	133.44	1.452	1.7%
	Nagaur	17,710	3,309,234	186.85	200.54	2.054	1.1%
	Jodhpur	22,903	3,685,681	160.93	253.18	33.099	1.1%
	Jaisalmer	38,501	672,008	17.45	128.08	2.259	0.3%
	Barmer	28,469	2,604,453	91.48	133.66	2.973	0.5%
	Jalor	10,752	1,830,151	170.22	93.81	1.212	0.9%
	Sirohi	5,169	1,037,185	200.65	51.49	3.97	1.0%
	Pali	12,377	2,038,533	164.7	134.53	5.28	1.1%
	Ajmer	8,537	2,584,913	302.79	134.51	6.86	1.6%
	Tonk	7,256	1,421,711	195.94	75.15	0.778	1.0%
	Bundi	5,825	1,113,725	191.2	49.99	0.939	0.9%
	Bhilwara	10,477	2,410,459	230.07	101.97	7.489	1.0%
	Rajsamand	4,683	1,158,283	247.34	35.86	11.386	0.8%
	Dungarpur	3,794	1,388,906	366.05	25.83	0.791	0.7%
	Banswara	4,315	1,798,194	416.72	15.56	1.347	0.4%
	Chittaurgarh	7,882	1,544,392	195.94	68.27	7.234	0.9%
	Kota	5,286	1,950,491	369.02	128.25	13.15	2.4%
	Baran	6,834	1,223,921	179.09	109.92	3.318	1.6%
	Jhalawar	6,270	1,411,327	225.11	151.94	7.328	2.4%
	Udaipur	12,047	3,067,549	254.64	115.26	14.086	1.0%
	Pratapgarh	4,259	868,231	203.86	20.59	0.245	0.5%
Maharashtra							

	District	Geographical Area (sq km)	Population 2011	Population Density	Residential Built--Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in percentage)
	Nandurbar	5,915	1,646,177	278.31	73.93	2.269	1.2%
	Dhule	7,197	2,048,781	284.69	78.64	4.806	1.1%
	Jalgaon	11,805	4,224,442	357.86	163.81	5.534	1.4%
	Buldana	9,775	2,588,039	264.75	96.47	2.766	1.0%
	Akola	5,421	1,818,617	335.48	76.58	4.784	1.4%
	Washim	5,212	1,196,714	229.62	44.92	0.881	0.9%
	Amravati	12,244	2,887,826	235.86	150.26	5.335	1.2%
	Wardha	6,326	1,296,157	204.9	64.9	2.857	1.0%
	Nagpur	9,951	4,653,171	467.63	152.02	20.136	1.5%
	Bhandara	4,090	1,198,810	293.11	49.41	0.728	1.2%
	Gondiya	5,265	1,322,331	251.18	77.26	2.616	1.5%
	Gadchiroli	14,486	1,071,795	73.99	128.39	1.108	0.9%
	Chandrapur	11,334	2,194,262	193.59	112	5.901	1.0%
	Yavatmal	13,566	2,775,457	204.6	129.66	5.239	1.0%
	Nanded	10,623	3,356,566	315.98	100.94	2.479	1.0%
	Hingoli	4,654	1,178,973	253.35	36.22	0.791	0.8%
	Parbhani	6,406	1,835,982	286.63	48.35	1.636	0.8%
	Jalna	7,706	1,958,483	254.16	66.94	3.231	0.9%
	Aurangabad	10,234	3,695,928	361.14	141.75	15.032	1.4%
	Nashik	15,599	6,109,052	391.62	239.08	25.156	1.5%
	Thane	9,548	11,054,131	1,157.79	229.74	29.643	2.4%
	Mumbai (Suburban)	454	9,332,481	20,560.65	104.57	7.761	23.0%
	Mumbai	150	3,145,966	21,015.14	29.54	5.304	19.7%
	Raigarh	7,060	2,635,394	373.29	71.39	14.23	1.0%
	Pune	15,700	9,426,959	600.43	370.39	53.713	2.4%
	Ahmadnagar	17,102	4,543,083	265.64	307.21	11.609	1.8%
	Bid	10,597	2,585,962	244.02	88.82	1.882	0.8%
	Latur	7,254	2,455,543	338.49	116.01	6.81	1.6%
	Osmanabad	7,588	1,660,311	218.82	89.13	1.871	1.2%
	Solapur	14,919	4,315,527	289.27	231.79	9.434	1.6%
	Satara	10,605	3,003,922	283.25	206.87	3.688	2.0%
	Ratnagiri	8,325	1,612,672	193.71	94.82	1.915	1.1%
	Sindhudurg	5,107	848,868	166.23	69.57	1.491	1.4%

District		Geographical Area (sq km)	Population 2011	Population Density	Residential Built--Up area (sq km)	Industrial Area (sq km)	Residential Built-Up area (in percentage)
	Kolhapur	7,683	3,874,015	504.22	196.89	10.018	2.6%
	Sangli	8,527	2,820,575	330.8	141.53	6.334	1.7%
Andaman & Nicobar Islands							
	Nicobars	1,579	36,819	23.32	3.8	0	0.2%
	North & Middle Andaman	3,401	105,539	31.03	20.17	0	0.6%
	South Andaman	2,425	237,586	97.98	19.53	0.121	0.8%
Puducherry UT							
	Karaikal	160.3	200,314	1,255.43	23.07	0.76	14.4%
	Yanam	20.9	55,616	1,853.87	4.01	0.75	13.4%
	Puducherry	312.8	946,600	3,038.94	31.67	1.76	10.2%
	Mahe	8.6	41,934	4,659.33	1.02	0.35	11.4%

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.). In Maharashtra, 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.) has 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. In pilot States and UT, about one-third (34%) districts fall in rank 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.

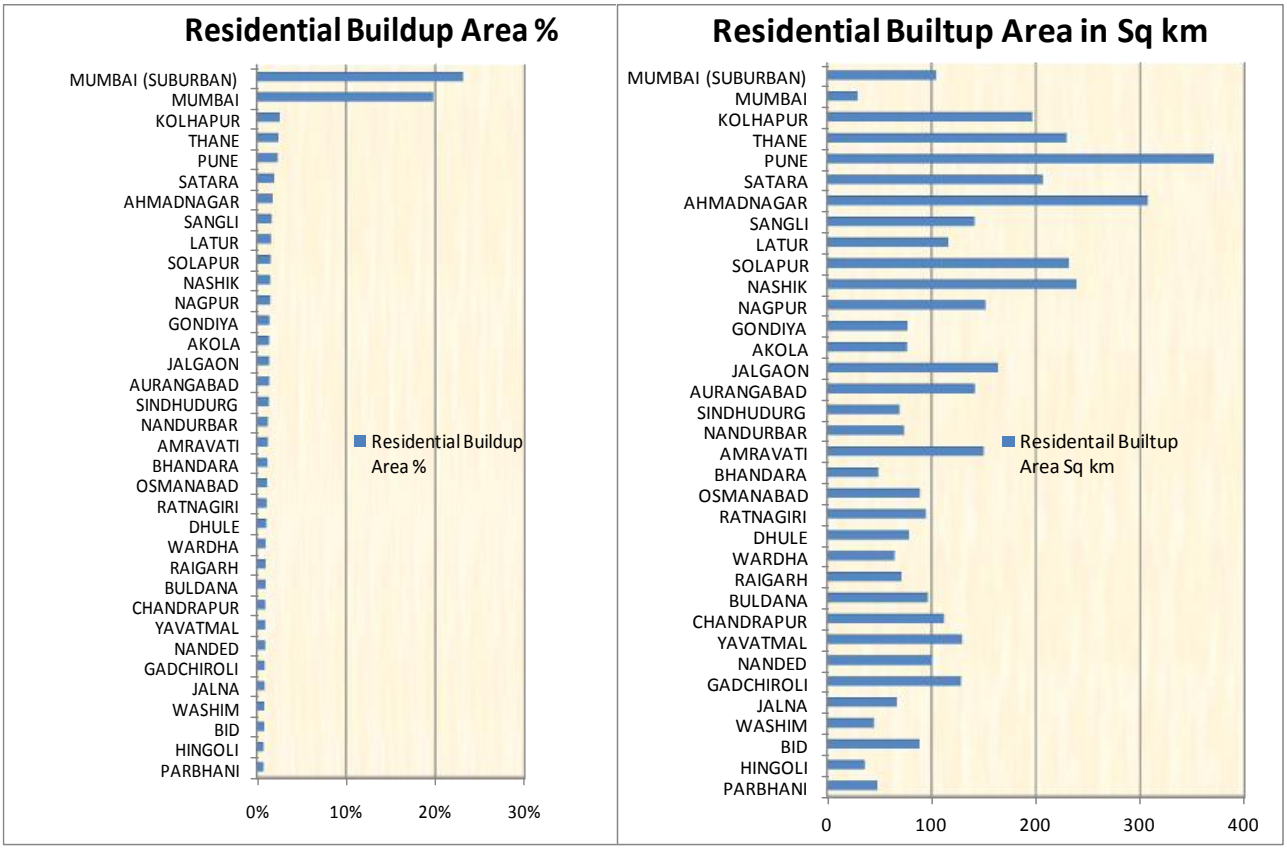


Figure 3-8 : Comparisons of district level ranking for residential built-up area percentages and absolute areas (in sq km) for all 35 districts of Maharashtra State

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).

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).

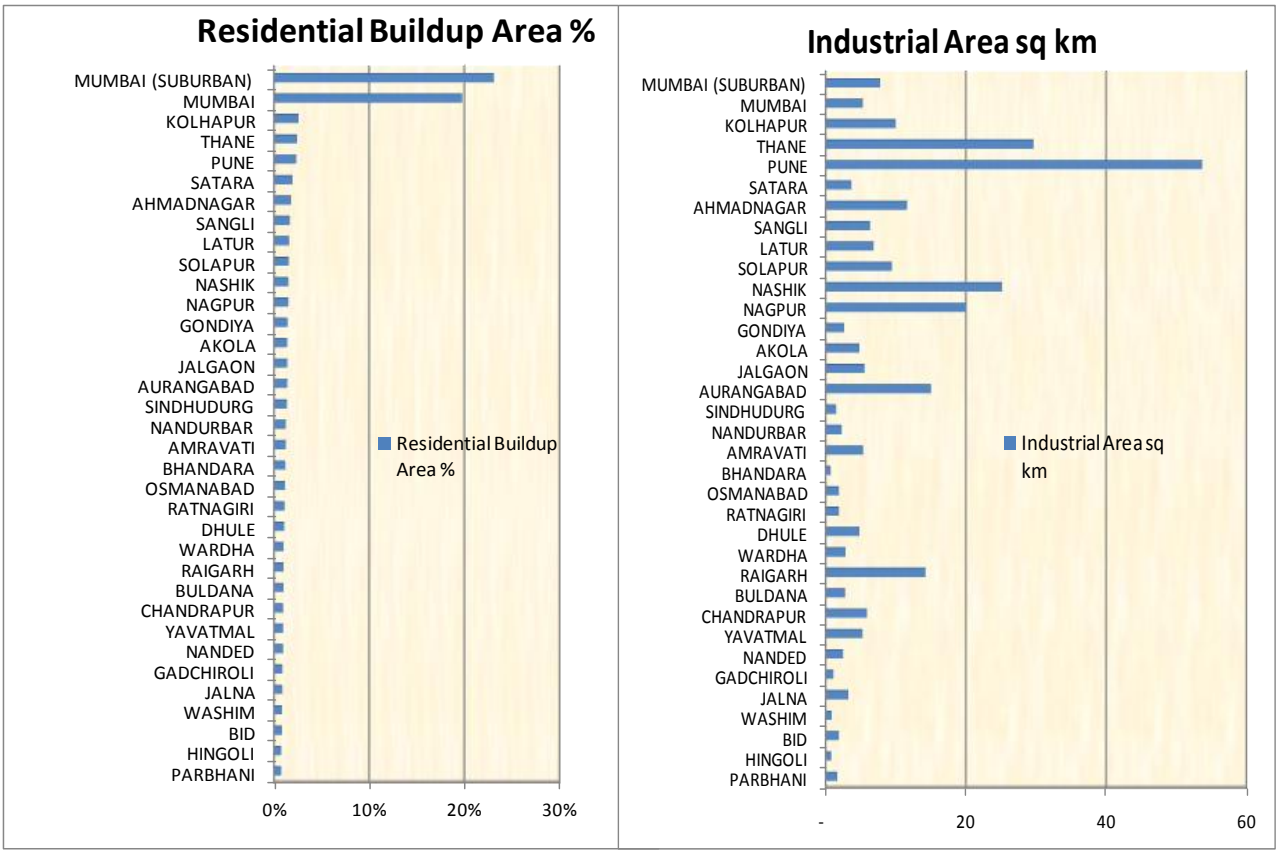


Figure 3-9 : Comparison of district level ranking for residential built-up areas and industrial areas (in sq km) for all 35 districts of Maharashtra State

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 Pilot States/UTs

District		Population Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area Percentage Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
Jammu & Kashmir							
	Kupwara	2	2	2	1	6.9	Medium
	Badgam	3	3	3	1	8.5	High
	Leh (Ladakh)	1	2	1	1	5.5	Low
	Kargil	1	1	1	1	5.2	Low
	Punch	2	1	1	1	5.9	Low
	Rajouri	2	1	1	1	5.9	Low
	Kathua	2	2	2	2	7.2	Medium
	Baramula	3	3	3	1	8.4	High
	Bandipore	1	2	1	1	5.9	Low

District	Population Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area Percentage Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
Srinagar	4	3	4	2	10.1	Very high
Ganderbal	2	2	2	1	7.0	Medium
Pulwama	3	2	3	1	8.1	Medium
Shupiyan	3	1	3	1	7.5	Medium
Anantnag	2	2	1	1	6.6	Low
Kulgam	2	1	2	1	6.4	Low
Doda	1	1	1	1	5.4	Low
Ramban	2	1	1	1	5.9	Low
Kishtwar	1	1	1	1	5.5	Low
Udhampur	2	2	2	1	6.6	Medium
Reasi	1	1	1	1	5.4	Low
Jammu	3	4	3	2	9.2	Very high
Samba	2	2	3	3	8.4	High
Delhi						
North West	4	3	4	5	10.2	Very high
North	5	2	5	2	9.3	Very high
North East	5	2	5	2	9.3	Very high
East	5	2	5	2	9.3	Very high
New Delhi	4	1	5	1	7.8	High
Central	5	1	5	1	8.3	High
West	5	3	5	3	10.2	Very high
South West	4	3	4	4	9.7	Very high
South	5	3	4	4	10.3	Very high
Rajasthan						
Ganganagar	1	5	3	4	8.5	Very high
Hanumangarh	1	5	3	3	7.9	High
Bikaner	1	5	1	4	7.8	High
Churu	1	5	2	1	6.5	Medium
Jhunjhunun	2	4	2	2	6.9	Medium
Alwar	2	4	2	5	8.6	Very high
Bharatpur	3	3	2	2	7.2	Medium
Dhaulpur	2	2	2	1	5.5	Low
Karauli	2	2	1	1	4.9	Low
Sawai Madhopur	2	3	2	1	5.9	Medium
Dausa	2	2	2	2	5.9	Medium
Jaipur	3	5	3	5	9.9	Very high
Sikar	2	4	2	2	6.9	Medium
Nagaur	1	5	2	3	7.5	High
Jodhpur	1	5	2	5	8.6	Very high
Jaisalmer	1	4	1	3	6.8	Medium
Barmer	1	4	1	3	6.8	Medium
Jalor	1	3	1	2	5.9	Low
Sirohi	2	3	2	3	7	Medium
Pali	1	4	2	4	7.6	High
Ajmer	2	4	2	4	8	High

District	Population Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area Percentage Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
Tonk	1	3	2	1	5.5	Low
Bundi	1	3	1	1	5.1	Low
Bhilwara	2	4	1	4	7.6	High
Rajsamand	2	2	1	5	7.1	Medium
Dungarpur	2	2	1	1	4.9	Low
Banswara	2	1	1	2	4.8	Low
Chittaurgarh	1	3	1	4	6.6	Medium
Kota	2	4	3	5	9.1	Very high
Baran	1	4	2	3	7.1	Medium
Jhalawar	2	4	3	4	8.6	Very high
Udaipur	2	4	1	5	8.1	High
Pratapgarh	2	2	1	1	5	Low
Maharashtra						
Nandurbar	2	3	2	3	7	Medium
Dhule	2	3	2	3	7	Medium
Jalgaon	2	4	2	4	7.9	High
Buldana	2	3	1	3	6.3	Medium
Akola	2	3	2	3	6.8	Medium
Washim	2	2	1	1	4.8	Low
Amravati	2	4	2	4	7.9	High
Wardha	2	3	2	3	6.7	Medium
Nagpur	2	4	2	5	8.2	High
Bhandara	2	2	2	1	5.1	Low
Gondiya	2	3	2	3	6.6	Medium
Gadchiroli	1	4	1	2	5.7	Low
Chandrapur	1	4	1	4	6.7	Medium
Yavatmal	2	4	1	4	7.2	Medium
Nanded	2	4	1	3	6.7	Medium
Hingoli	2	2	1	1	4.8	Low
Parbhani	2	2	1	2	5.3	Low
Jalna	2	3	1	3	6.3	Medium
Aurangabad	2	4	2	5	8.3	High
Nashik	2	5	2	5	9	Very high
Thane	4	5	3	5	10.2	Very high
Mumbai (Suburban)	5	4	4	4	10.3	Very high
Mumbai	5	2	4	4	9.3	Very high
Raigarh	2	3	2	5	7.9	High
Pune	3	5	3	5	9.8	Very high
Ahmadnagar	2	5	2	5	9	Very high
Bid	2	3	1	2	5.9	Medium
Latur	2	4	2	4	7.8	High
Osmanabad	2	3	2	2	6.5	Medium
Solapur	2	5	2	4	8.4	Very high
Satara	2	5	2	3	8.4	High
Ratnagiri	1	3	2	2	5.9	Low

District	Population Density Ranking	Res Built-up Area sq km Ranking	Res Built-up Area Percentage Ranking	Industrial Area Ranking	Integrated Ranking	Overall District Risk Ranking
Sindhudurg	1	3	2	2	5.6	Low
Kolhapur	3	5	3	5	9.6	Very high
Sangli	2	4	2	4	7.5	High
Andaman & Nicobar Islands						
Nicobars	1	1	1	1	4.2	Low
North & Middle Andaman	1	2	1	1	4.7	Low
South Andaman	1	2	1	1	4.7	Low
Puducherry UT						
Yanam	4	1	4	1	7.2	Medium
Puducherry	4	2	4	2	8	High
Mahe	4	1	4	1	6.6	Medium
Karaikal	4	2	4	1	7.3	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 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 highlighted along with RMSI's suggested solution.

Finally, RMSI team held discussions with officials of the DG NDRF & CD and members of project review to present the summary of observations for discussions in several meetings.

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 application 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:

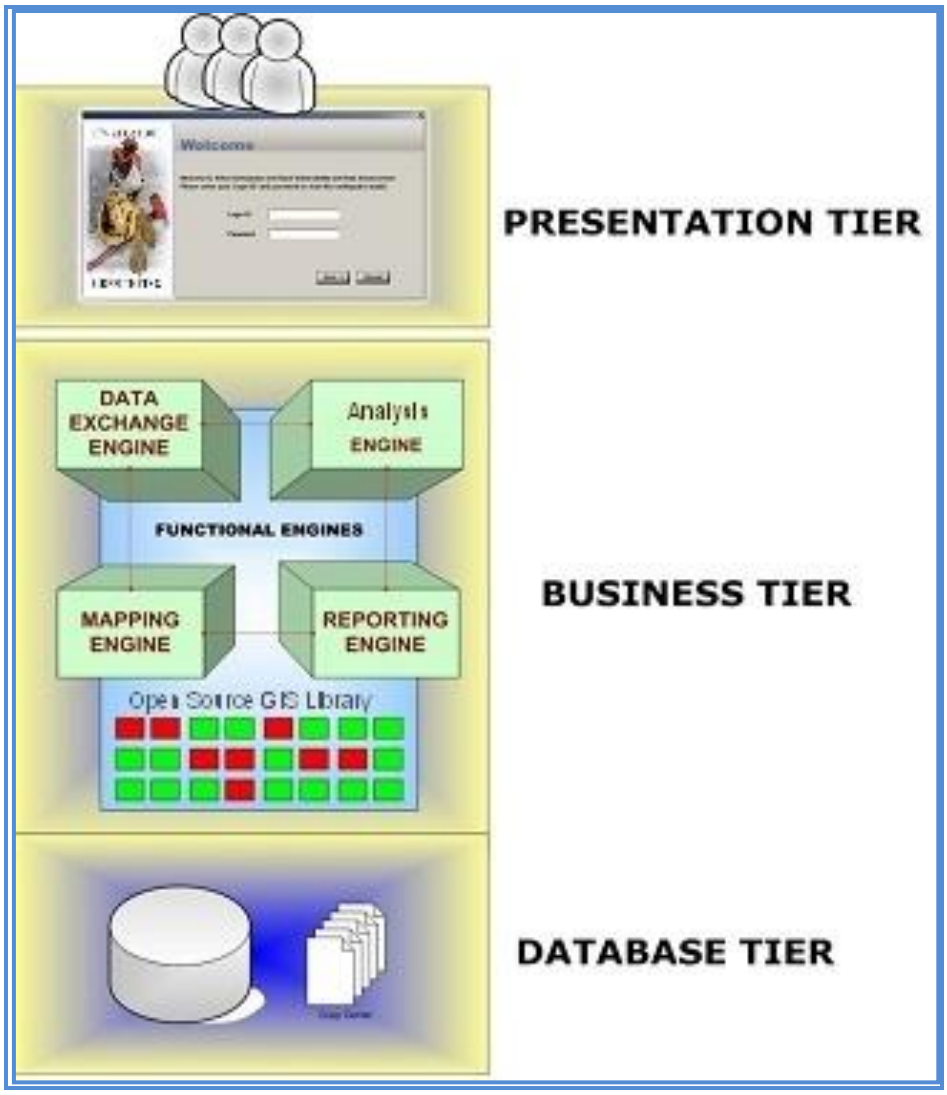


Figure 5-1 : Three-tier architecture

- **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.

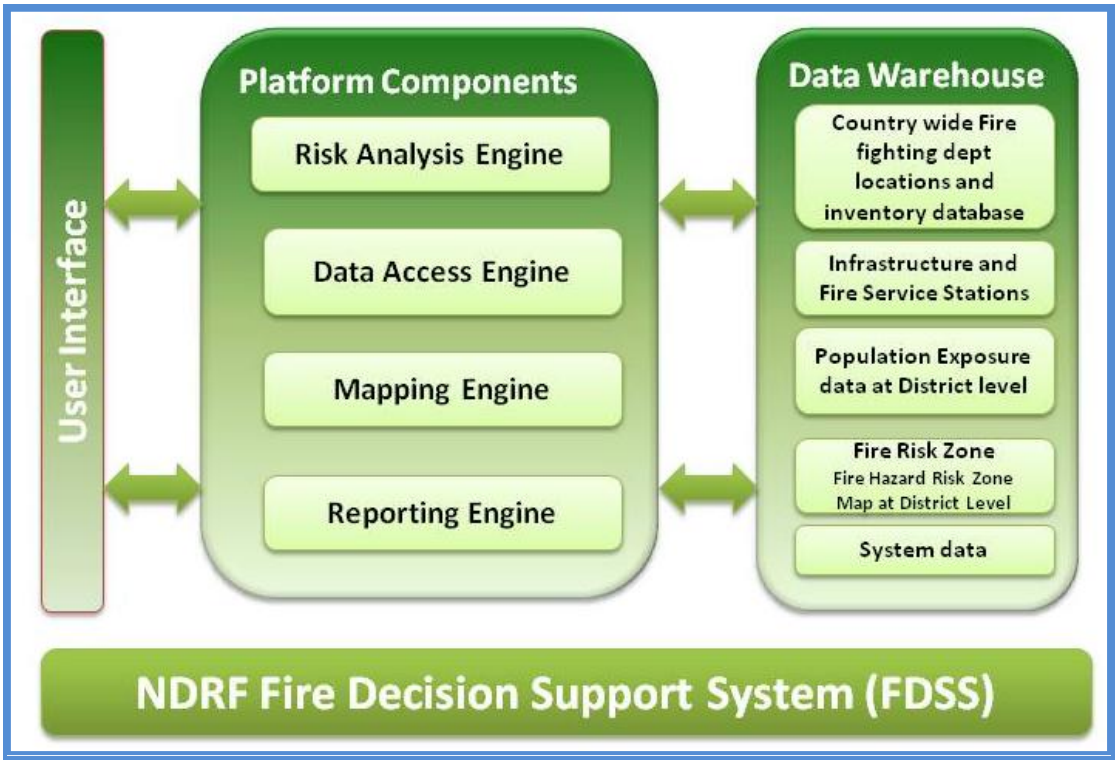


Figure 5-2 : High level design of FDSS

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, firefighting manpower, and building 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

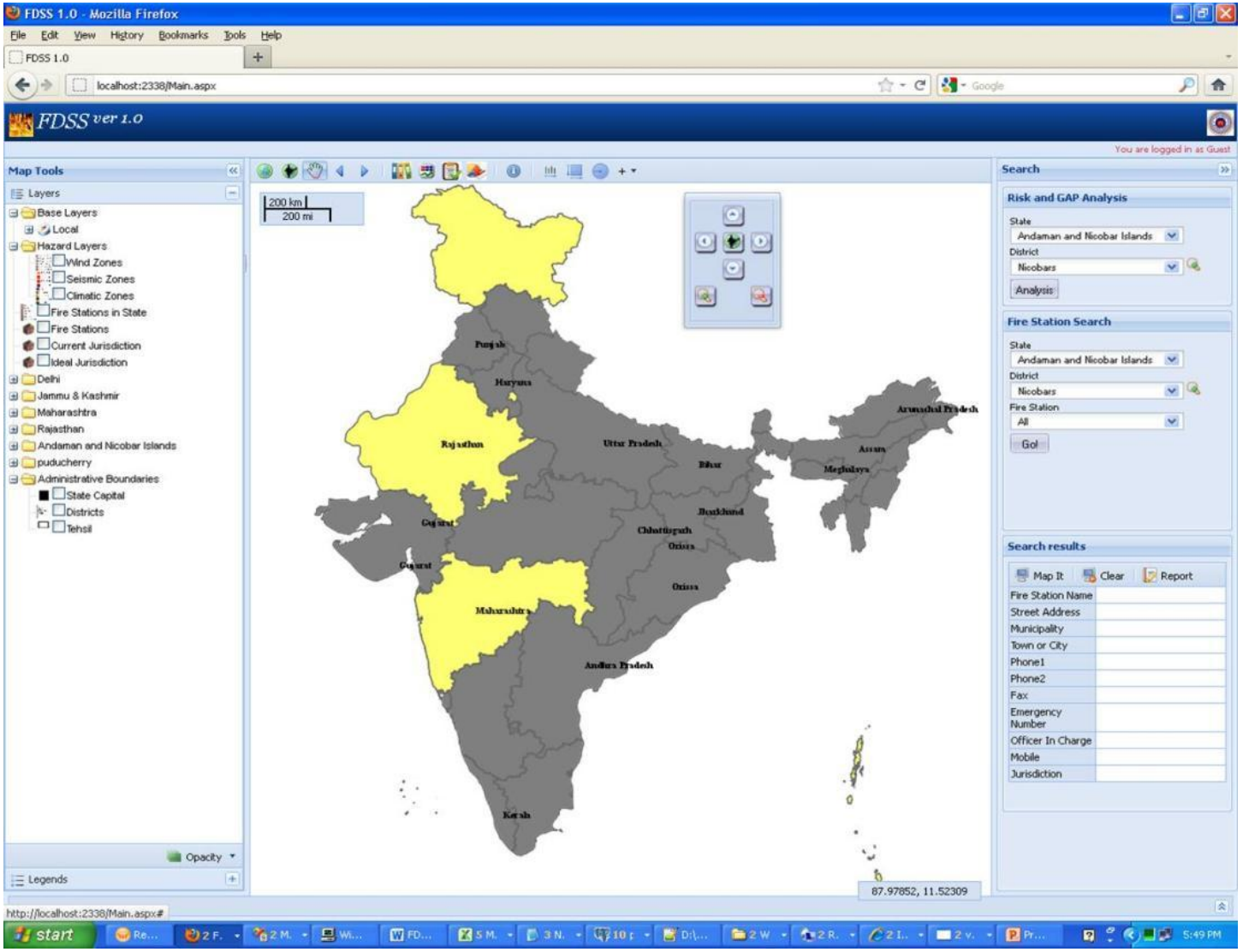


Figure 5-3 : User Interface for Base Analysis of FDSS

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.

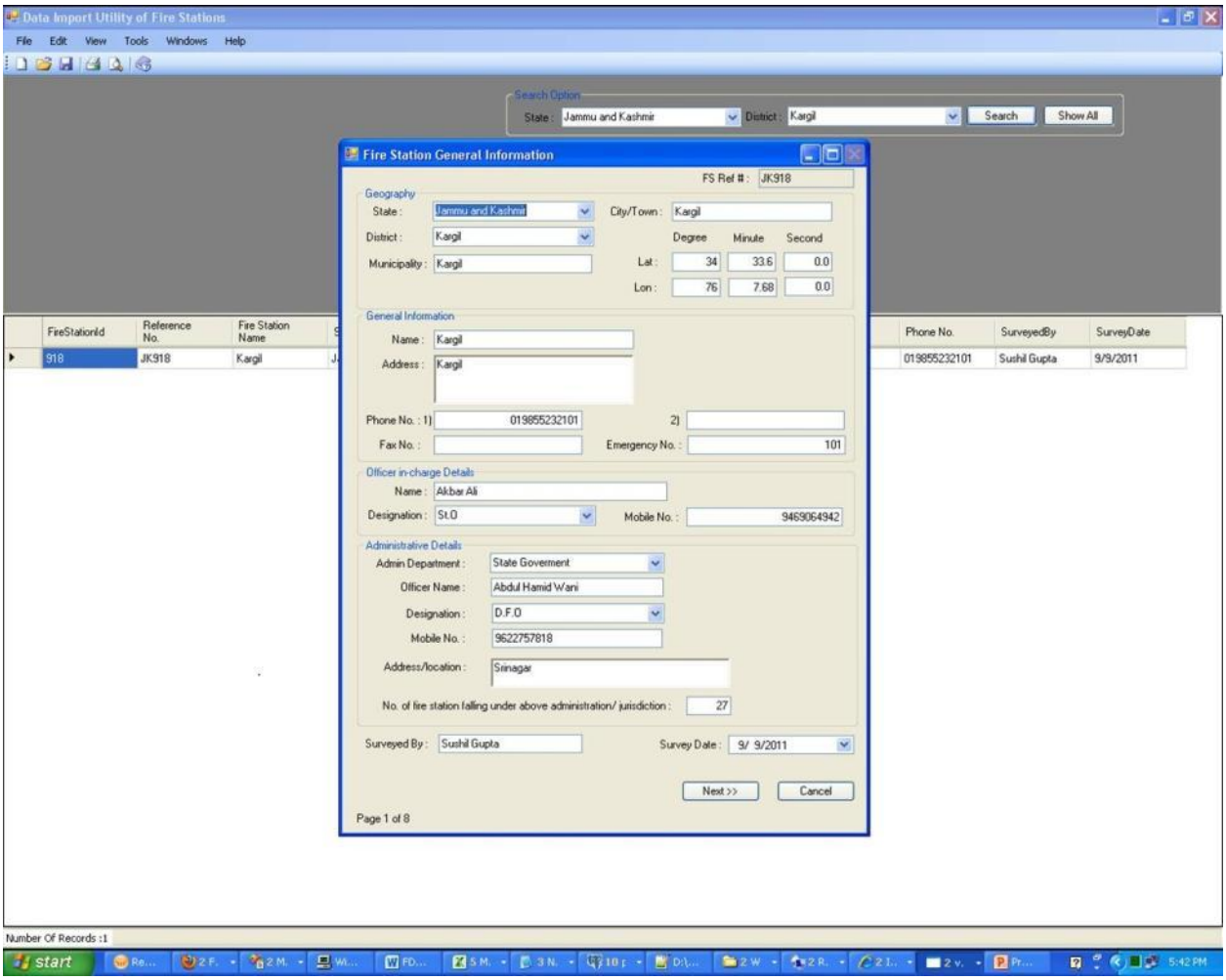


Figure 5-4 : System administration interface

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
- 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.

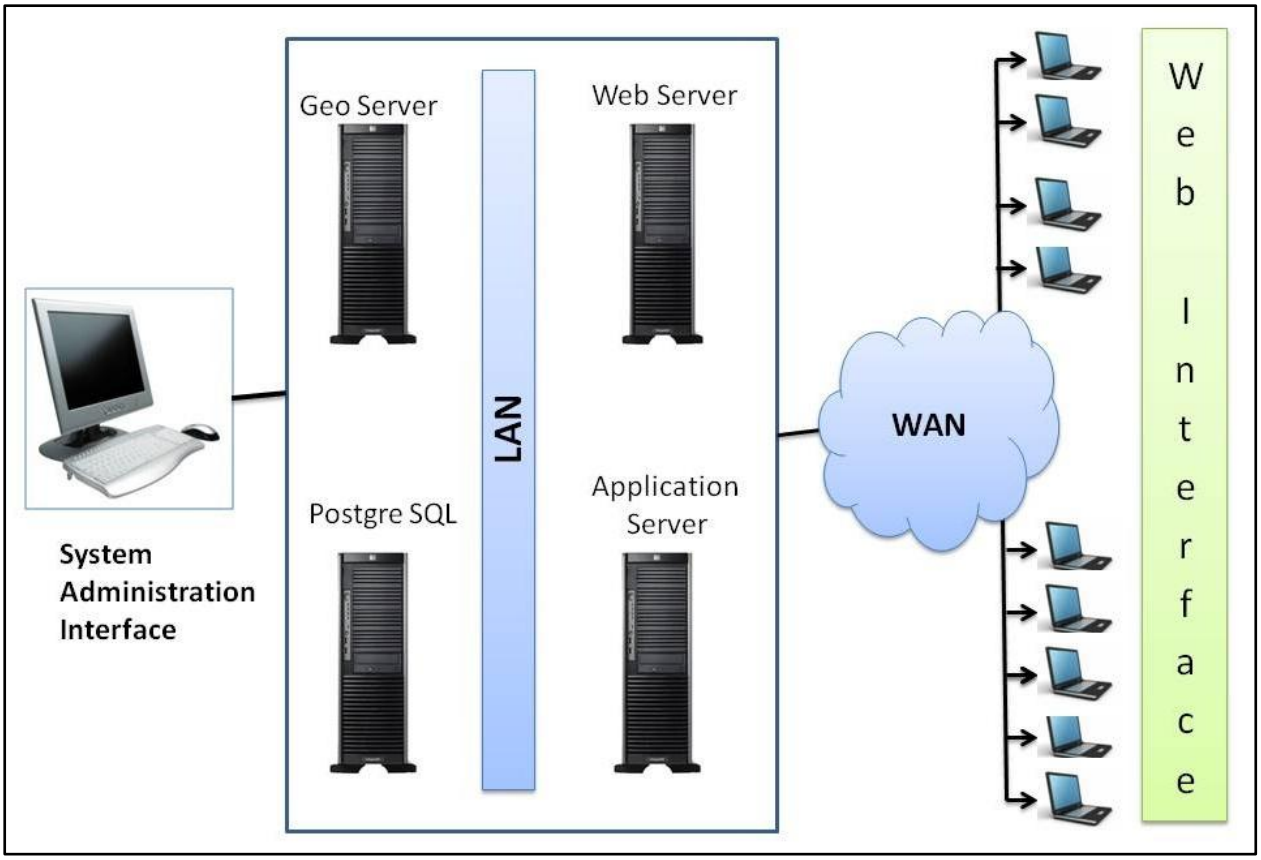


Figure 5-5 : FDSS - Systems Architecture

- 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:

- Geoserver and Geo web cache: This server handles map publishing and all the GIS functionalities. For all GIS analyses it relies on the PostGIS database server. Geoserver and Geo web cache are published in Apache Tomcat Server.
- PostGreSQL Database Server: This serves all the GIS and attribute 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	Not available publicly.

Advantages	Open Source Platform	Proprietary Software Platform
	excellence in design	
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. 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, operational 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 has been 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 in FDSS. This involves 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 has 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:

- **NFPA 1221**, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems;
- **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
- **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 one 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----------

Street address ……

……

Office Phone numbers: ……Fax…….. Website (if any)……

Name & Designation of the Head of Department: ……..

Name & Designation of the nominated person by the dept. for providing data: ……..

Phone numbers ----------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)

B. Area under Jurisdiction in each Zonal Office

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 controlof[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

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

C. Human Resources and Staff Welfare

Organization Structure and Human resources (Operational Staff)

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
10	Director						
9	Chief Fire Officers						
8	Dy. ChiefFire Officer						
7	Divisional Officer						
6	Astt Divisional Officer						
5	Station Officer						
4	Astt Station Officer						
3	Leading Fire men						
2	Fire men/ Driver/ Fire Operator						
1	Watch Room operator						
Any other	Sweeper/ Gardener etc.						

Please additional sheets for each Fire zonal region and Fire Stations

Recruitment Rules for entry level in organization chart

Level	Essential qualifications per recruitment rule	Preferential	Training / Experience	Departmental Reservation policy if any
7				
6				
5				
4				
3				
2				
1				
Any other				

Please provide copy of State recruitment rules

Trainings Details

Training Centre Infrastructure for basic training and sub-officer course: If yes, provide details:

Name of Training Centre:

Number of Faculty/Trainers:

Name of Training Course and Duration	Maximum capacity	Number of personnel Trained annually
1.		
2.		
3.		
4.		

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

S. No	Type of Training Obtained	Within State Training Centre	At NFSC, Nagpur	in other State Training Centre	Foreign country	Total Number of personnel Trained
1.						
2						
3						
4						

Please provide yearly break-up for the last 5 years, if available

Staff Welfare:

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

Details can be on ration money, sports facilities, TV for common room, cash rewards and recognition, incentives, through benevolent fund, Insurance, other schemes etc.

Measures to Improve Staff Efficiency

S. no	Type of Drill	Frequency	Type of Drill (Please tick the appropriate √/ ×)					others
			Squad Drill	Pump/ Hose Drill - Dry	Pump/ Hose Drill - Wet	Ladder/ Rescue Drill	Rope Rescue Drill	
	Daily							
	Weekly							
	Bimonthly							
	Monthly							
	others							

D. 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	Electric Drill	Circular Saw with Diamond Blade(Electric)	Chipping Hammer	Chain Saw- Diamond	Chain Saw- Bullet	Pneumatic Chisel	Spreader Cutters Hyd/electric/ Battery operated	Rescue Boats

Any other not covered in above list

…….

……..

……..

Please provide separate list for each division/district

E. 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:

F. 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

G. 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)	Totalinjured		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				
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 lakhs, Medium – Rs. 10 to 50 lakhs, Serious - >Rs. 50 lakhs, 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 **……**

H. Public Awareness Programs

Public Awareness Programs 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 programs
		Govt./ PSU (a)	Pvt. Locations (b)	Schools (c)	Govt./ PSU (d)	Pvt. Locations (e)	Schools (f)	

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

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

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-7, 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/ Garage- 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				

S. no.	Designation	Total Number of Permanent Working Staff	Duty pattern/ Shifts (hrs)	Vacant, but sanctioned posts	Numbers of temporary/ contract persons (if any)
6.	Fire Man (FM)				
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, Cleaner, Tindal.*

Mode to maintain Physical Fitness

S. no	Type of Drill	Yes/No	S. no	Type of Drill	Yes/No
1.	P.T./ Parade	Daily/……	4.	Vehicle maintenance	Weekly/Monthly/Quarterly/……
2.	Fire Drill	Daily/Weekly……	5.	Any other	……
3.	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			

Fire Risk	If Yes, Brief description of its Name, Type, Risks involved	Dist. From FS (km)	No. of Units
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			
Explosive manufacturing/stores			
Port/ dockyard area			
Railway Station			
Airport Area			
Wild Forest-Area			

Fire Risk	If Yes, Brief description of its Name, Type, Risks involved	Dist. From FS (km)	No. of Units
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 /	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
	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 / GPS	Minor/ Major/Condemned
	Hazmat Van							Wireless / GPS	Minor/ Major/Condemned

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)
	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

Sr 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
	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

Sr No	Fire Vehicle Type	Vehicle Registration Number	Make	If allotted to individual	Comm. System mounted on vehicle	If not in running condition (off road)
	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	
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	

Equipment	Number/ Quantity	Equipment	Number/ Quantity
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																
11-Feb																
11-Jan																
10-Dec																
10-Nov																
10-Oct																
10-Sep																
10-Aug																
10-Jul																
10-Jun																
10-May																
10-Apr																
10-Mar																
10-Feb																
10-Jan																
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 NCT of Delhi

This page is left intentionally blank.

8 Rajasthan State

8.1 Introduction

Rajasthan is the largest State of India with a land area of 342,239 sq km. It lies between 23^0 3' – 30^0 12' N latitude and 69^0 30' – 78^0 17'E longitude with Tropic of Cancer passing through the southernmost district of the State. The State stretches 826 km from North (Sri Ganganagar district) to South (Banswara district), and 869 km from East (Dhaulpur district) to West (Jaisalmer district). The overall length of the State boundary is 5,920 km, of which 1,070 km is international border with Pakistan. The State shares its boundary with Gujarat, Madhya Pradesh, Uttar Pradesh, Haryana, and Punjab. It also shares its border with Pakistan having Barmer, Jaisalmer, Bikaner, and Sri Ganganagar districts as the border districts (Figure 8-1).

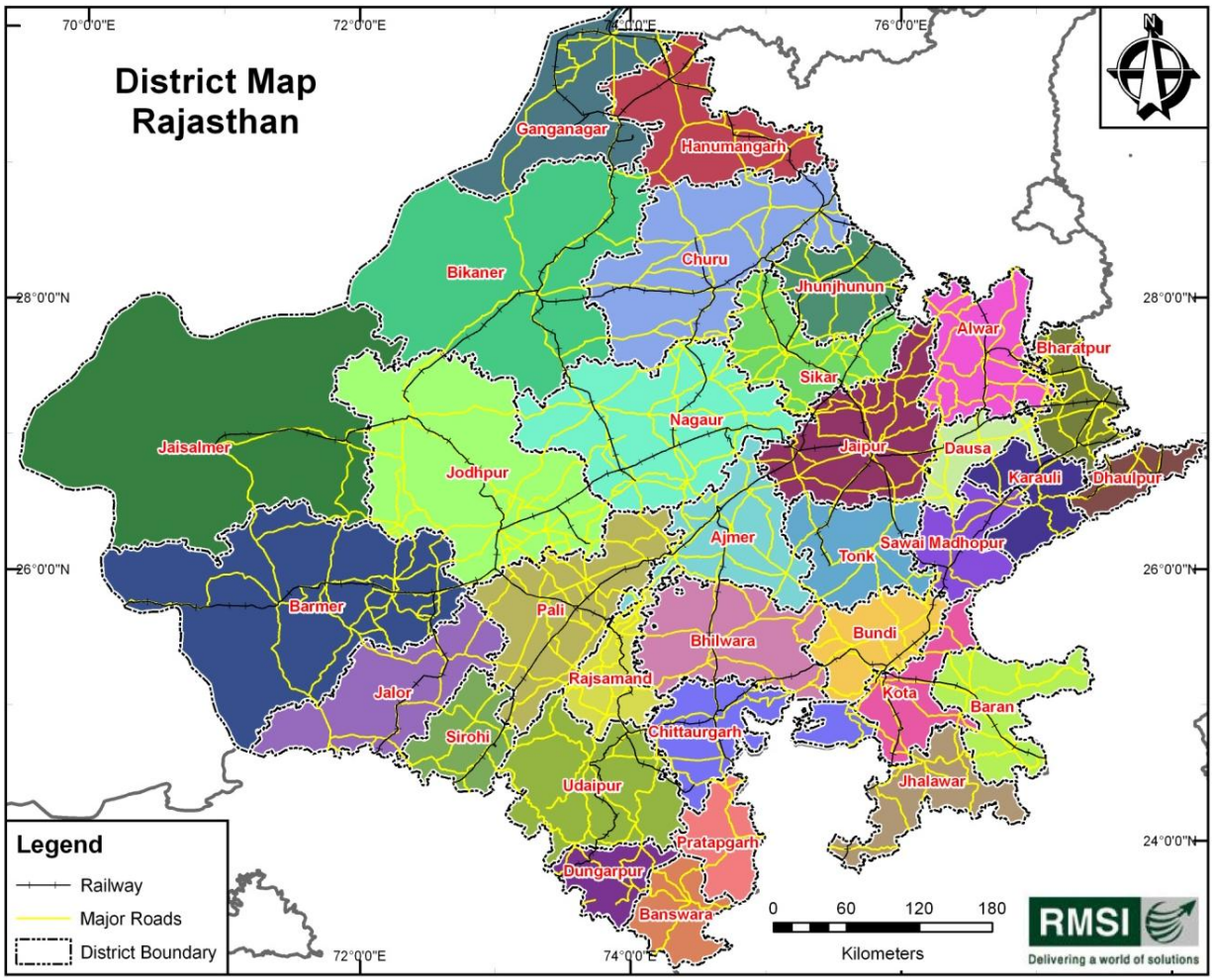


Figure 8-1: District map of Rajasthan

The State occupies 10% of the total area and 6% of the total population of the country having only 1% of the country's water resources.

Sixty percent of the State falls under the Thar Desert, which is situated in western Rajasthan. The Thar Desert consists of the districts (Rajasthan) of Jaisalmer, Barmer, Bikaner, Churu, Nagaur, Sirohi, Jalore, and Jodhpur. Thus, this huge stretch of barren land extends into the southern part of Haryana, Punjab and northern Gujarat and the Sind province of Pakistan. The deserst in Rajasthan are bounded by the Sutlej River in the

northwest, the Aravalli Mountains (the oldest chain of folded mountains) in the east and the salty marshland of the Rann of Kutch in the south and the Indus River in the west.

The Aravalli range runs across the State from southwest Guru Peak (Mount Abu), which is 1,722 m in height to Khetri in the northeast. This divides the State into 60% in the northwest of the lines and 40% in the southeast. Only 9.5% of the total geographical area is recorded as forest.

The climate of Rajasthan varies from arid to semi-arid. On an average, summer temperatures range from 25° to 46°C. At times, temperatures touch a maximum of 49°C creating hypothermic conditions in the State. On an average, the winter temperatures range from 8° to 28°C, which drops to -2°C creating wind-chill effects in some parts of the State.

As per Census (2011), Rajasthan has 6.86 Crores population distributed in 33 districts, having about three fourth populations (75.1%) as rural and one fourth (24.9%) as urban (Table 8-1).

Table 8-1: Rajasthan Demography as per Census 2011

Rajasthan State			
No. of Districts	33		Percentage of Urban Population
No. of Sub-Districts	244		
No. of Towns	297		24.9
No of Villages	44,672		
Population			
	Total	**Rural**	**Urban**
Persons	68,621,012	51,540,236	17,080,776
Males	35,620,086	26,680,882	8,939,204
Females	33,000,926	24,859,354	8,141,572
Sex Ratio (females per 1,000 males)	926	932	911

Administratively, the State is divided into 7 revenue divisions, 33 districts, and 244 Tehsils. It has 33 Zila Parishads, 249 Panchayat Samities, and 9,168 Gram Panchayats.

Presently, Rajasthan State Fire Services is headed by a Director, Additional Director, Local Body Directorate, Rajasthan, and two Chief Fire Officers. A few Fire Stations operated by Civil Defence & Home Guard are headed by ADG, Civil Defence & Home Guard, Rajasthan.

Currently, there are 126 Fire Stations operational in Rajasthan, and on an average serving more than 5.4 lakhs population per Fire Station (Figure 8.2, and Table 8-2).

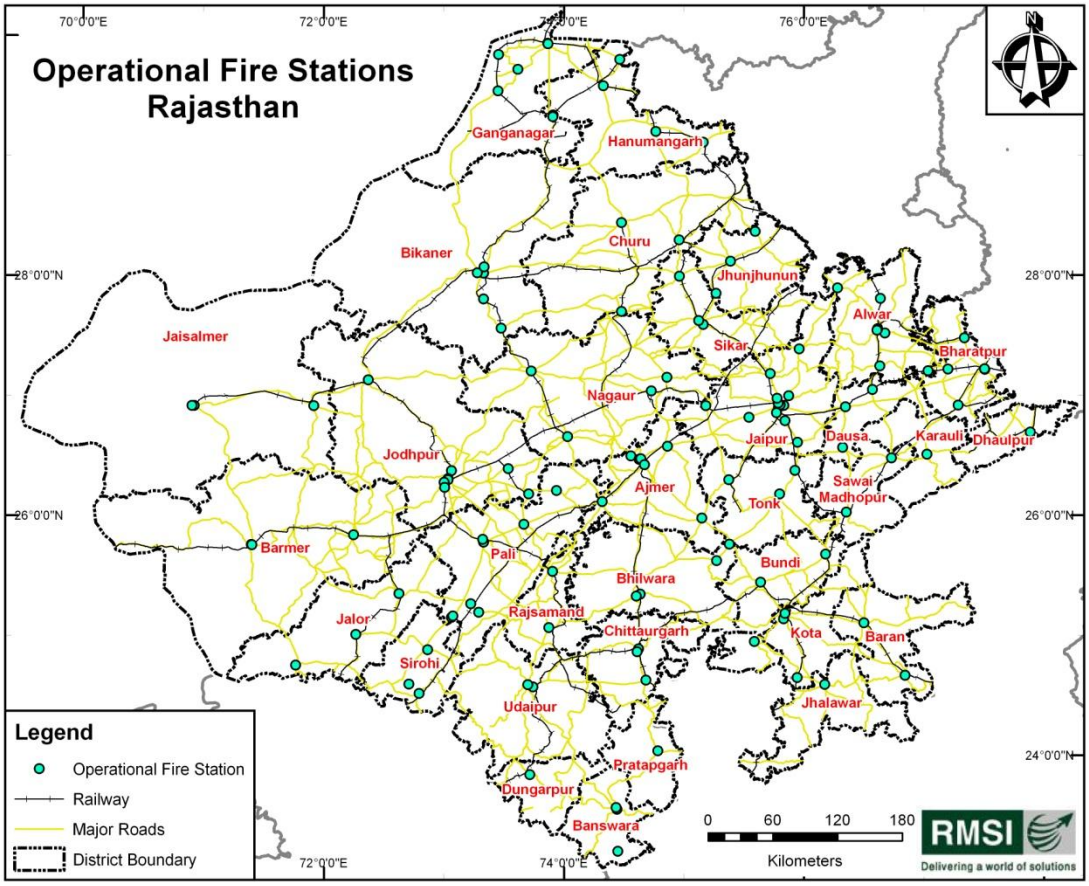


Figure 8-2: Location of operational Fire Stations in Rajasthan State with road and rail networks

Table 8-2: Summary of District level operational Fire Stations in Rajasthan

District	Area (in sq km)	Total Population (Census 2011)	Population Density	Number of Fire Station	Average Population per Fire station
Ganganagar	10,629	1,969,520	185	7	281,360
Hanumangarh	9,992	1,779,650	178	4	444,913
Bikaner	27,043	2,367,745	88	5	473,549
Churu	17,098	2,041,172	119	3	680,391
Jhunjhunun	5,904	2,139,658	362	3	713,219
Alwar	8,317	3,671,999	442	7	524,571
Bharatpur	5,082	2,549,121	502	5	509,824
Dhaulpur	3,032	1,207,293	398	1	1,207,293
Karauli	4,874	1,458,459	299	1	1,458,459
Sawai Madhopur	5,024	1,338,114	266	2	669,057
Dausa	3,555	1,637,226	461	3	545,742
Jaipur	11,309	6,663,971	589	14	475,998
Sikar	7,692	2,677,737	348	3	892,579
Nagaur	17,710	3,309,234	187	4	827,309

District	Area (in sq km)	Total Population (Census 2011)	Population Density	Number of Fire Station	Average Population per Fire station
Jodhpur	22,903	3,685,681	161	8	460,710
Jaisalmer	38,501	672,008	17	3	224,003
Barmer	28,469	2,604,453	91	3	868,151
Jalor	10,752	1,830,151	170	3	610,050
Sirohi	5,169	1,037,185	201	4	259,296
Pali	12,377	2,038,533	165	7	291,219
Ajmer	8,537	2,584,913	303	8	323,114
Tonk	7,256	1,421,711	196	4	355,428
Bundi	5,825	1,113,725	191	2	556,863
Bhilwara	10,477	2,410,459	230	3	803,486
Rajsamand	4,683	1,158,283	247	2	579,142
Dungarpur	3,794	1,388,906	366	1	1,388,906
Banswara	4,315	1,798,194	417	3	599,398
Chittaurgarh	7,882	1,544,392	196	4	386,098
Kota	5,286	1,950,491	369	3	650,164
Baran	6,834	1,223,921	179	2	611,961
Jhalawar	6,270	1,411,327	225	1	1,411,327
Udaipur	12,047	3,067,549	255	2	1,533,775
Pratapgarh	4,259	868,231	204	1	868,231
Total	**342,896**	**68,621,012**	**200**	**126**	**544,611**

8.2 Field Surveys of Fire Stations for Data Collection

To have first-hand information on the distribution of the fire service stations across the country, trained human resources, infrastructure availability and their status, 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 are following categories.

- Fire Station General Information
- Fire Station Infrastructure Details
- Communication Systems
- Water Supply Details for Fire Fighting Purpose
- Human Resources
- Fire Risk Covered in the Area under Jurisdiction
- Status of Fire Fighting Vehicles
- Specialized equipment provided (specify whether kept in vehicle or in stores)
- Other Accessories
- Fire Calls and other 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 GPS. The geographical coordinate information is used for plotting all the Fire Station locations in the map to perform GIS based spatial analysis. 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.

8.3 Fire Infrastructure Gap Analysis

8.3.1 Fire Station Location Gap Analysis

As discussed in section 6.2.5, response time of 5-7 minutes in urban areas and 20 minutes in rural areas has been considered as appropriate. Considering the response time, using network analysis and travel distance, ideal jurisdiction areas have been delineated for all the 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 also shown to be filled by new proposed urban Fire Stations. Table 8-3 shows district level summary of number of operational and new proposed Fire Stations with population covered within their ideal jurisdiction areas.

Rural areas are also covered with new rural Fire Stations. In Rajasthan, rural populations are very sparsely distributed. Locations of rural Fire Stations are demarcated to the nearest bigger village having population more than 5,000 - 10,000 or major roads intersection. District level numbers of new proposed rural Fire Stations are given in Table 8-3. Figures 8-3 to 8-16 depict representative detailed maps showing delineated ideal jurisdiction areas for operational and new proposed urban Fire Stations and location of new rural Fire Station at various places in the State.

Detailed list of delineated operational, new urban and new rural Fire Stations are given in Tables 8-50 and 8-51.

Table 8-3: District level number of operational and additional Fire Stations required in the State

Districts	Number of Operational Fire Stations	Ideal Population severed under operational Fire Stations	Number of New Urban Fire Stations	Ideal Population severed for new Urban Fire Stations	Number of New Rural Fire Stations	Total number of Fire Stations
Ajmer	8	781,453	6	745,706	22	37
Alwar	7	411,293	3	704,833	24	34
Banswara	3	136,588	1	34,708	7	11
Baran	2	115,949	2	203,400	14	18
Barmer	3	498,282	1	38,250	32	36
Bharatpur	5	395,766	1	166,920	20	26
Bhilwara	3	387,468	5	610,751	18	26
Bikaner	5	333,931	7	828,408	32	44
Bundi	2	238,440	2	91,575	13	17
Chittaurgarh	4	384,644	2	224,393	17	23
Churu	3	353,896	7	484,417	28	38
Dausa	3	225,487	1	118,917	10	14
Dhaulpur	1	185,931	1	88,389	9	11
Dungarpur	1	153,779	1	74,474	9	11
Ganganagar	7	348,985	5	318,368	21	33
Hanumangarh	4	187,510	3	310,649	23	30
Jaipur	14	1,393,744	20	3,341,018	27	61

Districts	Number of Operational Fire Stations	Ideal Population severed under operational Fire Stations	Number of New Urban Fire Stations	Ideal Population severed for new Urban Fire Stations	Number of New Rural Fire Stations	Total number of Fire Stations
Jaisalmer	3	69,437	0	0	20	23
Jalor	3	211,541	0	0	23	26
Jhalawar	1	75,516	0	0	26	27
Jhunjhunun	3	281,886	4	353,440	19	26
Jodhpur	8	713,238	4	314,837	47	59
Karauli	1	133,673	1	107,952	15	17
Kota	3	291,633	6	413,267	19	28
Nagaur	4	526,160	5	411,348	27	36
Pali	7	437,378	2	62,787	21	30
Pratapgarh	1	70,815	1	64,081	6	8
Rajsamand	2	99,669	2	95,300	11	15
Sawai Madhopur	2	281,466	1	134,910	14	17
Sikar	3	335,135	8	623,270	16	27
Sirohi	4	325,629	1	63,850	14	19
Tonk	4	407,250	0	0	21	25
Udaipur	2	327,457	4	482,132	16	22
Total	**126**	**11,121,029**	**107**	**11,512,350**	**641**	**874**

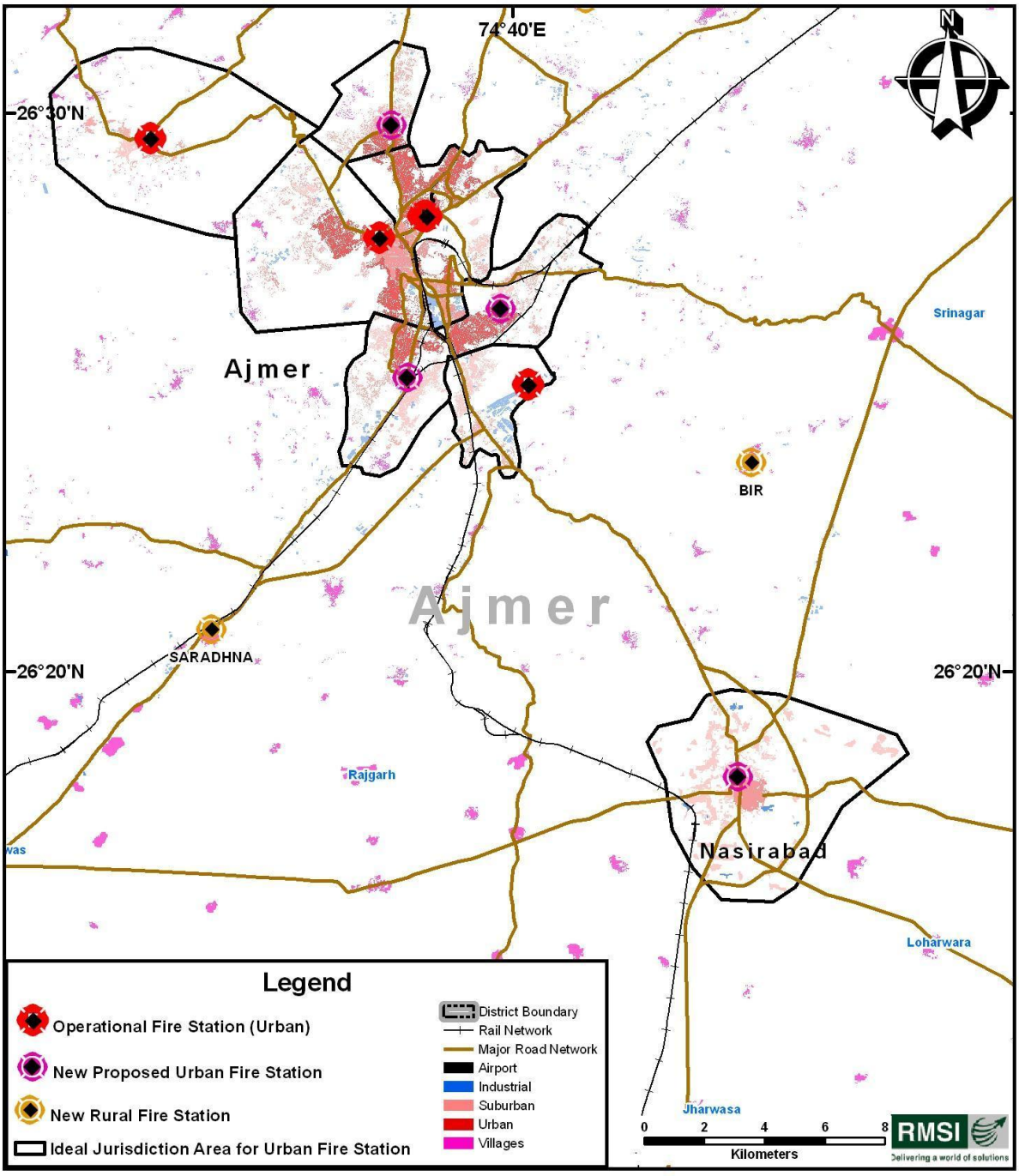


Figure 8-3: Fire stations gap analysis for Ajmer urban area

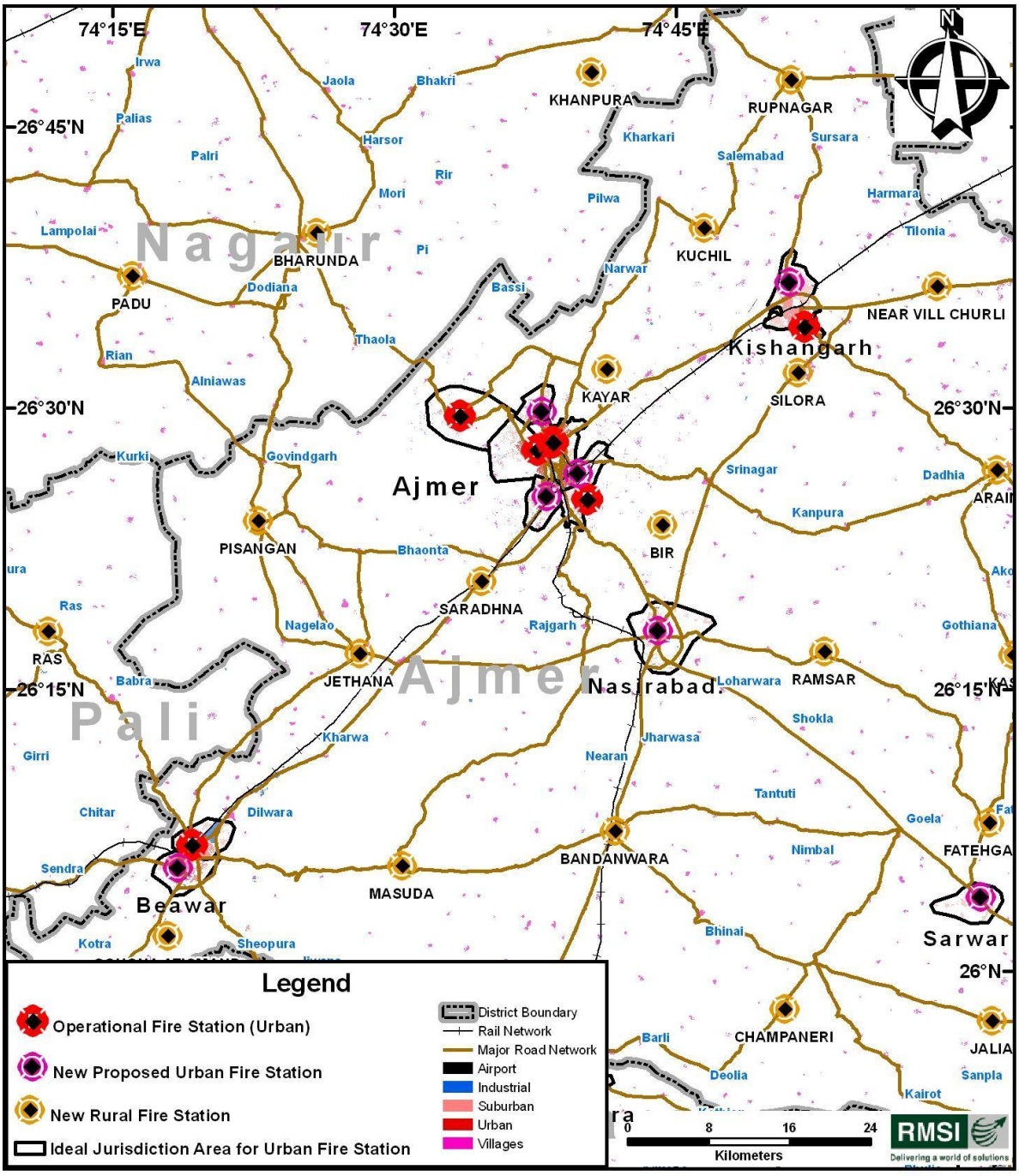


Figure 8-4: Fire stations gap analysis for Ajmer rural areas

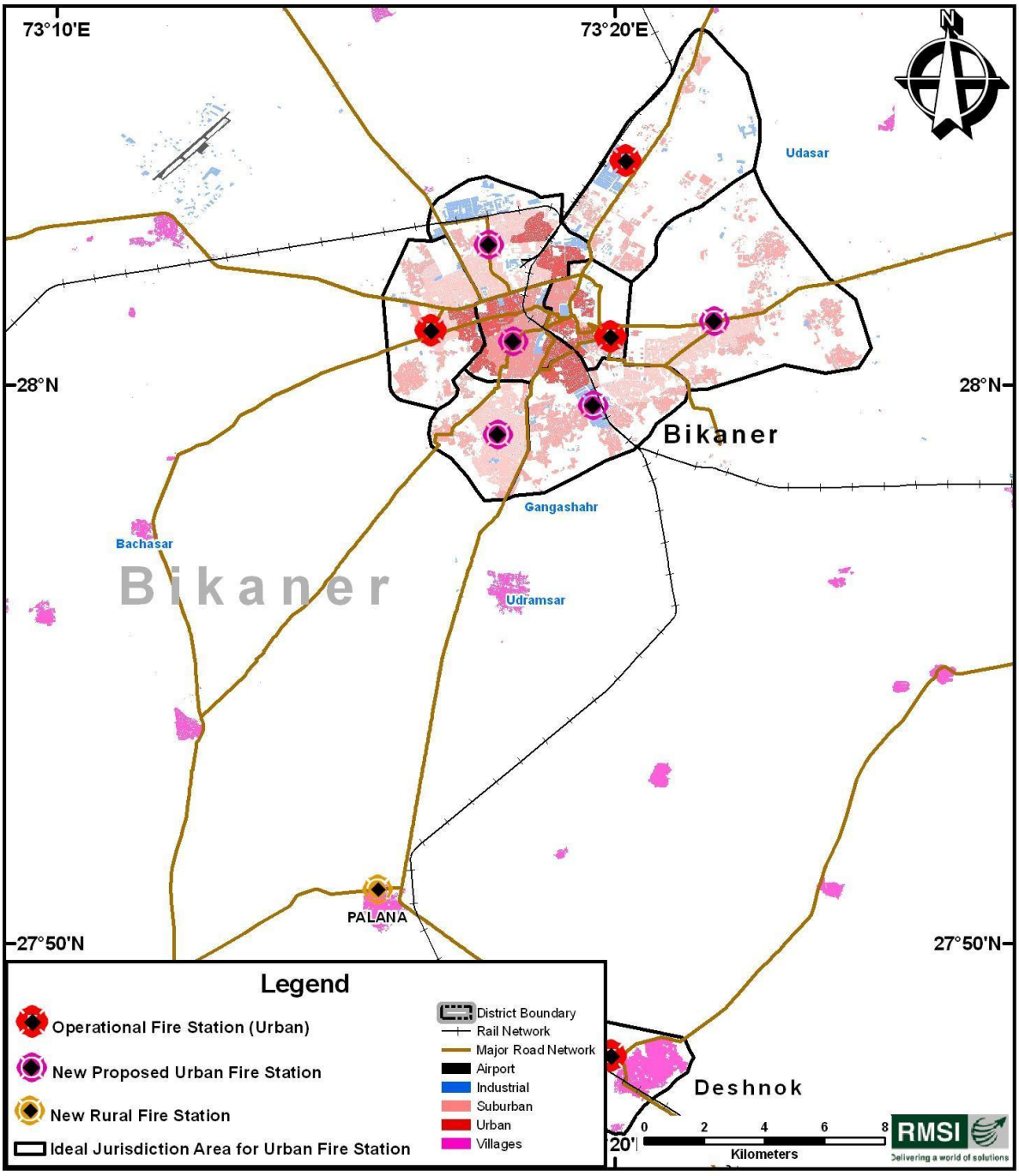


Figure 8-5: Fire stations gap analysis for Bikaner urban areas

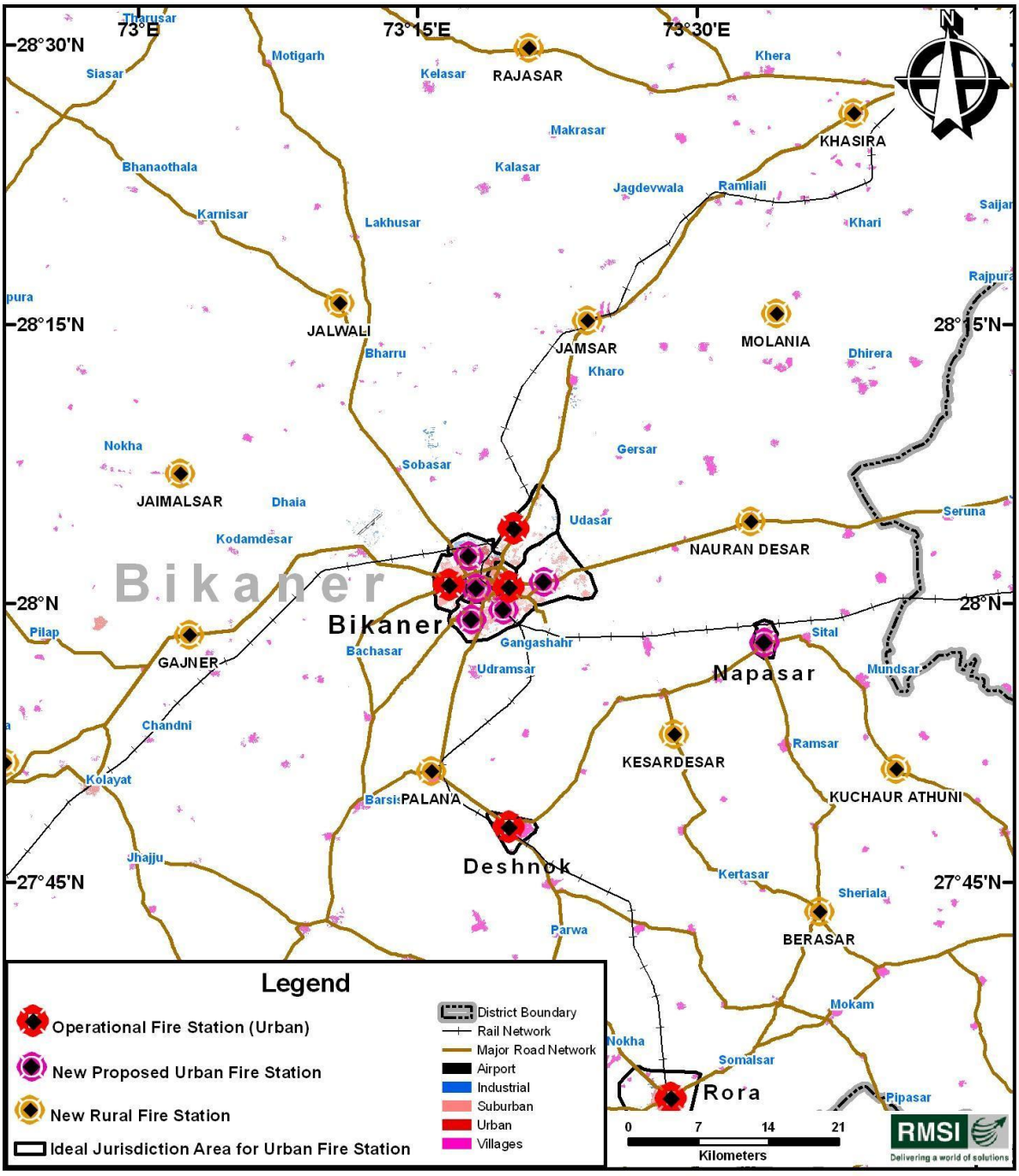


Figure 8-6: Fire stations gap analysis for Bikaner rural areas

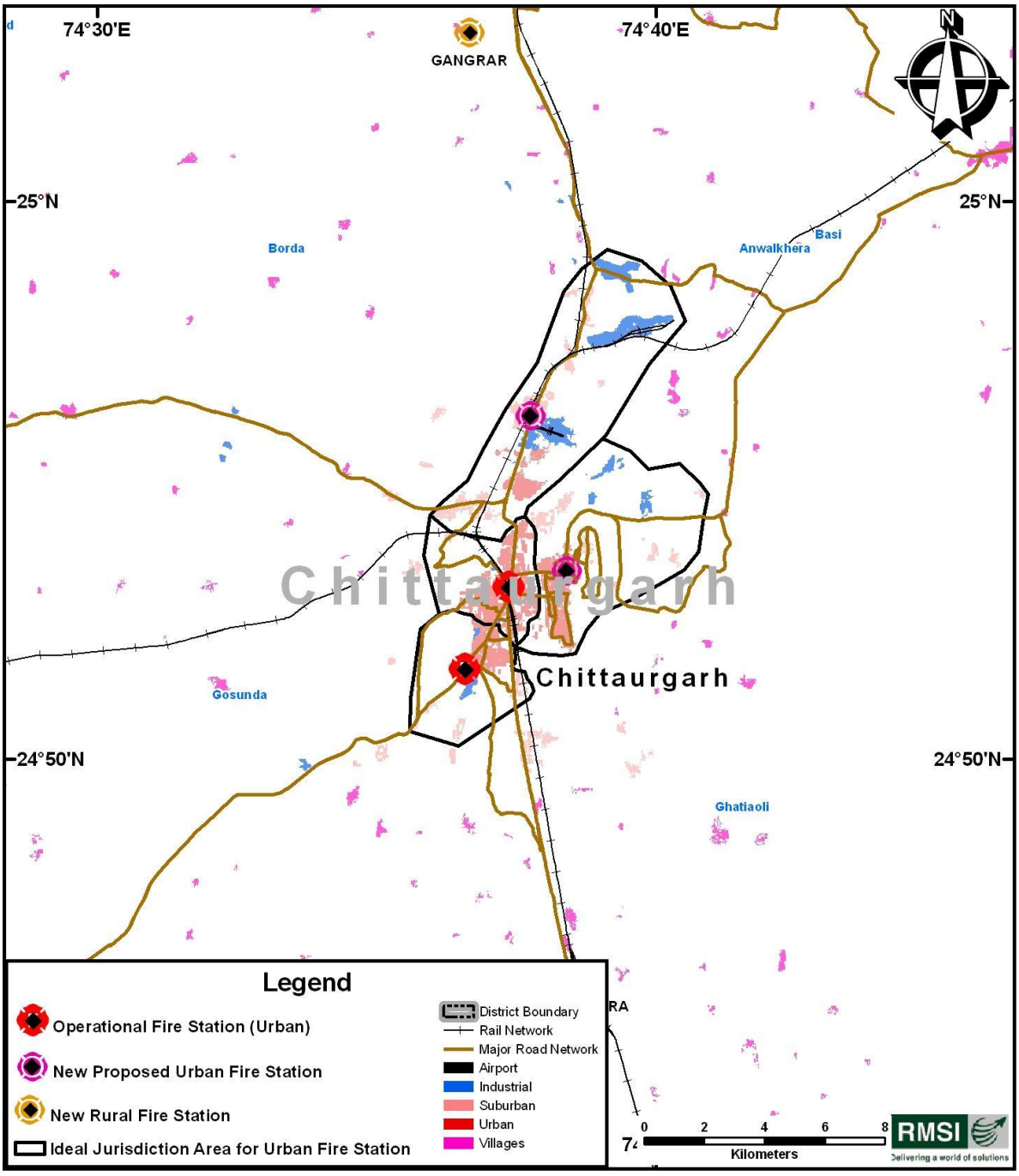


Figure 8-7: Fire stations gap analysis for Chittaurgarh urban areas

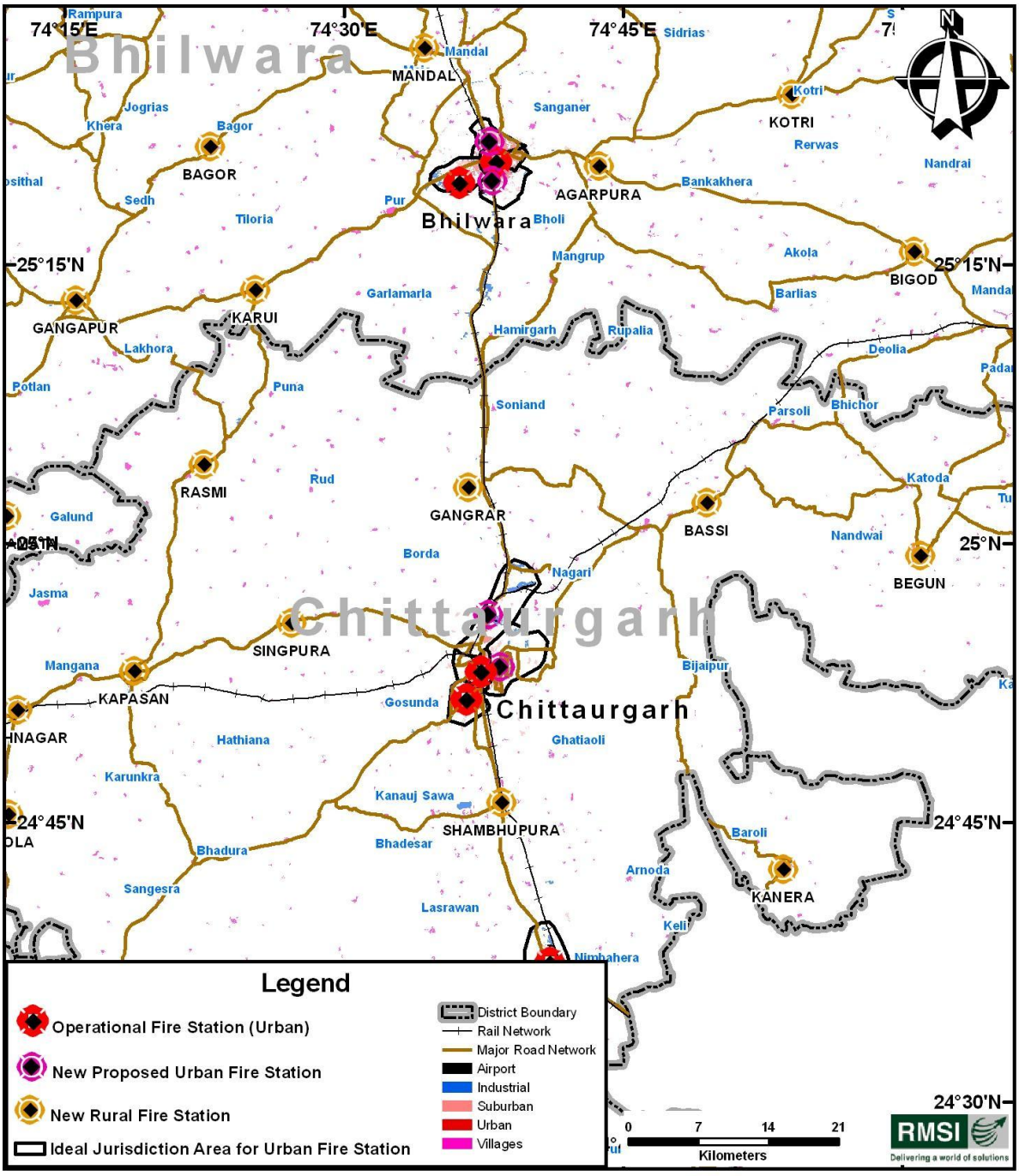


Figure 8-8: Fire stations gap analysis for Chittaurgarh rural areas

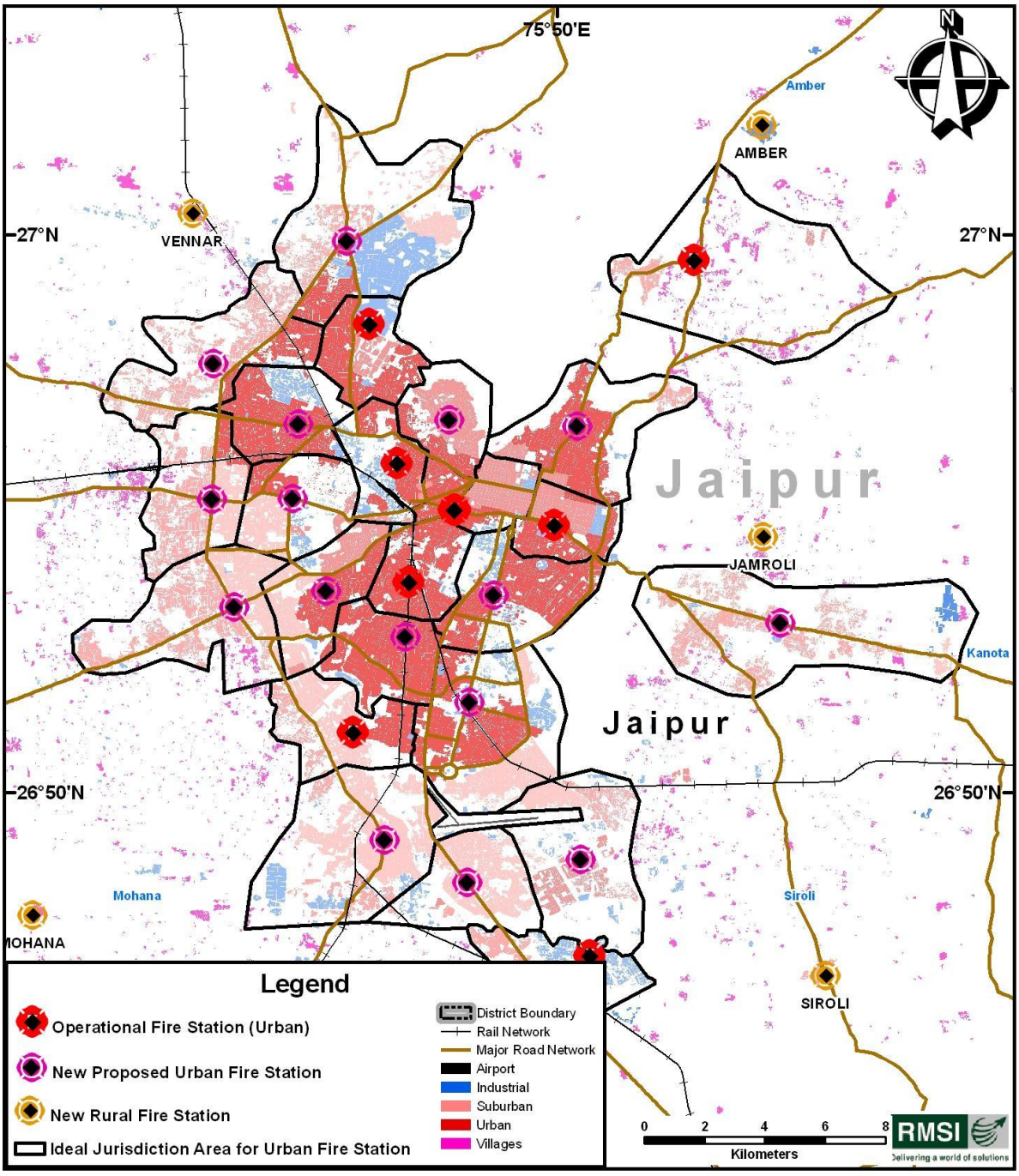


Figure 8-9: Fire stations gap analysis for Jaipur urban areas

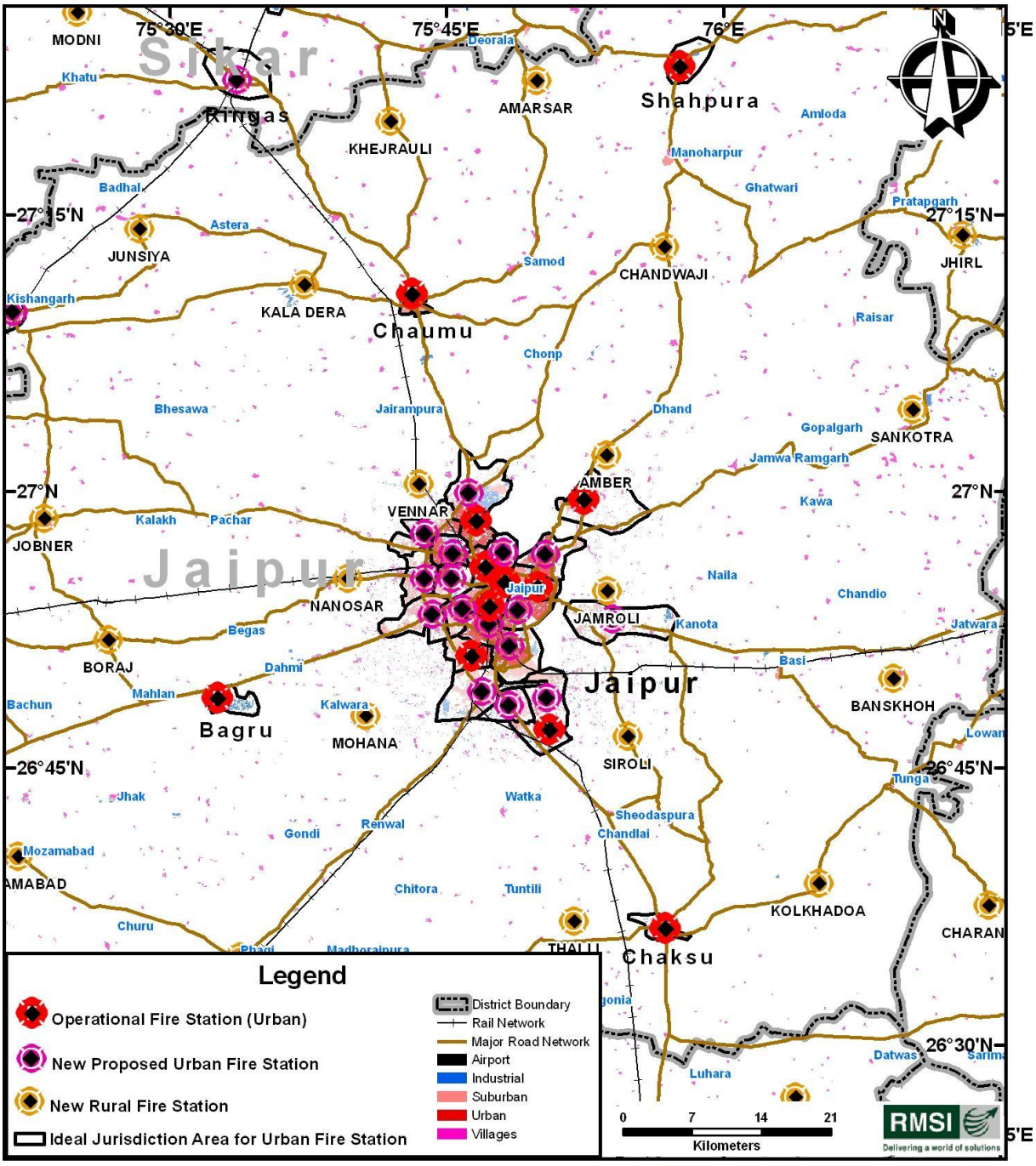


Figure 8-10: Fire stations gap analysis for Jaipur rural areas

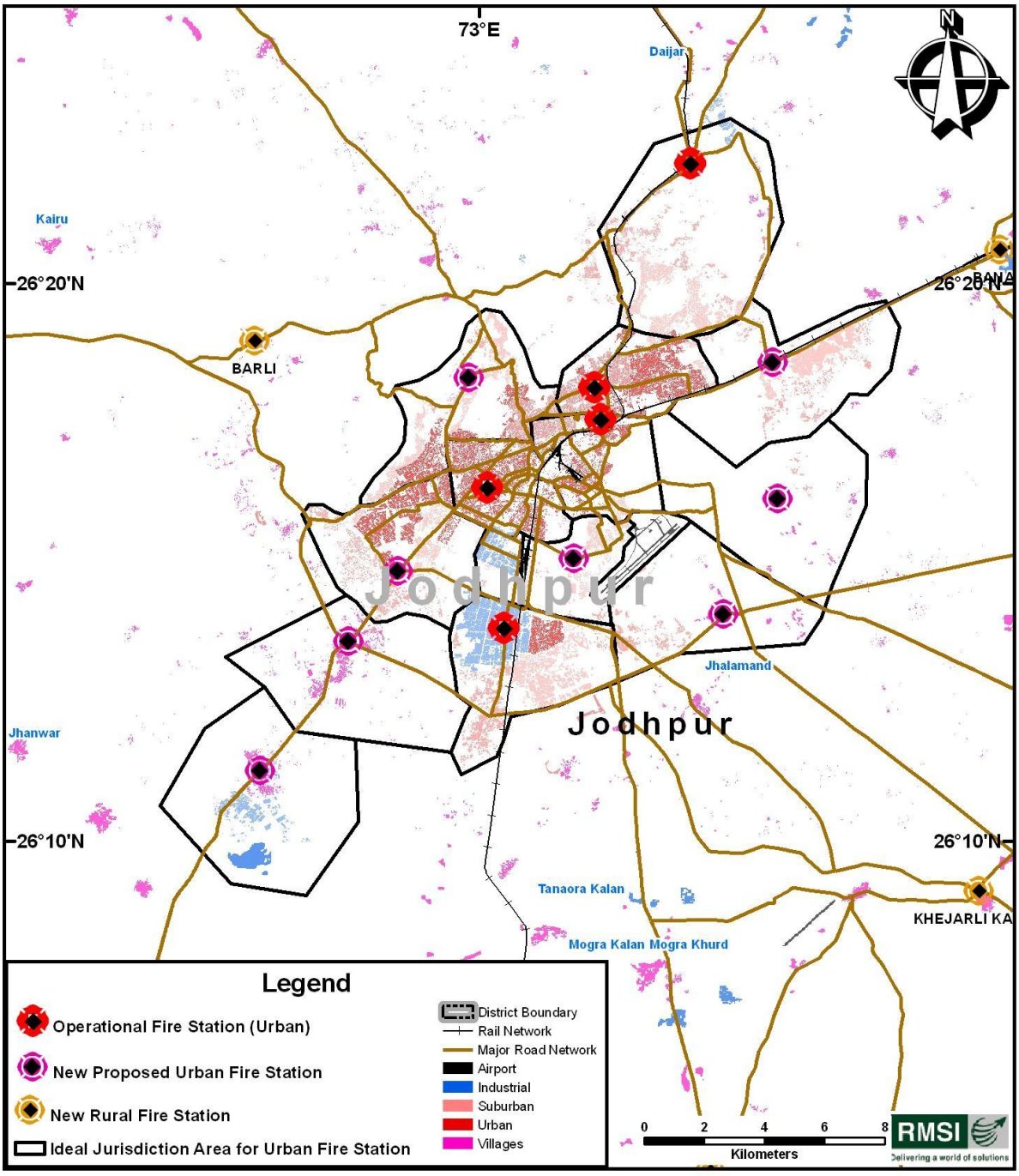


Figure 8-11: Fire stations gap analysis for Jodhpur urban areas

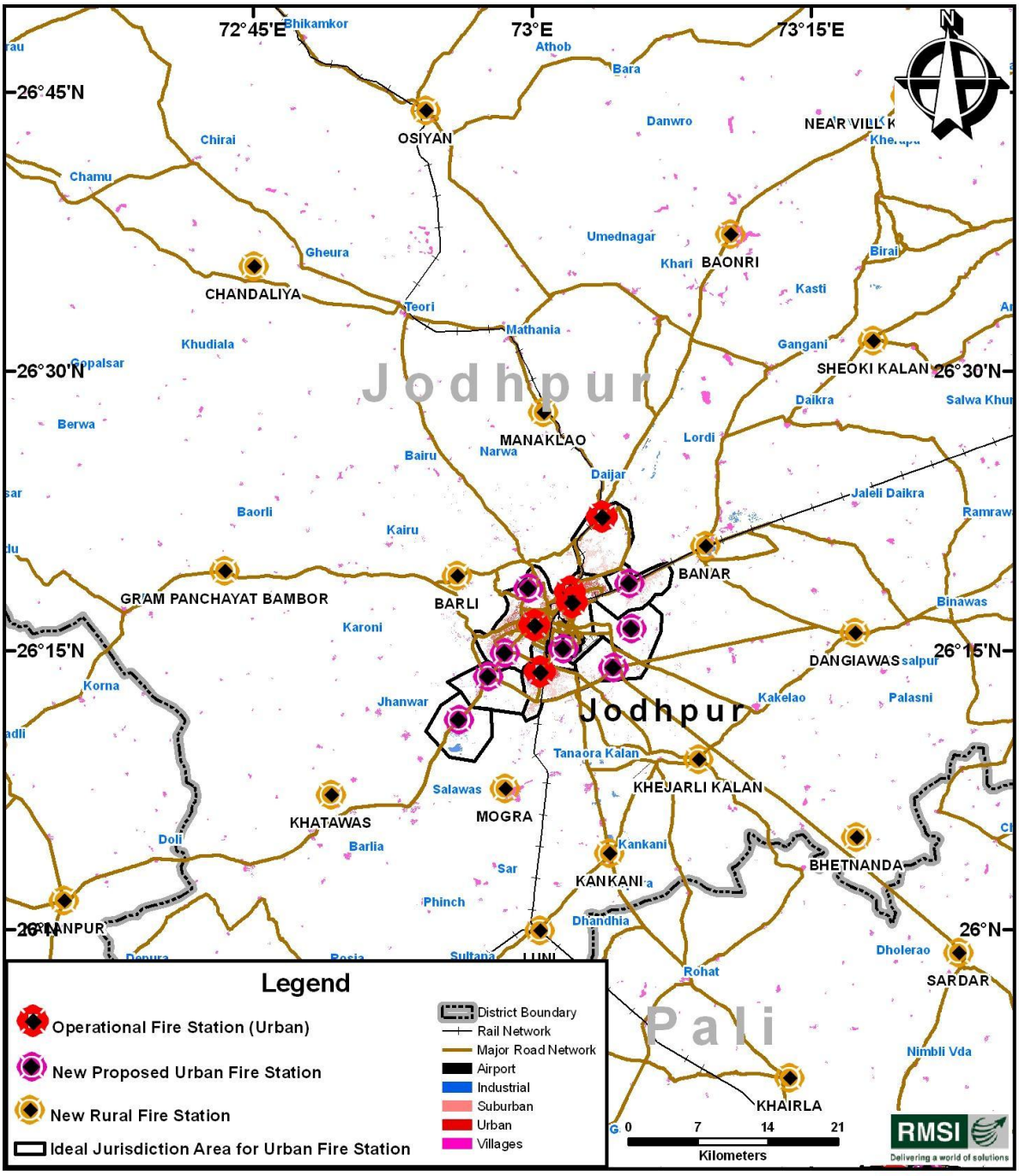


Figure 8-12: Fire stations gap analysis for Jodhpur rural areas

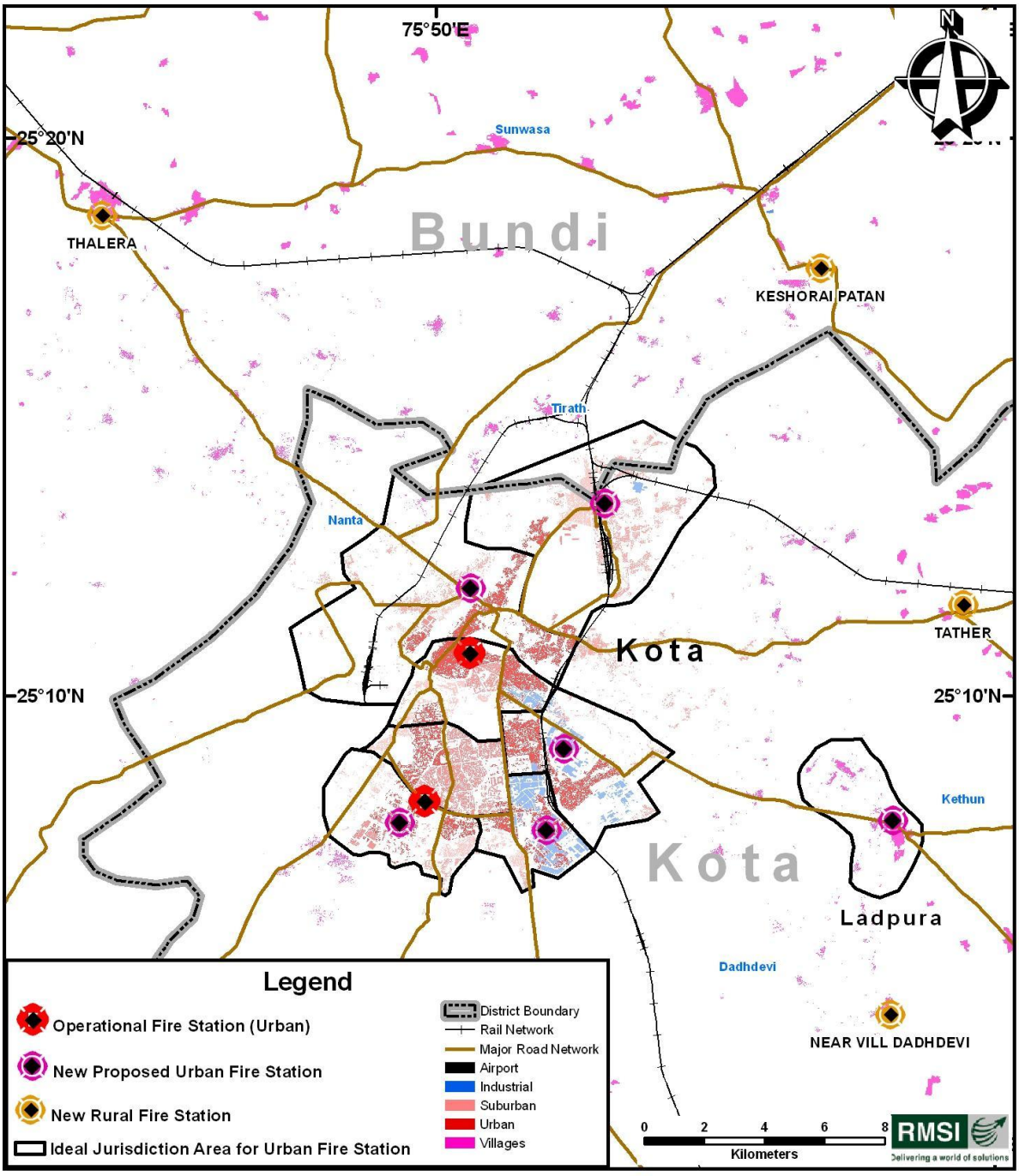


Figure 8-13: Fire stations gap analysis for Kota urban areas

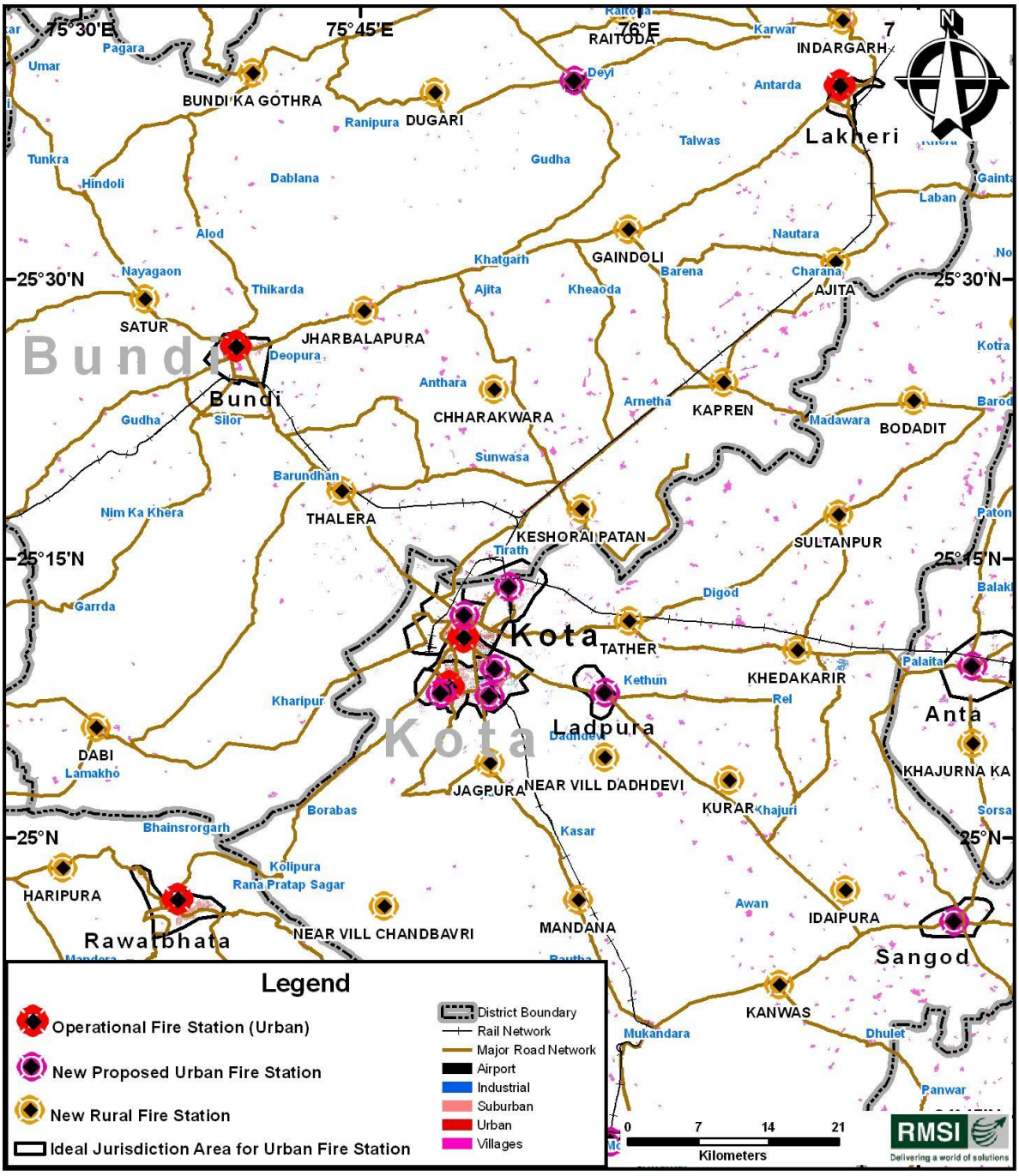


Figure 8-14: Fire stations gap analysis for Kota and surrounding rural areas

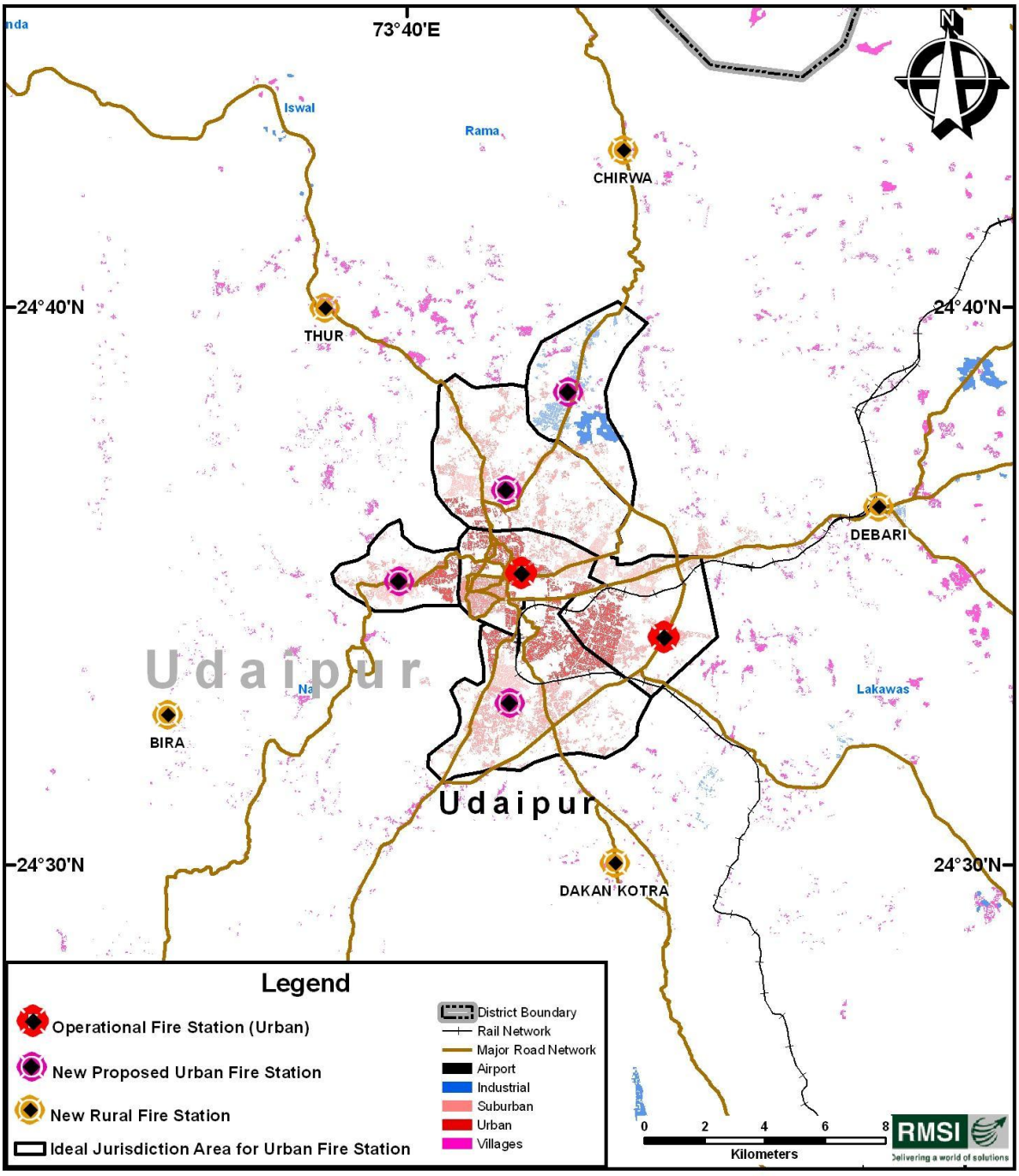


Figure 8-15: Fire stations gap analysis for Udaipur urban areas

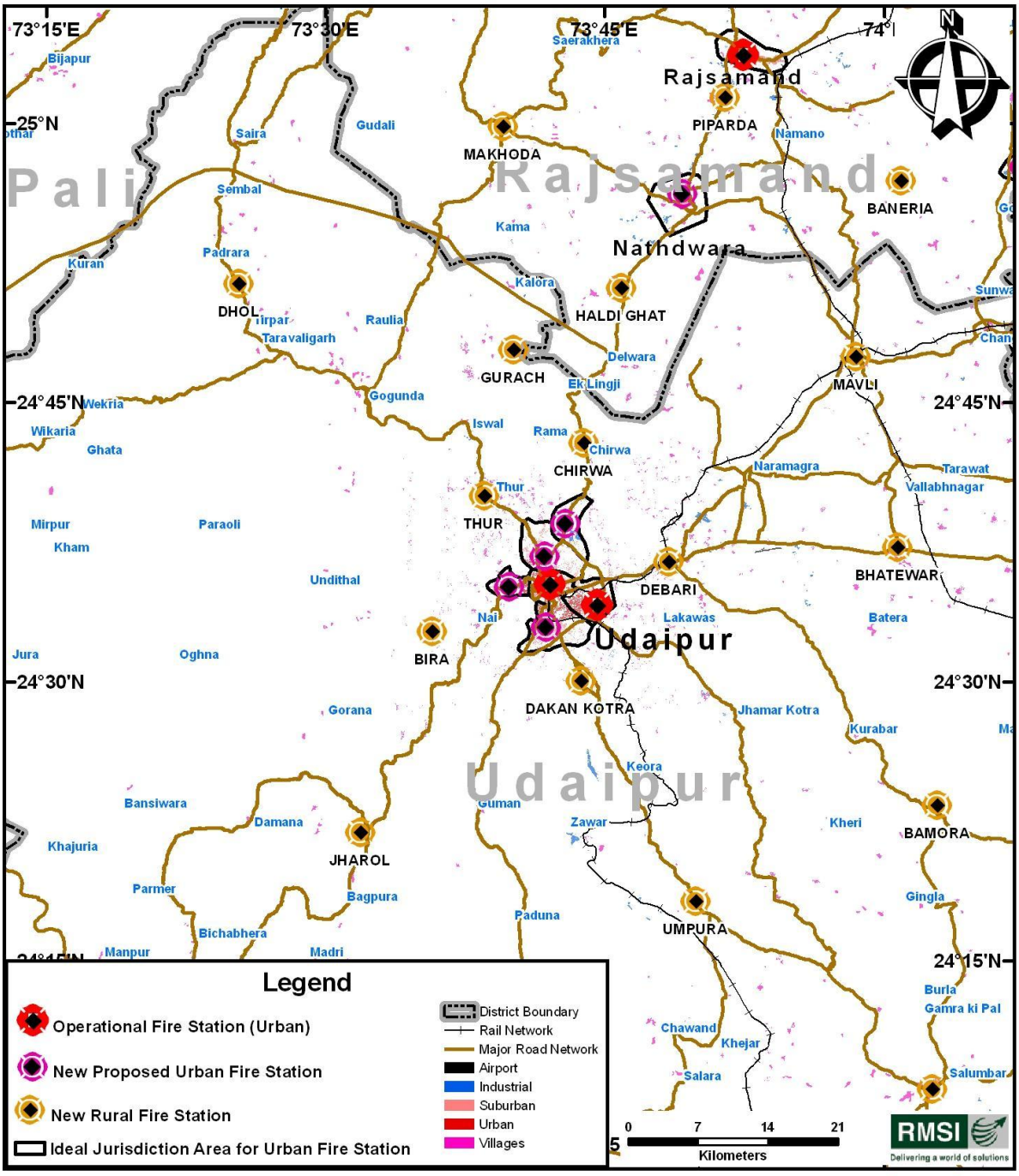


Figure 8-16: Fire stations gap analysis for Udaipur rural areas

8.3.2 FIREFIGHTING AND RESCUE VEHICLES AND EQUIPMENT GAP

For firefighting and rescue vehicles and specialized equipment gap analysis at the operational Fire Stations and the new Fire Stations in urban areas and Fire Stations/fire posts in 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.

- **Pumping Unit:** For counting of existing pumping units at various DFS 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 three Lakhs population has been considered. For population of more than three 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.
- **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.
- **Foam Tender:** For those Fire Stations, in whose jurisdiction small industrial area also lie, one Water Tender should be replaced with Foam Tender.
- **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 sq km to 6.0 sq km, there should be two DCP Tenders and so on.
- **Advanced Rescue Tender:** One per district (minimum) up to 10 Lakhs population, and one additional unit for every 10 Lakhs urban population.
- **Hydraulic Platform/ALP/TTL:** One per district (minimum) depending upon the presence of building blocks having 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 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.*
- **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.
- **Crash Fire Tender:** Crash fire Tender is not recommended for State Fire Services. 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.

- **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.
- **Hose Tender:** One per district (minimum) or one for 8-10 Fire Stations.
- **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 Pump are recommended, which will be part of a Fire Tender (**(Specialized Equipment** Sl. No. 12).
- **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

- **Motorcycle with 2 water mist set:** One each at Fire Stations serving higher population density or in congested areas with each QRT.
- **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. In case of Delhi, the ambulance service was initially with Delhi Police then transferred to DFS in the year 1985-86 and then transferred to CATS (Centralized Accident Trauma Service, Ministry of Health).

  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.
- **Educational Van**: One per district and one additional unit for every 30 Lakhs district population

  At rural Fire Station/ Fire Post level, if the estimated pumping units 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 a majority of inside roads within rural villages is narrow in width and congested. This will also help in optimization of resources.

  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 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:

- **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.
- **Combi-Tool:** One Combi-Tool set shall be provided with each fire fighting vehicle.
- **B.A. Set with BA Compressor:** Four B. A. Sets per fire fighting vehicle with minimum 1 compressor per Fire Station
- **First Aid Box:** One for each fire fighting vehicle (minimum 2 at each Fire Station) with regular replacement of expired medicines
- **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
- **Personal Protection Equipment (PPE):** One Set for each pumping unit or a minimum of 2 for each Fire Station
- **Hydraulic Chain Saw/Cutter for Wood:** One for each Fire Station
- **Electric/Petrol Chain Saw/Cutter for Wood**: One for each Fire Station
- **Electric/Petrol Chain Saw/Cutter for Concrete:** One for each Fire Station
- **Hand Held Gas Detector:** One piece per Vehicle
- **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
- **Smoke Exhauster/PPV:** One per Fire Stations located in urban areas (minimum one per district)
- **Portable Pump:** One for each fire fighting unit
- **Pneumatic Lifting Bags:** One set 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
- **Inflatable Lighting Tower:** One per Fire Station
- **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 Stations/ fire posts, following specialized equipment has been recommended:

- **B.A. Set with BA Compressor:** Two B. A. set per QRT and four B.A. Sets per fire fighting vehicle with one compressor per Fire Station/post
- **Personal Protection Equipment (PPE):** One set per fire fighting vehicle
- **Electric/Petrol Chain Saw/Cutter for Wood:** One per Fire Station/Post

- **Hydraulic Chain Saw/Cutter for Wood:** One per Fire Station/post
- **Portable Pump:** One for each fire fighting unit
- **Inflatable Lighting Tower:** One per Fire Station
- **High Capacity LED Torch Light:** One piece per fire fighting vehicle
- **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. 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:

- **Static Wireless Set (VHF):** One set at each Fire Station
- **Mobile Wireless Set (VHF):** One per vehicle including QRT
- **Walky-Talky:** One per vehicle
- **Megaphone:** One set per Fire Station/Post
- Additionally, at each rural Fire Post, each QRT should be equipped with one mobile wireless set and one walky-talky.

Detailed district level list of currently operational firefighting and rescue vehicles available with Rajasthan Fire Services (As on Aug-Sep, 2011), vehicle gap in operational Fire Stations for ideal Jurisdiction area, additional firefighting and rescue vehicle required for new urban and rural Fire Stations and total firefighting and rescue vehicle gap for existing and new Urban Fire stations are shown in Table 8-4 to 8-9.

In the similar manner, gap analyses of specialized fire equipment are shown in Tables 8-10 to 8-18.

Table 8-4: List of operational firefighting and rescue vehicles available with Rajasthan Fire Services (As on Aug-Sep, 2011)

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Ajmer	8	781,453	17	2	0	0	0	0	0	0	0	0	0	0	0	0	19
Alwar	7	411,293	7	1	1	0	0	0	0	0	0	0	0	0	0	0	9
Banswara	3	136,588	4	0	0	0	0	0	0	0	0	0	0	0	1	0	5
Baran	2	115,949	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Barmer	3	498,282	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Bharatpur	5	395,766	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Bhilwara	3	387,468	6	0	2	0	0	0	0	0	0	0	0	0	0	0	8
Bikaner	5	333,931	9	1	1	0	0	0	0	0	0	0	0	0	0	0	11
Bundi	2	238,440	2	0	1	0	0	0	0	0	0	0	0	0	0	0	3
Chittaurgarh	4	384,644	6	0	0	0	0	0	0	0	0	0	0	0	1	0	7
Churu	3	353,896	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Dausa	3	225,487	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Dhaulpur	1	185,931	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Dungarpur	1	153,779	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Ganganagar	7	348,985	12	1	0	0	0	0	0	0	0	0	0	0	0	0	13
Hanumangarh	4	187,510	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Jaipur	14	1,393,744	31	11	3	0	1	0	0	0	0	0	2	0	0	0	48
Jaisalmer	3	69,437	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Jalor	3	211,541	4	0	1	0	0	0	0	0	0	0	0	0	0	0	5

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Jhalawar	1	75,516	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Jhunjhunun	3	281,886	6	0	1	0	0	0	0	0	0	0	0	0	0	0	7
Jodhpur	8	713,238	14	3	0	0	1	0	0	0	0	0	0	0	0	0	18
Karauli	1	133,673	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Kota	3	291,633	10	3	0	0	0	0	0	0	0	0	0	0	0	0	13
Nagaur	4	526,160	5	0	1	0	0	0	0	0	0	0	0	0	0	0	6
Pali	7	437,378	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Pratapgarh	1	70,815	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Rajasamand	2	99,669	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Sawai Madhopur	2	281,466	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Sikar	3	335,135	1	2	0	0	0	0	0	0	0	0	0	0	0	0	3
Sirohi	4	325,629	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Tonk	4	407,250	6	1	0	0	0	0	0	0	0	0	0	0	0	0	7
Udaipur	2	327,457	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Total	**126**	**11,121,029**	**222**	**25**	**11**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**2**	**0**	**264**

*: Fire fighting vehicles, which are under condemnation or off road for major repairs are not included. Replacement of such vehicles can be accounted for reserve vehicles in operational Fire Stations.

Table 8-5: Firefighting and rescue 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	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Ajmer	8	781,453	-8	1	4	2	1	1	1	1	0	0	0	0	0	1	4
Alwar	7	411,293	0	0	1	1	0	1	1	1	0	0	0	0	0	1	6
Banswara	3	136,588	-1	1	1	1	0	1	1	1	0	0	0	0	0	1	6
Baran	2	115,949	-2	1	0	1	0	1	1	1	0	0	0	0	0	1	4
Barmer	3	498,282	0	5	0	1	0	1	1	1	0	0	0	0	0	1	10
Bharatpur	5	395,766	1	3	2	1	0	1	1	1	0	0	0	0	0	1	11
Bhilwara	3	387,468	-1	2	-1	1	0	1	1	1	0	0	0	0	0	1	5
Bikaner	5	333,931	-4	0	1	1	0	1	1	1	0	0	0	0	0	1	2
Bundi	2	238,440	1	1	0	1	0	1	1	1	0	0	0	0	0	1	7
Chittaurgarh	4	384,644	-1	3	1	1	0	1	1	1	0	0	0	0	0	1	8
Churu	3	353,896	0	3	0	1	0	1	1	1	0	0	0	0	0	1	8
Dausa	3	225,487	-1	2	0	1	0	1	1	1	0	0	0	0	0	1	6
Dhaulpur	1	185,931	0	1	1	1	0	1	1	1	0	0	0	0	0	1	7
Dungarpur	1	153,779	-2	0	1	1	0	1	1	1	0	0	0	0	0	1	4
Ganganagar	7	348,985	-5	-1	1	1	0	1	1	1	0	0	0	0	0	1	0
Hanumangarh	4	187,510	-1	0	0	1	0	1	1	1	0	0	0	0	0	1	4
Jaipur	14	1,393,744	-13	-4	1	3	0	2	3	1	0	1	0	0	0	2	-4
Jaisalmer	3	69,437	-1	0	0	1	0	1	1	1	0	0	0	0	0	1	4
Jalor	3	211,541	-1	0	1	1	0	1	1	1	0	0	0	0	0	1	5

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Jhalawar	1	75,516	-2	0	1	1	0	1	1	1	0	0	0	0	0	1	4
Jhunjhunun	3	281,886	-3	1	0	1	0	1	1	1	0	0	0	0	0	1	3
Jodhpur	8	713,238	-3	0	4	1	0	1	1	1	0	0	0	0	0	1	6
Karauli	1	133,673	-1	0	1	1	0	1	1	1	0	0	0	0	0	1	5
Kota	3	291,633	-7	-1	1	1	1	1	1	1	0	0	0	0	0	1	-1
Nagaur	4	526,160	1	5	-1	1	0	1	1	1	0	0	0	0	0	1	10
Pali	7	437,378	-2	1	1	1	0	1	1	1	0	0	0	0	0	1	5
Pratapgarh	1	70,815	-1	0	0	1	0	1	1	1	0	0	0	0	0	1	4
Rajasamand	2	99,669	-1	0	0	1	0	1	1	1	0	0	0	0	0	1	4
Sawai Madhopur	2	281,466	0	2	0	1	0	1	1	1	0	0	0	0	0	1	7
Sikar	3	335,135	3	0	1	1	0	1	1	1	0	0	0	0	0	1	9
Sirohi	4	325,629	-2	2	1	1	0	1	1	1	0	0	0	0	0	1	6
Tonk	4	407,250	0	0	1	1	0	1	1	1	0	0	0	0	0	1	6
Udaipur	2	327,457	-6	2	1	1	0	1	1	1	0	0	0	0	0	1	2
Total	**126**	**11,121,029**	**-63**	**30**	**25**	**36**	**2**	**34**	**35**	**33**	**0**	**1**	**0**	**0**	**0**	**34**	**167**

Table 8-6: Additional firefighting and rescue vehicle required for new urban Fire Stations for their ideal jurisdiction areas

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Ajmer	6	608,701	11	4	1	0	0	0	0	0	0	0	0	0	0	0	16
Alwar	3	704,833	8	7	2	0	0	0	0	0	0	0	0	0	0	0	17
Banswara	1	34,708	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Baran	2	203,400	3	1	1	0	0	0	0	0	0	0	0	0	0	0	5
Barmer	1	38,250	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Bharatpur	1	166,920	2	2	0	0	0	0	0	0	0	0	0	0	0	0	4
Bhilwara	5	610,751	7	5	2	0	0	0	0	0	0	0	0	0	0	0	14
Bikaner	7	828,408	14	4	3	0	0	0	0	0	0	0	0	0	0	0	21
Bundi	2	91,575	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Chittaurgarh	2	224,393	2	2	1	0	0	0	0	0	0	0	0	0	0	0	5
Churu	7	484,417	12	3	0	0	0	0	0	0	0	0	0	0	0	0	15
Dausa	1	118,917	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Dhaulpur	1	88,389	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Dungarpur	1	74,474	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Ganganagar	5	318,368	5	2	2	0	0	0	0	0	0	0	0	0	0	0	9
Hanumangarh	3	310,649	3	3	1	0	0	0	0	0	0	0	0	0	0	0	7
Jaipur	20	3,341,018	41	27	11	0	0	3	0	0	0	0	0	0	0	0	82
Jaisalmer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jalor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Jhalawar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhunjhunun	4	353,440	5	3	1	0	0	0	0	0	0	0	0	0	0	0	9
Jodhpur	4	314,837	5	3	0	0	0	0	0	0	0	0	0	0	0	0	8
Karauli	1	107,952	1	1	1	0	0	0	0	0	0	0	0	0	0	0	3
Kota	6	413,267	7	3	0	0	0	0	0	0	0	0	0	0	0	0	10
Nagaur	5	411,348	6	5	0	0	0	0	0	0	0	0	0	0	0	0	11
Pali	2	62,787	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pratapgarh	1	64,081	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Rajasamand	2	95,300	2	1	1	0	0	0	0	0	0	0	0	0	0	0	4
Sawai Madhopur	1	134,910	2	1	0	0	0	0	0	0	0	0	0	0	0	0	3
Sikar	8	623,270	11	6	1	0	0	0	0	0	0	0	0	0	0	0	18
Sirohi	1	63,850	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Tonk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Udaipur	4	482,132	7	4	2	0	0	0	0	0	0	0	0	0	0	0	13
Total	**107**	**11,375,345**	**169**	**91**	**30**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**293**

Table 8-7: Total firefighting and rescue vehicle gap for operational and new urban Fire Stations

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Ajmer	14	1,390,154	3	5	5	2	1	1	1	1	0	0	0	0	0	1	20
Alwar	10	1,116,126	8	7	3	1	0	1	1	1	0	0	0	0	0	1	23
Banswara	4	171,296	0	1	1	1	0	1	1	1	0	0	0	0	0	1	7
Baran	4	319,349	1	2	1	1	0	1	1	1	0	0	0	0	0	1	9
Barmer	4	536,532	1	6	0	1	0	1	1	1	0	0	0	0	0	1	12
Bharatpur	6	562,686	3	5	2	1	0	1	1	1	0	0	0	0	0	1	15
Bhilwara	8	998,219	6	7	1	1	0	1	1	1	0	0	0	0	0	1	19
Bikaner	12	1,162,339	10	4	4	1	0	1	1	1	0	0	0	0	0	1	23
Bundi	4	330,015	3	1	0	1	0	1	1	1	0	0	0	0	0	1	9
Chittaurgarh	6	609,037	1	5	2	1	0	1	1	1	0	0	0	0	0	1	13
Churu	10	838,313	12	6	0	1	0	1	1	1	0	0	0	0	0	1	23
Dausa	4	344,404	1	3	0	1	0	1	1	1	0	0	0	0	0	1	9
Dhaulpur	2	274,320	2	2	1	1	0	1	1	1	0	0	0	0	0	1	10
Dungarpur	2	228,253	0	0	1	1	0	1	1	1	0	0	0	0	0	1	6
Ganganagar	12	667,353	0	1	3	1	0	1	1	1	0	0	0	0	0	1	9
Hanumangarh	7	498,159	2	3	1	1	0	1	1	1	0	0	0	0	0	1	11
Jaipur	34	4,734,762	28	23	12	3	0	5	3	1	0	1	0	0	0	2	78
Jaisalmer	3	69,437	-1	0	0	1	0	1	1	1	0	0	0	0	0	1	4
Jalor	3	211,541	-1	0	1	1	0	1	1	1	0	0	0	0	0	1	5
Jhalawar	1	75,516	-2	0	1	1	0	1	1	1	0	0	0	0	0	1	4

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Jhunjhunun	7	635,326	2	4	1	1	0	1	1	1	0	0	0	0	0	1	12
Jodhpur	12	1,028,075	2	3	4	1	0	1	1	1	0	0	0	0	0	1	14
Karauli	2	241,625	0	1	2	1	0	1	1	1	0	0	0	0	0	1	8
Kota	9	704,900	0	2	1	1	1	1	1	1	0	0	0	0	0	1	9
Nagaur	9	937,508	7	10	-1	1	0	1	1	1	0	0	0	0	0	1	21
Pali	9	500,165	0	1	1	1	0	1	1	1	0	0	0	0	0	1	7
Pratapgarh	2	134,896	0	1	0	1	0	1	1	1	0	0	0	0	0	1	6
Rajasamand	4	194,969	1	1	1	1	0	1	1	1	0	0	0	0	0	1	8
Sawai Madhopur	3	416,376	2	3	0	1	0	1	1	1	0	0	0	0	0	1	10
Sikar	11	958,405	14	6	2	1	0	1	1	1	0	0	0	0	0	1	27
Sirohi	5	389,479	0	2	1	1	0	1	1	1	0	0	0	0	0	1	8
Tonk	4	407,250	0	0	1	1	0	1	1	1	0	0	0	0	0	1	6
Udaipur	6	809,589	1	6	3	1	0	1	1	1	0	0	0	0	0	1	15
Total	**233**	**22,496,374**	**106**	**121**	**55**	**36**	**2**	**37**	**35**	**33**	**0**	**1**	**0**	**0**	**0**	**34**	**460**

Table 8-8: 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	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Ajmer	22	983,569	22	0	0	0	0	0	0	0	0	3	0	0	0	0	25
Alwar	24	2,575,909	34	11	0	0	0	0	0	0	0	18	10	0	0	0	73
Banswara	7	329,842	7	0	0	0	0	0	0	0	0	2	6	0	0	0	15
Baran	14	904,527	15	0	0	0	0	0	0	0	0	5	5	0	0	0	25
Barmer	32	2,086,830	35	1	0	0	0	0	0	0	0	14	11	0	0	0	61
Bharatpur	20	1,127,363	20	0	0	0	0	0	0	0	0	13	10	0	0	0	43
Bhilwara	18	1,444,244	25	0	0	0	0	0	0	0	0	13	10	0	0	0	48
Bikaner	32	1,197,513	32	0	0	0	0	0	0	0	0	1	0	0	0	0	33
Bundi	13	745,958	14	1	0	0	0	0	0	0	0	4	2	0	0	0	21
Chittaurgarh	17	1,015,089	21	0	0	0	0	0	0	0	0	4	3	0	0	0	28
Churu	28	1,177,613	29	0	0	0	0	0	0	0	0	1	1	0	0	0	31
Dausa	10	588,624	10	0	0	0	0	0	0	0	0	5	5	0	0	0	20
Dhaulpur	9	502,253	9	0	0	0	0	0	0	0	0	4	4	0	0	0	17
Dungarpur	9	381,609	9	0	0	0	0	0	0	0	0	5	7	0	0	0	21
Ganganagar	21	1,311,931	21	0	0	0	0	0	0	0	0	4	4	0	0	0	29
Hanumangarh	23	1,267,105	25	1	0	0	0	0	0	0	0	3	2	0	0	0	31
Jaipur	27	1,998,528	30	1	0	0	0	0	0	0	0	10	8	0	0	0	49
Jaisalmer	20	567,364	20	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Jalor	23	1,598,135	25	0	0	0	0	0	0	0	0	9	9	0	0	0	43
Jhalawar	26	1,326,559	28	0	0	0	0	0	0	0	0	2	2	0	0	0	32

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicles
Jhunjhunun	19	1,499,511	21	0	0	0	0	0	0	0	0	10	9	0	0	0	40
Jodhpur	47	2,623,678	51	0	0	0	0	0	0	0	0	10	7	0	0	0	68
Karauli	15	790,951	15	0	0	0	0	0	0	0	0	5	5	0	0	0	25
Kota	19	1,277,805	19	0	0	0	0	0	0	0	0	9	9	0	0	0	37
Nagaur	27	2,401,540	28	0	0	0	0	0	0	0	0	19	16	0	0	0	63
Pali	21	1,547,889	25	1	0	0	0	0	0	0	0	9	7	0	0	0	42
Pratapgarh	6	295,515	6	0	0	0	0	0	0	0	0	3	3	0	0	0	12
Rajasamand	11	567,865	11	0	0	0	0	0	0	0	0	6	6	0	0	0	23
Sawai Madhopur	14	911,641	14	0	0	0	0	0	0	0	0	4	3	0	0	0	21
Sikar	16	1,701,394	21	1	0	0	0	0	0	0	0	12	7	0	0	0	41
Sirohi	14	626,489	15	1	0	0	0	0	0	0	0	1	1	0	0	0	18
Tonk	21	1,030,504	23	0	0	0	0	0	0	0	0	1	1	0	0	0	25
Udaipur	16	1,074,280	16	0	0	0	0	0	0	0	0	11	13	0	0	0	40
Total	**641**	**39,479,627**	**696**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**220**	**186**	**0**	**0**	**0**	**1120**

Table 8-9: List of special equipment available with Rajasthan Fire Services (As on Aug-Sep, 2011)

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
Ajmer	8	781,453	0	0	6	0	3	0	0	0	0	0	1	0	0	0
Alwar	7	411,293	0	0	9	0	5	0	0	0	0	0	0	0	0	0
Banswara	3	136,588	0	0	4	0	3	0	0	0	0	0	0	0	0	0
Baran	2	115,949	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Barmer	3	498,282	0	0	1	0	3	0	0	0	0	0	0	0	0	0
Bharatpur	5	395,766	0	0	7	0	2	0	1	0	0	2	0	0	0	0
Bhilwara	3	387,468	0	0	2	0	3	0	1	1	0	0	2	0	0	0
Bikaner	5	333,931	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Bundi	2	238,440	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chittaurgarh	4	384,644	0	0	13	0	2	0	1	0	0	2	1	0	0	0
Churu	3	353,896	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Dausa	3	225,487	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Dhaulpur	1	185,931	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dungarpur	1	153,779	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Ganganagar	7	348,985	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Hanumangarh	4	187,510	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Jaipur	14	1,393,744	0	0	25	0	5	0	3	1	0	3	0	0	2	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
Jaisalmer	3	69,437	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Jalor	3	211,541	0	0	2	0	2	0	0	1	0	0	0	0	0	0
Jhalawar	1	75,516	0	0	0	0	1	0	0	0	0	1	0	0	0	0
Jhunjhunun	3	281,886	0	0	2	0	2	0	0	0	0	0	0	0	0	0
Jodhpur	8	713,238	0	0	6	0	6	0	0	0	0	0	0	0	0	0
Karauli	1	133,673	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Kota	3	291,633	0	0	2	0	3	0	0	0	0	0	0	0	0	0
Nagaur	4	526,160	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Pali	7	437,378	0	0	3	0	7	0	0	1	0	0	0	0	0	0
Pratapgarh	1	70,815	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Rajasamand	2	99,669	0	0	1	0	2	0	0	0	0	0	0	0	0	0
Sawai Madhopur	2	281,466	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Sikar	3	335,135	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Sirohi	4	325,629	0	0	0	0	6	0	2	0	0	0	0	0	0	0
Tonk	4	407,250	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Udaipur	2	327,457	0	0	0	0	2	0	0	1	0	0	0	0	0	0
Total	**126**	**11,121,029**	**0**	**0**	**86**	**0**	**90**	**0**	**8**	**5**	**0**	**8**	**4**	**0**	**2**	**0**

Table 8-10: List of special equipment available with Rajasthan Fire Services (As on Aug-Sep, 2011)

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
Ajmer	8	781,453	0	0	0	0	0	0	0	1	6	5	0	22
Alwar	7	411,293	0	0	0	0	0	0	0	0	0	0	0	14
Banswara	3	136,588	0	0	0	0	0	0	0	0	0	0	0	7
Baran	2	115,949	0	0	0	0	0	0	0	0	0	0	0	2
Barmer	3	498,282	0	0	0	0	0	0	0	0	0	0	0	4
Bharatpur	5	395,766	0	0	0	0	0	0	0	0	0	0	0	12
Bhilwara	3	387,468	0	0	0	0	0	0	0	0	0	1	0	10
Bikaner	5	333,931	0	0	0	0	0	0	0	0	0	0	0	4
Bundi	2	238,440	0	0	0	0	0	0	0	0	0	0	0	1
Chittaurgarh	4	384,644	0	0	0	0	0	0	0	0	0	0	0	19
Churu	3	353,896	0	0	0	0	0	0	0	0	0	0	0	2
Dausa	3	225,487	0	0	0	0	0	0	0	0	0	0	0	2
Dhaulpur	1	185,931	0	0	0	0	0	0	0	0	0	0	0	0
Dungarpur	1	153,779	0	0	0	0	0	0	0	0	0	0	0	2
Ganganagar	7	348,985	0	0	0	0	0	0	0	0	0	0	0	6
Hanumangarh	4	187,510	0	0	0	0	0	0	0	0	0	0	0	3
Jaipur	14	1,393,744	0	0	0	0	1	0	0	7	0	19	0	66
Jaisalmer	3	69,437	0	0	0	0	0	0	0	0	0	0	0	2
Jalor	3	211,541	0	0	0	0	0	0	0	0	0	0	0	5

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
Jhalawar	1	75,516	0	0	0	0	0	0	0	0	0	0	0	2
Jhunjhunun	3	281,886	0	0	0	0	0	0	0	0	0	0	0	4
Jodhpur	8	713,238	0	0	0	0	0	0	0	0	0	0	0	12
Karauli	1	133,673	0	0	0	0	0	0	0	0	0	0	0	1
Kota	3	291,633	0	0	0	0	0	0	0	0	1	1	0	7
Nagaur	4	526,160	0	0	0	0	0	0	0	0	0	0	0	3
Pali	7	437,378	0	0	0	0	0	0	0	0	0	0	0	11
Pratapgarh	1	70,815	0	0	0	0	0	0	0	0	0	0	0	1
Rajasamand	2	99,669	0	0	0	0	0	0	0	0	0	0	0	3
Sawai Madhopur	2	281,466	0	0	0	0	0	0	0	0	0	0	0	2
Sikar	3	335,135	0	0	0	0	0	0	0	0	0	0	0	3
Sirohi	4	325,629	0	0	0	0	0	0	0	0	0	0	0	8
Tonk	4	407,250	0	0	0	0	0	0	0	0	0	0	0	2
Udaipur	2	327,457	0	0	0	0	0	0	0	0	0	0	0	3
Total	**126**	**11,121,029**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**8**	**7**	**26**	**0**	**245**

Table 8-11: Special 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
Ajmer	8	781,453	1	29	147	8	39	1	10	14	14	33	28	1	12	0
Alwar	7	411,293	0	19	102	15	30	0	10	15	15	32	20	0	8	0
Banswara	3	136,588	0	10	41	5	12	0	4	5	5	9	10	0	4	0
Baran	2	115,949	0	9	50	6	14	0	3	6	6	11	10	0	3	0
Barmer	3	498,282	2	18	103	10	28	2	4	10	10	24	18	2	11	0
Bharatpur	5	395,766	1	15	68	10	24	1	5	10	10	19	15	1	10	0
Bhilwara	3	387,468	2	17	86	8	23	2	4	7	8	22	16	2	7	0
Bikaner	5	333,931	0	17	92	14	28	0	7	14	14	24	17	0	6	0
Bundi	2	238,440	0	11	56	5	16	0	3	5	5	10	12	0	4	0
Chittaurgarh	4	384,644	1	15	64	9	22	1	4	9	9	16	15	1	8	0
Churu	3	353,896	1	15	84	11	25	1	5	11	11	19	16	1	8	0
Dausa	3	225,487	0	11	53	6	14	0	4	6	6	11	12	0	5	0
Dhaulpur	1	185,931	1	10	46	3	13	1	1	3	3	7	10	1	3	0
Dungarpur	1	153,779	1	9	41	3	11	1	1	3	3	6	9	1	2	0
Ganganagar	7	348,985	0	16	82	14	26	0	10	14	14	25	16	0	7	0
Hanumangarh	4	187,510	0	11	64	10	21	0	5	10	10	18	11	0	5	0
Jaipur	14	1,393,744	5	58	232	26	71	5	18	25	26	67	59	5	24	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
Jaisalmer	3	69,437	0	8	50	8	17	0	4	8	8	12	9	0	4	0
Jalor	3	211,541	1	11	63	8	19	1	4	7	8	15	11	1	3	0
Jhalawar	1	75,516	0	7	50	6	17	0	1	6	6	8	8	0	1	0
Jhunjhunun	3	281,886	0	12	67	8	19	0	4	8	8	16	13	0	4	0
Jodhpur	8	713,238	0	26	143	20	41	0	10	20	20	39	27	0	14	0
Karauli	1	133,673	0	9	46	4	14	0	1	4	4	8	9	0	2	0
Kota	3	291,633	0	15	76	9	20	0	5	9	9	17	15	0	5	0
Nagaur	4	526,160	2	20	110	11	30	2	5	11	11	28	20	2	11	0
Pali	7	437,378	0	16	84	13	24	0	9	12	13	26	17	0	8	0
Pratapgarh	1	70,815	0	6	30	3	8	0	1	3	3	5	7	0	1	0
Rajasamand	2	99,669	0	8	38	5	12	0	3	5	5	8	8	0	2	0
Sawai Madhopur	2	281,466	0	13	62	5	18	0	3	5	5	12	13	0	6	0
Sikar	3	335,135	0	16	86	8	21	0	5	8	8	21	17	0	6	0
Sirohi	4	325,629	0	13	65	8	14	0	3	8	8	14	14	0	6	0
Tonk	4	407,250	1	14	75	9	22	1	4	9	9	16	15	1	6	0
Udaipur	2	327,457	1	15	72	6	19	1	3	5	6	15	15	1	6	0
Total	**126**	**11,121,029**	**20**	**499**	**2528**	**294**	**732**	**20**	**163**	**295**	**300**	**613**	**512**	**20**	**212**	**0**

Table 8-12: Special Equipment Gap in Operational Fire Stations for ideal jurisdiction area (continue …)

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
Ajmer	8	781,453	0	0	8	8	1	33	0	13	27	11	14	452
Alwar	7	411,293	0	0	7	7	0	24	0	15	30	28	15	392
Banswara	3	136,588	0	0	3	3	0	11	0	5	11	10	5	153
Baran	2	115,949	0	0	2	2	0	12	0	6	13	11	6	170
Barmer	3	498,282	0	0	3	3	2	24	0	10	27	20	10	341
Bharatpur	5	395,766	0	0	5	5	1	19	0	10	19	20	10	278
Bhilwara	3	387,468	0	0	3	3	2	17	0	8	23	15	8	283
Bikaner	5	333,931	0	0	5	5	0	23	0	14	23	27	14	344
Bundi	2	238,440	0	0	2	2	0	14	0	5	14	10	5	179
Chittaurgarh	4	384,644	0	0	4	4	1	19	0	9	20	17	9	257
Churu	3	353,896	0	0	3	3	1	21	0	11	21	21	11	300
Dausa	3	225,487	0	0	3	3	0	13	0	6	13	12	6	184
Dhaulpur	1	185,931	0	0	1	1	1	12	0	3	12	6	3	141
Dungarpur	1	153,779	0	0	1	1	1	10	0	3	10	6	3	126
Ganganagar	7	348,985	0	0	7	7	0	20	0	14	21	27	14	334
Hanumangarh	4	187,510	0	0	4	4	0	15	0	10	16	20	10	244
Jaipur	14	1,393,744	0	0	14	14	4	64	0	19	66	33	26	861
Jaisalmer	3	69,437	0	0	3	3	0	12	0	8	12	15	8	189
Jalor	3	211,541	0	0	3	3	1	15	0	8	17	16	8	223
Jhalawar	1	75,516	0	0	1	1	0	12	0	6	13	13	6	162

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
Jhunjhunun	3	281,886	0	0	3	3	0	15	0	8	18	18	8	232
Jodhpur	8	713,238	0	0	8	8	0	36	0	20	38	39	20	529
Karauli	1	133,673	0	0	1	1	0	12	0	4	12	9	4	144
Kota	3	291,633	0	0	3	3	0	19	0	9	19	16	9	258
Nagaur	4	526,160	0	0	4	4	2	25	0	11	29	22	11	371
Pali	7	437,378	0	0	7	7	0	20	0	13	23	26	13	331
Pratapgarh	1	70,815	0	0	1	1	0	7	0	3	7	5	3	94
Rajasamand	2	99,669	0	0	2	2	0	10	0	5	10	10	5	138
Sawai Madhopur	2	281,466	0	0	2	2	0	15	0	5	16	11	5	198
Sikar	3	335,135	0	0	3	3	0	19	0	8	23	17	8	277
Sirohi	4	325,629	0	0	4	4	0	16	0	8	16	16	8	225
Tonk	4	407,250	0	0	4	4	1	19	0	9	19	18	9	265
Udaipur	2	327,457	0	0	2	2	1	18	0	6	18	12	6	230
Total	**126**	**11,121,029**	**0**	**0**	**126**	**126**	**19**	**621**	**0**	**292**	**656**	**557**	**300**	**8,905**

Table 8-13: Additional equipment required for new urban Fire Stations under their ideal jurisdiction areas

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
Ajmer	6	608,701	1	12	48	6	15	1	6	6	6	16	12	1	15	0
Alwar	3	704,833	3	14	56	3	14	3	3	3	3	17	14	3	15	0
Banswara	1	34,708	0	1	4	1	2	0	1	1	1	2	1	0	1	0
Baran	2	203,400	1	4	16	2	5	1	2	2	2	6	4	1	4	0
Barmer	1	38,250	0	1	4	1	2	0	1	1	1	2	1	0	2	0
Bharatpur	1	166,920	1	3	12	1	3	1	1	1	1	4	3	1	4	0
Bhilwara	5	610,751	1	13	52	5	14	1	5	5	5	15	13	1	12	0
Bikaner	7	828,408	1	17	68	7	18	1	7	7	7	21	17	1	18	0
Bundi	2	91,575	0	2	8	2	4	0	2	2	2	4	2	0	2	0
Chittaurgarh	2	224,393	0	5	20	2	5	0	2	2	2	5	5	0	4	0
Churu	7	484,417	0	10	40	7	14	0	7	7	7	16	10	0	15	0
Dausa	1	118,917	0	2	8	1	2	0	1	1	1	3	2	0	3	0
Dhaulpur	1	88,389	0	2	8	1	2	0	1	1	1	3	2	0	3	0
Dungarpur	1	74,474	0	1	4	1	2	0	1	1	1	2	1	0	2	0
Ganganagar	5	318,368	0	7	28	5	10	0	5	5	5	12	7	0	7	0
Hanumangarh	3	310,649	0	6	24	3	7	0	3	3	3	7	6	0	6	0
Jaipur	20	3,341,018	12	71	284	20	74	12	20	20	20	82	71	12	68	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
Jaisalmer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jalor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhalawar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhunjhunun	4	353,440	0	7	28	4	8	0	4	4	4	9	7	0	8	0
Jodhpur	4	314,837	0	6	24	4	8	0	4	4	4	9	6	0	8	0
Karauli	1	107,952	0	2	8	1	2	0	1	1	1	3	2	0	2	0
Kota	6	413,267	0	8	32	6	12	0	6	6	6	12	8	0	10	0
Nagaur	5	411,348	0	8	32	5	11	0	5	5	5	12	8	0	11	0
Pali	2	62,787	0	2	8	2	4	0	2	2	2	4	2	0	2	0
Pratapgarh	1	64,081	0	1	4	1	2	0	1	1	1	2	1	0	2	0
Rajasamand	2	95,300	0	2	8	2	4	0	2	2	2	4	2	0	3	0
Sawai Madhopur	1	134,910	0	3	12	1	3	0	1	1	1	3	3	0	3	0
Sikar	8	623,270	1	14	56	8	18	1	8	8	8	21	14	1	17	0
Sirohi	1	63,850	0	1	4	1	2	0	1	1	1	2	1	0	2	0
Tonk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Udaipur	4	482,132	2	10	40	4	11	2	4	4	4	14	10	2	11	0
Total	**107**	**11,375,345**	**23**	**235**	**940**	**107**	**278**	**23**	**107**	**107**	**107**	**312**	**235**	**23**	**260**	**0**

Table 8-14: Additional equipment required for new urban Fire Stations under their ideal jurisdiction areas (Continue ….)

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
Ajmer	6	608,701	0	0	6	6	1	12	0	6	12	12	6	206
Alwar	3	704,833	0	0	3	3	3	14	0	3	14	6	3	200
Banswara	1	34,708	0	0	1	1	0	1	0	1	1	2	1	23
Baran	2	203,400	0	0	2	2	1	4	0	2	4	4	2	71
Barmer	1	38,250	0	0	1	1	0	1	0	1	1	2	1	24
Bharatpur	1	166,920	0	0	1	1	1	3	0	1	3	2	1	49
Bhilwara	5	610,751	0	0	5	5	1	13	0	5	13	10	5	199
Bikaner	7	828,408	0	0	7	7	1	17	0	7	17	14	7	267
Bundi	2	91,575	0	0	2	2	0	2	0	2	2	4	2	46
Chittaurgarh	2	224,393	0	0	2	2	0	5	0	2	5	4	2	74
Churu	7	484,417	0	0	7	7	0	10	0	7	10	14	7	195
Dausa	1	118,917	0	0	1	1	0	2	0	1	2	2	1	34
Dhaulpur	1	88,389	0	0	1	1	0	2	0	1	2	2	1	34
Dungarpur	1	74,474	0	0	1	1	0	1	0	1	1	2	1	24
Ganganagar	5	318,368	0	0	5	5	0	7	0	5	7	10	5	135
Hanumangarh	3	310,649	0	0	3	3	0	6	0	3	6	6	3	98
Jaipur	20	3,341,018	0	0	20	20	12	71	0	20	71	40	20	1,040
Jaisalmer	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jalor	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhalawar	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhunjhunun	4	353,440	0	0	4	4	0	7	0	4	7	8	4	121

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
Jodhpur	4	314,837	0	0	4	4	0	6	0	4	6	8	4	113
Karauli	1	107,952	0	0	1	1	0	2	0	1	2	2	1	33
Kota	6	413,267	0	0	6	6	0	8	0	6	8	12	6	158
Nagaur	5	411,348	0	0	5	5	0	8	0	5	8	10	5	148
Pali	2	62,787	0	0	2	2	0	2	0	2	2	4	2	46
Pratapgarh	1	64,081	0	0	1	1	0	1	0	1	1	2	1	24
Rajasamand	2	95,300	0	0	2	2	0	2	0	2	2	4	2	47
Sawai Madhopur	1	134,910	0	0	1	1	0	3	0	1	3	2	1	43
Sikar	8	623,270	0	0	8	8	1	14	0	8	14	16	8	252
Sirohi	1	63,850	0	0	1	1	0	1	0	1	1	2	1	24
Tonk	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Udaipur	4	482,132	0	0	4	4	2	10	0	4	10	8	4	164
Total	**107**	**11,375,345**	**0**	**0**	**107**	**107**	**23**	**235**	**0**	**107**	**235**	**214**	**107**	**3,892**

Table 8-15: 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
Ajmer	14	1,390,154	2	41	195	14	54	2	16	20	20	49	40	2	27	0
Alwar	10	1,116,126	3	33	158	18	44	3	13	18	18	49	34	3	23	0
Banswara	4	171,296	0	11	45	6	14	0	5	6	6	11	11	0	5	0
Baran	4	319,349	1	13	66	8	19	1	5	8	8	17	14	1	7	0
Barmer	4	536,532	2	19	107	11	30	2	5	11	11	26	19	2	13	0
Bharatpur	6	562,686	2	18	80	11	27	2	6	11	11	23	18	2	14	0
Bhilwara	8	998,219	3	30	138	13	37	3	9	12	13	37	29	3	19	0
Bikaner	12	1,162,339	1	34	160	21	46	1	14	21	21	45	34	1	24	0
Bundi	4	330,015	0	13	64	7	20	0	5	7	7	14	14	0	6	0
Chittaurgarh	6	609,037	1	20	84	11	27	1	6	11	11	21	20	1	12	0
Churu	10	838,313	1	25	124	18	39	1	12	18	18	35	26	1	23	0
Dausa	4	344,404	0	13	61	7	16	0	5	7	7	14	14	0	8	0
Dhaulpur	2	274,320	1	12	54	4	15	1	2	4	4	10	12	1	6	0
Dungarpur	2	228,253	1	10	45	4	13	1	2	4	4	8	10	1	4	0
Ganganagar	12	667,353	0	23	110	19	36	0	15	19	19	37	23	0	14	0
Hanumangarh	7	498,159	0	17	88	13	28	0	8	13	13	25	17	0	11	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
Jaipur	34	4,734,762	17	129	516	46	145	17	38	45	46	149	130	17	92	0
Jaisalmer	3	69,437	0	8	50	8	17	0	4	8	8	12	9	0	4	0
Jalor	3	211,541	1	11	63	8	19	1	4	7	8	15	11	1	3	0
Jhalawar	1	75,516	0	7	50	6	17	0	1	6	6	8	8	0	1	0
Jhunjhunun	7	635,326	0	19	95	12	27	0	8	12	12	25	20	0	12	0
Jodhpur	12	1,028,075	0	32	167	24	49	0	14	24	24	48	33	0	22	0
Karauli	2	241,625	0	11	54	5	16	0	2	5	5	11	11	0	4	0
Kota	9	704,900	0	23	108	15	32	0	11	15	15	29	23	0	15	0
Nagaur	9	937,508	2	28	142	16	41	2	10	16	16	40	28	2	22	0
Pali	9	500,165	0	18	92	15	28	0	11	14	15	30	19	0	10	0
Pratapgarh	2	134,896	0	7	34	4	10	0	2	4	4	7	8	0	3	0
Rajasamand	4	194,969	0	10	46	7	16	0	5	7	7	12	10	0	5	0
Sawai Madhopur	3	416,376	0	16	74	6	21	0	4	6	6	15	16	0	9	0
Sikar	11	958,405	1	30	142	16	39	1	13	16	16	42	31	1	23	0
Sirohi	5	389,479	0	14	69	9	16	0	4	9	9	16	15	0	8	0
Tonk	4	407,250	1	14	75	9	22	1	4	9	9	16	15	1	6	0
Udaipur	6	809,589	3	25	112	10	30	3	7	9	10	29	25	3	17	0
Total	**233**	**22,496,374**	**43**	**734**	**3,468**	**401**	**1,010**	**43**	**270**	**402**	**407**	**925**	**747**	**43**	**472**	**0**

Table 8-16: Total gap in specialized equipment for operational and new urban Fire Stations (continue…)

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
Ajmer	14	1,390,154	0	0	14	14	2	45	0	19	39	23	20	658
Alwar	10	1,116,126	0	0	10	10	3	38	0	18	44	34	18	592
Banswara	4	171,296	0	0	4	4	0	12	0	6	12	12	6	176
Baran	4	319,349	0	0	4	4	1	16	0	8	17	15	8	241
Barmer	4	536,532	0	0	4	4	2	25	0	11	28	22	11	365
Bharatpur	6	562,686	0	0	6	6	2	22	0	11	22	22	11	327
Bhilwara	8	998,219	0	0	8	8	3	30	0	13	36	25	13	482
Bikaner	12	1,162,339	0	0	12	12	1	40	0	21	40	41	21	611
Bundi	4	330,015	0	0	4	4	0	16	0	7	16	14	7	225
Chittaurgarh	6	609,037	0	0	6	6	1	24	0	11	25	21	11	331
Churu	10	838,313	0	0	10	10	1	31	0	18	31	35	18	495
Dausa	4	344,404	0	0	4	4	0	15	0	7	15	14	7	218
Dhaulpur	2	274,320	0	0	2	2	1	14	0	4	14	8	4	175
Dungarpur	2	228,253	0	0	2	2	1	11	0	4	11	8	4	150
Ganganagar	12	667,353	0	0	12	12	0	27	0	19	28	37	19	469
Hanumangarh	7	498,159	0	0	7	7	0	21	0	13	22	26	13	342
Jaipur	34	4,734,762	0	0	34	34	16	135	0	39	137	73	46	1901
Jaisalmer	3	69,437	0	0	3	3	0	12	0	8	12	15	8	189
Jalor	3	211,541	0	0	3	3	1	15	0	8	17	16	8	223
Jhalawar	1	75,516	0	0	1	1	0	12	0	6	13	13	6	162

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
Jhunjhunun	7	635,326	0	0	7	7	0	22	0	12	25	26	12	353
Jodhpur	12	1,028,075	0	0	12	12	0	42	0	24	44	47	24	642
Karauli	2	241,625	0	0	2	2	0	14	0	5	14	11	5	177
Kota	9	704,900	0	0	9	9	0	27	0	15	27	28	15	416
Nagaur	9	937,508	0	0	9	9	2	33	0	16	37	32	16	519
Pali	9	500,165	0	0	9	9	0	22	0	15	25	30	15	377
Pratapgarh	2	134,896	0	0	2	2	0	8	0	4	8	7	4	118
Rajasamand	4	194,969	0	0	4	4	0	12	0	7	12	14	7	185
Sawai Madhopur	3	416,376	0	0	3	3	0	18	0	6	19	13	6	241
Sikar	11	958,405	0	0	11	11	1	33	0	16	37	33	16	529
Sirohi	5	389,479	0	0	5	5	0	17	0	9	17	18	9	249
Tonk	4	407,250	0	0	4	4	1	19	0	9	19	18	9	265
Udaipur	6	809,589	0	0	6	6	3	28	0	10	28	20	10	394
Total	**233**	**22,496,374**	**0**	**0**	**233**	**233**	**42**	**856**	**0**	**399**	**891**	**771**	**407**	**12,797**

Table 8-17: 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
Ajmer	22	983,569	0	0	82	22	44	0	0	22	22	25	0	0	25	0
Alwar	24	2,575,909	0	0	164	24	57	0	0	24	24	64	0	0	63	0
Banswara	7	329,842	0	0	24	7	14	0	0	7	7	8	0	0	9	0
Baran	14	904,527	0	0	66	14	28	0	0	14	14	21	0	0	20	0
Barmer	32	2,086,830	0	0	152	32	65	0	0	32	32	50	0	0	50	0
Bharatpur	20	1,127,363	0	0	54	20	40	0	0	20	20	32	0	0	33	0
Bhilwara	18	1,444,244	0	0	94	18	37	0	0	18	18	39	0	0	38	0
Bikaner	32	1,197,513	0	0	126	32	64	0	0	32	32	33	0	0	33	0
Bundi	13	745,958	0	0	52	13	26	0	0	13	13	19	0	0	19	0
Chittaurgarh	17	1,015,089	0	0	80	17	36	0	0	17	17	22	0	0	25	0
Churu	28	1,177,613	0	0	114	28	56	0	0	28	28	30	0	0	30	0
Dausa	10	588,624	0	0	34	10	20	0	0	10	10	15	0	0	15	0
Dhaulpur	9	502,253	0	0	28	9	18	0	0	9	9	13	0	0	13	0
Dungarpur	9	381,609	0	0	26	9	18	0	0	9	9	13	0	0	14	0
Ganganagar	21	1,311,931	0	0	92	21	42	0	0	21	21	26	0	0	25	0
Hanumangarh	23	1,267,105	0	0	102	23	47	0	0	23	23	29	0	0	29	0
Jaipur	27	1,998,528	0	0	136	27	56	0	0	27	27	40	0	0	41	0
Jaisalmer	20	567,364	0	0	80	20	40	0	0	20	20	21	0	0	20	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
Jalor	23	1,598,135	0	0	110	23	46	0	0	23	23	34	0	0	34	0
Jhalawar	26	1,326,559	0	0	108	26	52	0	0	26	26	30	0	0	30	0
Jhunjhunun	19	1,499,511	0	0	92	19	39	0	0	19	19	31	0	0	31	0
Jodhpur	47	2,623,678	0	0	220	47	97	0	0	47	47	61	0	0	61	0
Karauli	15	790,951	0	0	50	15	30	0	0	15	15	20	0	0	20	0
Kota	19	1,277,805	0	0	94	19	38	0	0	19	19	30	0	0	28	0
Nagaur	27	2,401,540	0	0	158	27	57	0	0	27	27	45	0	0	47	0
Pali	21	1,547,889	0	0	114	21	45	0	0	21	21	36	0	0	35	0
Pratapgarh	6	295,515	0	0	18	6	12	0	0	6	6	10	0	0	9	0
Rajasamand	11	567,865	0	0	32	11	22	0	0	11	11	17	0	0	17	0
Sawai Madhopur	14	911,641	0	0	68	14	29	0	0	14	14	17	0	0	18	0
Sikar	16	1,701,394	0	0	104	16	36	0	0	16	16	34	0	0	34	0
Sirohi	14	626,489	0	0	58	14	28	0	0	14	14	18	0	0	17	0
Tonk	21	1,030,504	0	0	86	21	42	0	0	21	21	24	0	0	24	0
Udaipur	16	1,074,280	0	0	54	16	32	0	0	16	16	26	0	0	27	0
Total	**641**	**39,479,627**	**0**	**0**	**2,872**	**641**	**1313**	**0**	**0**	**641**	**641**	**933**	**0**	**0**	**934**	**0**

Table 8-18: 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
Ajmer	22	983,569	0	0	22	0	0	22	0	22	22	44	22	396
Alwar	24	2,575,909	0	0	24	0	0	24	0	24	50	48	24	614
Banswara	7	329,842	0	0	7	0	0	7	0	7	7	14	7	125
Baran	14	904,527	0	0	14	0	0	14	0	14	19	28	14	280
Barmer	32	2,086,830	0	0	32	0	0	32	0	32	45	64	32	650
Bharatpur	20	1,127,363	0	0	20	0	0	20	0	20	20	40	20	359
Bhilwara	18	1,444,244	0	0	18	0	0	18	0	18	30	36	18	400
Bikaner	32	1,197,513	0	0	32	0	0	32	0	32	32	64	32	576
Bundi	13	745,958	0	0	13	0	0	13	0	13	15	26	13	248
Chittaurgarh	17	1,015,089	0	0	17	0	0	17	0	17	22	34	17	338
Churu	28	1,177,613	0	0	28	0	0	28	0	28	29	56	28	511
Dausa	10	588,624	0	0	10	0	0	10	0	10	11	20	10	185
Dhaulpur	9	502,253	0	0	9	0	0	9	0	9	9	18	9	162
Dungarpur	9	381,609	0	0	9	0	0	9	0	9	9	18	9	161
Ganganagar	21	1,311,931	0	0	21	0	0	21	0	21	25	42	21	399
Hanumangarh	23	1,267,105	0	0	23	0	0	23	0	23	27	46	23	441
Jaipur	27	1,998,528	0	0	27	0	0	27	0	27	39	54	27	555
Jaisalmer	20	567,364	0	0	20	0	0	20	0	20	20	40	20	361
Jalor	23	1,598,135	0	0	23	0	0	23	0	23	32	46	23	463
Jhalawar	26	1,326,559	0	0	26	0	0	26	0	26	28	52	26	482
Jhunjhunun	19	1,499,511	0	0	19	0	0	19	0	19	28	38	19	392

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
Jodhpur	47	2,623,678	0	0	47	0	0	47	0	47	60	94	47	922
Karauli	15	790,951	0	0	15	0	0	15	0	15	15	30	15	270
Kota	19	1,277,805	0	0	19	0	0	19	0	19	28	38	19	389
Nagaur	27	2,401,540	0	0	27	0	0	27	0	27	49	54	27	599
Pali	21	1,547,889	0	0	21	0	0	21	0	21	33	42	21	452
Pratapgarh	6	295,515	0	0	6	0	0	6	0	6	6	12	6	109
Rajasamand	11	567,865	0	0	11	0	0	11	0	11	11	22	11	198
Sawai Madhopur	14	911,641	0	0	14	0	0	14	0	14	19	28	14	277
Sikar	16	1,701,394	0	0	16	0	0	16	0	16	32	32	16	384
Sirohi	14	626,489	0	0	14	0	0	14	0	14	15	28	14	262
Tonk	21	1,030,504	0	0	21	0	0	21	0	21	22	42	21	387
Udaipur	16	1,074,280	0	0	16	0	0	16	0	16	19	32	16	302
Total	**641**	**39,479,627**	**0**	**0**	**641**	**0**	**0**	**641**	**0**	**641**	**828**	**1282**	**641**	**12,649**

8.3.3 FIRE MANPOWER GAP

SFAC guidelines have suggested manpower, including reserve for duty off, training, leave for Station Officer, Sub-Officer (75%) and Leading Firemen and lower staff (25%). This has been further estimated for two shifts for Leading Firemen and lower staff (Table 8-19).

Table 8-19: Manpower requirement for Station Officer and lower staff for Rajasthan as per SFAC norm (Considering two shifts duty pattern)

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

**: Where extent of fire risk may justify Sub-Officers may be replaced with Station Officers*

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 Tables 8-19 and 8-20, 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 8-20).

Table 8-20: 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 Rajasthan State has been estimated, which comes to 29,936 (Table 8.22 to 8.25) against the present strength of 1,158 (Table 8-21).

Since, in Rajasthan State, there is a system of ULBs, which are not be functioning in a well-coordinated manner in the State. Thus, in addition to fire fighting staff, 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, similiar to that of Advance Medical Research Institute (AMRI), Kolkata, in terms of their magnitude and frequency can be reduced. Accordingly, to support Director, Rajasthan fire services, additional officers at the levels of Joint Director (JD), Chief Fire Officers (CFO), Dy Chief Fire Officers (DyCFO), Division Fire Officers (DFO), and Assistant Divisional Officer (ADO) have been suggested. 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:

- Joint- Director : 7
- CFO: 33
- Dy CFO: 33
- DFO: 113 (one per 6-8 Fire Stations)
- ADFO 225 (one per 3-4 Fire Stations)

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 Rajasthan State have been carried out.

Table 8-21: List of manpower available for operational Fire Stations (As on Aug-Sep, 2011)

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
Ajmer	8	0	0	0	0	0	3	0	1	3	62	4	73
Alwar	7	0	0	0	0	0	1	0	0	3	32	11	47
Banswara	3	0	0	0	0	0	0	0	0	3	8	0	11
Baran	2	0	0	0	0	1	0	0	0	0	9	1	11
Barmer	3	0	0	0	0	0	0	2	0	1	21	0	24
Bharatpur	5	0	0	0	0	0	0	0	0	1	26	7	34
Bhilwara	3	0	0	0	0	0	3	0	0	0	35	0	38
Bikaner	5	0	0	0	1	0	0	1	0	1	29	0	32
Bundi	2	0	0	0	0	0	0		0	0	31	1	32
Chittaurgarh	4	0	0	0	0	2	0	1	0	0	31	2	36
Churu	3	0	0	0	0	0	0	0	0	0	18	0	18
Dausa	3	0	0	0	0	0	0	0	0	0	13	7	20
Dhaulpur	1	0	0	0	0	0	0	0	0	0	14	1	15
Dungarpur	1	0	0	0	0	0	1	0	0	0	7	0	8
Ganganagar	7	0	0	0	0	0	0	0	0	4	54	0	58
Hanumangarh	4	0	0	0	0	0	1	0	0	2	38	0	41
Jaipur	14	0	1	0	0	1	1	0	3	5	146	8	165
Jaisalmer	3	0	0	0	1	0	0	0	0	0	6	1	8
Jalor	3	0	0	0	0	2	1	0	0	1	24	0	28
Jhalawar	1	0	0	0	0	0	0	0	0	0	5	1	6
Jhunjhunun	3	0	0	0	0	0	0	1	0	0	27	0	28
Jodhpur	8	0	1	0	1	1	1	1	0	5	66	4	80
Karauli	1	0	0	0	0	0	0	0	0	0	9	0	9
Kota	3	0	0	0	1	1	3	0	0	7	87	2	101
Nagaur	4	0	0	0	0	1	1	0	0	0	23	0	25
Pali	7	0	0	0	0	1	5	0	0	0	41	9	56
Pratapgarh	1	0	0	0	0	1	0	0	0	0	2	0	3
Rajsamand	2	0	0	0	0	0	1	0	0	0	15	0	16
Sawai	2	0	0	0	0	1	0	0	0	0	24	0	25

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
Madhopur													
Sikar	3	0	0	0	0	0	0	0	0	0	20	0	20
Sirohi	4	0	0	0	0	0	1	0	0	0	25	2	28
Tonk	4	0	0	0	0	2	0	0	0	0	12	3	17
Udaipur	2	0	0	0	0	0	2	0	0	0	43	0	45
Total	**126**	0	**2**	0	**4**	**14**	**25**	**6**	**4**	**36**	**1,003**	**64**	**1,158**

- Temporary/ private staff or staff on contract are not accounted in above

Level 10: *Director/Joint Director****;*** ***Level 9:*** *CFO/ CO;* ***Level 8:*** *Deputy CFO;* ***Level 7:*** *Deputy Controller;* ***Level 6:*** *DFO/ADO/Fire Officer/Fire Supervisor/Astt. Controller/Revenue Inspector;* ***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.*

Table 8-22: 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
Ajmer	8	1	1	1	0	5	5	10	28	44	257	4	356
Alwar	7	0	1	1	0	4	6	6	22	25	180	-4	241
Banswara	3	0	1	1	0	1	3	4	12	15	110	3	150
Baran	2	0	1	1	0	1	2	4	9	16	94	1	129
Barmer	3	0	1	1	0	3	3	7	17	33	200	3	268
Bharatpur	5	1	1	1	0	3	5	5	18	27	155	-2	214
Bhilwara	3	0	1	1	0	3	0	6	15	27	141	3	197
Bikaner	5	1	1	1	0	5	5	4	16	20	138	5	196
Bundi	2	0	1	1	0	2	2	5	10	17	101	1	140
Chittaurgarh	4	0	1	1	0	1	4	5	15	26	150	2	205
Churu	3	0	1	1	0	3	3	6	12	20	146	3	195
Dausa	3	0	1	1	0	2	3	5	12	18	121	-4	159
Dhaulpur	1	0	1	1	0	1	1	5	8	17	100	0	134
Dungarpur	1	0	1	1	0	1	0	4	7	15	94	1	124

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
Ganganagar	7	0	1	1	0	4	6	4	22	24	127	7	196
Hanumangarh	4	0	1	1	0	4	3	2	13	17	82	4	127
Jaipur	14	2	0	1	0	6	11	17	47	79	406	6	575
Jaisalmer	3	0	1	1	0	3	3	2	11	16	98	2	137
Jalor	3	0	1	1	0	1	2	5	12	17	110	3	152
Jhalawar	1	0	1	1	0	1	1	4	7	13	82	0	110
Jhunjhunun	3	0	1	1	0	3	3	4	12	18	107	3	152
Jodhpur	8	1	0	1	0	7	7	10	26	32	254	4	342
Karauli	1	0	1	1	0	1	1	4	7	15	92	1	123
Kota	3	1	1	1	0	2	0	6	12	13	77	1	114
Nagaur	4	0	1	1	0	3	3	9	18	34	200	4	273
Pali	7	0	1	1	0	3	2	5	22	28	156	-2	216
Pratapgarh	1	0	1	1	0	0	1	2	6	11	71	1	94
Rajsamand	2	0	1	1	0	2	1	2	8	14	74	2	105
Sawai Madhopur	2	0	1	1	0	1	2	5	11	22	124	2	169
Sikar	3	0	1	1	0	3	3	6	13	23	145	3	198
Sirohi	4	0	1	1	0	3	3	6	14	21	140	2	191
Tonk	4	0	1	1	0	1	4	6	15	22	167	1	218
Udaipur	2	1	1	1	0	2	0	6	12	24	118	2	167
Total	**126**	**8**	**31**	**33**	**0**	**85**	**98**	**181**	**489**	**763**	**4,617**	**62**	**6,367**

Level 10: *Director/Joint Director****;*** ***Level 9:*** *CFO/ CO;* ***Level 8:*** *Deputy CFO;* ***Level 7:*** *Deputy Controller;* ***Level 6:*** *DFO/Fire Officer/ADO/Fire Supervisor/Astt. Controller/Revenue Inspector;* ***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.*

Table 8-23: Additional staff required for new urban Fire Stations under their ideal jurisdiction areas

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
Ajmer	6	0	0	0	0	0	2	5	18	27	185	6	243
Alwar	3	0	0	0	0	0	2	7	16	32	207	3	267
Banswara	1	0	0	0	0	0	0	0	2	2	16	1	21
Baran	2	0	0	0	0	0	2	1	6	10	62	2	83
Barmer	1	0	0	0	0	1	1		2	2	16	1	23
Bharatpur	1	0	0	0	0	0	1	1	4	7	47	1	61
Bhilwara	5	0	0	0	0	0	4	6	17	29	201	5	262
Bikaner	7	0	0	0	0	1	6	7	22	37	266	7	346
Bundi	2	0	0	0	0	0	2		5	5	31	2	45
Chittaurgarh	2	0	0	0	0	0	2	2	6	10	78	2	100
Churu	7	0	0	0	0	2	7	4	17	17	156	7	210
Dausa	1	0	0	0	0	0	1	1	2	2	31	1	38
Dhaulpur	1	0	0	0	0	0	1	1	2	2	31	1	38
Dungarpur	1	0	0	0	0	0	1	0	2	2	16	1	22
Ganganagar	5	0	0	0	0	0	2	2	12	12	109	5	142
Hanumangarh	3	0	0	0	0	0	3	2	9	12	94	3	123
Jaipur	20	0	0	0	0	1	4	36	87	161	1,065	20	1,374
Jaisalmer	0	0	0	0	0	0	0	0	0	0	0	0	0
Jalor	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhalawar	0	0	0	0	0	0	0	0	0	0	0	0	0
Jhunjhunun	4	0	0	0	0	0	4	4	10	10	109	4	141
Jodhpur	4	0	0	0	0	0	4	2	10	10	94	4	124
Karauli	1	0	0	0	0	1	1	1	2	2	31	1	39
Kota	6	0	0	0	0	1	5	2	15	15	125	6	169
Nagaur	5	0	0	0	0	1	5	2	14	17	125	5	169
Pali	2	0	0	0	0	0	1	0	5	5	31	2	44
Pratapgarh	1	0	0	0	0	0	1	0	2	2	16	1	22
Rajsamand	2	0	0	0	0	0	2	0	5	5	31	2	45
Sawai Madhopur	1	0	0	0	0	0	1	1	4	7	47	1	61

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
Sikar	8	0	0	0	0	0	4	6	22	27	216	8	283
Sirohi	1	0	0	0	0	0	1	0	2	2	16	1	22
Tonk	0	0	0	0	0	0	0	0	0	0	0	0	0
Udaipur	4	0	0	0	0	1	4	5	13	22	154	4	203
Total	**107**	0	0	0	0	**9**	**74**	**98**	**333**	**493**	**3,606**	**107**	**4,720**

Table 8-24: Total staff 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
Ajmer	14	1	1	1	0	5	7	15	46	71	442	10	599
Alwar	10	0	1	1	0	4	8	13	38	57	387	-1	508
Banswara	4	0	1	1	0	1	3	4	14	17	126	4	171
Baran	4	0	1	1	0	1	4	5	15	26	156	3	212
Barmer	4	0	1	1	0	4	4	7	19	35	216	4	291
Bharatpur	6	1	1	1	0	3	6	6	22	34	202	-1	275
Bhilwara	8	0	1	1	0	3	4	12	32	56	342	8	459
Bikaner	12	1	1	1	0	6	11	11	38	57	404	12	542
Bundi	4	0	1	1	0	2	4	5	15	22	132	3	185
Chittaurgarh	6	0	1	1	0	1	6	7	21	36	228	4	305
Churu	10	0	1	1	0	5	10	10	29	37	302	10	405
Dausa	4	0	1	1	0	2	4	6	14	20	152	-3	197
Dhaulpur	2	0	1	1	0	1	2	6	10	19	131	1	172
Dungarpur	2	0	1	1	0	1	1	4	9	17	110	2	146
Ganganagar	12	0	1	1	0	4	8	6	34	36	236	12	338
Hanumangarh	7	0	1	1	0	4	6	4	22	29	176	7	250
Jaipur	34	2		1	0	7	15	53	134	240	1,471	26	1,949
Jaisalmer	3	0	1	1	0	3	3	2	11	16	98	2	137
Jalor	3	0	1	1	0	1	2	5	12	17	110	3	152
Jhalawar	1	0	1	1	0	1	1	4	7	13	82		110
Jhunjhunun	7	0	1	1	0	3	7	8	22	28	216	7	293

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
Jodhpur	12	1	0	1	0	7	11	12	36	42	348	8	466
Karauli	2	0	1	1	0	2	2	5	9	17	123	2	162
Kota	9	1	1	1	0	3	5	8	27	28	202	7	283
Nagaur	9	0	1	1	0	4	8	11	32	51	325	9	442
Pali	9	0	1	1	0	3	3	5	27	33	187	0	260
Pratapgarh	2	0	1	1	0		2	2	8	13	87	2	116
Rajsamand	4	0	1	1	0	2	3	2	13	19	105	4	150
Sawai Madhopur	3	0	1	1	0	1	3	6	15	29	171	3	230
Sikar	11	0	1	1	0	3	7	12	35	50	361	11	481
Sirohi	5	0	1	1	0	3	4	6	16	23	156	3	213
Tonk	4	0	1	1	0	1	4	6	15	22	167	1	218
Udaipur	6	1	1	1	0	3	4	11	25	46	272	6	370
Total	**233**	**8**	**31**	**33**	**0**	**94**	**172**	**279**	**822**	**1,256**	**8,223**	**169**	**11,087**

Table 8-25: Additional staff required for new rural Fire Stations under their ideal jurisdiction areas

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
Ajmer	22	0	0	0	0	0	0	3	58	59	350	22	492
Alwar	24	0	0	0	0	0	0	42	89	136	826	24	1,117
Banswara	7	0	0	0	0	0	0	2	19	28	121	7	177
Baran	14	0	0	0	0	0	1	11	40	48	314	14	428
Barmer	32	0	0	0	0	1	5	29	95	118	746	32	1,026
Bharatpur	20	0	0	0	0	0	1	13	63	81	352	20	530
Bhilwara	18	0	0	0	0	0	0	27	59	81	508	18	693
Bikaner	32	0	0	0	0	0	0	1	81	81	502	32	697
Bundi	13	0	0	0	0	0	0	6	36	40	245	13	340
Chittaurgarh	17	0	0	0	0	0	0	8	49	62	356	17	492
Churu	28	0	0	0	0	0	0	2	71	73	456	28	630
Dausa	10	0	0	0	0	0	0	6	30	38	189	10	273

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
Dhaulpur	9	0	0	0	0	0	1	4	26	33	154	9	227
Dungarpur	9	0	0	0	0	0	1	5	27	38	160	9	240
Ganganagar	21	0	0	0	0	0	0	9	56	63	404	21	553
Hanumangarh	23	0	0	0	0	0	1	7	62	69	431	23	593
Jaipur	27	0	0	0	0	0	0	22	80	101	640	27	87
Jaisalmer	20	0	0	0	0	0	3	0	50	50	312	20	435
Jalor	23	0	0	0	0	0	4	20	66	81	530	23	724
Jhalawar	26	0	0	0	0	2	6	4	67	70	444	26	619
Jhunjhunun	19	0	0	0	0	0	0	20	59	78	469	19	645
Jodhpur	47	0	0	0	0	0	3	22	131	155	967	47	1,325
Karauli	15	0	0	0	0	0	2	5	42	51	251	15	366
Kota	19	0	0	0	0	0	0	20	56	71	467	19	633
Nagaur	27	0	0	0	0	0	0	43	90	129	825	27	1,114
Pali	21	0	0	0	0	0	0	21	65	86	540	21	733
Pratapgarh	6	0	0	0	0	0	0	3	18	23	104	6	154
Rajsamand	11	0	0	0	0	0	0	6	33	43	192	11	285
Sawai Madhopur	14	0	0	0	0	0	1	9	40	49	309	14	422
Sikar	16	0	0	0	0	0	0	27	57	85	533	16	718
Sirohi	14	0	0	0	0	0	0	2	36	38	238	14	328
Tonk	21	0	0	0	0	0	2	2	53	55	347	21	480
Udaipur	16	0	0	0	0	0	0	15	51	72	336	16	490
Total	**641**	0	0	0	0	**3**	**31**	**416**	**1,855**	**2,285**	**13,618**	**641**	**18,849**

Level 10: *Director/Joint Director****;*** ***Level 9:*** *CFO/ CO;* ***Level 8:*** *Deputy CFO;* ***Level 7:*** *Deputy Controller;* ***Level 6:*** *DFO/ADO/Fire Officer/Fire Supervisor/Astt. Controller/Revenue Inspector;* ***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.*

8.3.4 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 and expansion of Fire Station, 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 Fire Stations, and new rural Fire Stations have been given in Tables 8-26 and 8-27.

Table 8-26: Fire station building required for gap in operational and new urban Fire Stations (no of Bays)

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7
Ajmer	14	0	5	1	1	0	0	0
Alwar	10	0	2	1	0	1	1	0
Banswara	4	0	1	0	0	0	1	0
Baran	4	0	1	1	0	0	0	0
Barmer	4	0	1	0	0	0	0	1
Bharatpur	6	0	0	2	0	0	0	0
Bhilwara	8	0	3	2	1	0	0	0
Bikaner	12	0	4	4	0	0	0	0
Bundi	4	0	3	0	0	0	0	0
Chittaurgarh	6	0	1	1	0	0	1	0
Churu	10	0	7	0	0	0	0	0
Dausa	4	0	1	0	0	0	0	0
Dhaulpur	2	0	1	0	0	0	0	0
Dungarpur	2	0	1	0	0	0	0	1
Ganganagar	12	0	6	0	0	0	0	0
Hanumangarh	7	0	2	1	0	1	0	0
Jaipur	34	0	6	5	4	4	1	1
Jaisalmer	3	0	0	0	0	0	0	0
Jalor	3	0	1	0	0	0	0	0
Jhalawar	1	0	0	0	0	0	0	0
Jhunjhunun	7	0	4	0	0	0	0	0
Jodhpur	12	0	6	0	0	0	0	0
Karauli	2	0	1	0	0	0	0	0
Kota	9	0	6	0	0	0	0	0
Nagaur	9	0	4	1	2	0	1	0
Pali	9	0	4	0	0	0	0	0
Pratapgarh	2	0	1	0	0	0	0	0
Rajsamand	4	0	2	0	0	0	0	0
Sawai Madhopur	3	0	0	1	0	0	0	0
Sikar	11	0	7	0	1	0	0	0
Sirohi	5	0	3	0	0	0	0	0
Tonk	4	0	0	0	0	0	0	0
Udaipur	6	0	2	1	1	0	0	0
Total	**233**	**0**	**86**	**21**	**10**	**6**	**5**	**3**

- considering only pacca permanent structure

Table 8-27: Fire station building required for new rural Fire Stations (no of Bays)

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay More Than 7
Ajmer	22	0	22	0	0	0	0
Alwar	24	0	17	5	2	0	0
Banswara	7	0	7	0	0	0	0
Baran	14	0	14	0	0	0	0
Barmer	32	0	31	1	0	0	0
Bharatpur	20	0	20	0	0	0	0
Bhilwara	18	0	17	1	0	0	0
Bikaner	32	0	32	0	0	0	0
Bundi	13	0	13	0	0	0	0
Chittaurgarh	17	0	15	2	0	0	0
Churu	28	0	28	0	0	0	0
Dausa	10	0	10	0	0	0	0
Dhaulpur	9	0	9	0	0	0	0
Dungarpur	9	0	9	0	0	0	0
Ganganagar	21	0	21	0	0	0	0
Hanumangarh	23	0	22	1	0	0	0
Jaipur	27	0	25	2	0	0	0
Jaisalmer	20	0	20	0	0	0	0
Jalor	23	0	23	0	0	0	0
Jhalawar	26	0	26	0	0	0	0
Jhunjhunun	19	0	18	1	0	0	0
Jodhpur	47	0	44	3	0	0	0
Karauli	15	0	15	0	0	0	0
Kota	19	0	19	0	0	0	0
Nagaur	27	0	24	3	0	0	0
Pali	21	0	19	1	1	0	0
Pratapgarh	6	0	6	0	0	0	0
Rajsamand	11	0	11	0	0	0	0
Sawai Madhopur	14	0	13	1	0	0	0
Sikar	16	0	12	4	0	0	0
Sirohi	14	0	14	0	0	0	0
Tonk	21	0	21	0	0	0	0
Udaipur	16	0	16	0	0	0	0
Total	**641**	**0**	**613**	**25**	**3**	**0**	**0**

8.4 Investment and Financial Analysis

8.4.1 Capital Cost

Building Infrastructure Cost:

Table 8-28 provides details of the Fire Station gap analysis in Rajasthan State. The ideal requirement of land for a Fire Station is 2 ½ acres, however, a 2 bay Fire Station may be constructed even 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 respectively (Tables 7-28 to 7-29). To start with, Rural-Fire Station/ Fire Post may be stationed in a government building, such as school/ hospital or a Panchayat-Ghar.

Table 8-28: Cost of Fire Station building (no of bays) required for gap in operational and new urban Fire Stations (in Lakhs Rupees)

District	Fire Stations	Bay 1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Total Bay Cost
Ajmer	14	0.0	1500.0	450.0	575.0	0	0.0	0.0	2525.0
Alwar	10	0.0	600.0	450.0	0	700.0	825.0	0.0	2575.0
Banswara	4	0.0	300.0	0.0	0.0	0.0	825.0	0.0	1125.0
Baran	4	0.0	300.0	450.0	0.0	0.0	0.0	0.0	750.0
Barmer	4	0.0	300.0	0	0.0	0.0	0.0	950.0	1250.0
Bharatpur	6	0.0	0	900.0	0.0	0.0	0.0	0.0	900.0
Bhilwara	8	0.0	900.0	900.0	575.0	0.0	0.0	0.0	2375.0
Bikaner	12	0.0	1200.0	1800.0	0.0	0.0	0.0	0.0	3000.0
Bundi	4	0.0	900.0	0	0.0	0.0	0.0	0.0	900.0
Chittaurgarh	6	0.0	300.0	450.0	0.0	0.0	825.0	0.0	1575.0
Churu	10	0.0	2100.0	0.0	0.0	0.0	0.0	0.0	2100.0
Dausa	4	0.0	300.0	0.0	0.0	0.0	0.0	0.0	300.0
Dhaulpur	2	0.0	300.0	0.0	0.0	0.0	0.0	0.0	300.0
Dungarpur	2	0.0	300.0	0.0	0.0	0.0	0.0	950.0	1250.0
Ganganagar	12	0.0	1800.0	0.0	0.0	0.0	0.0		1800.0
Hanumangarh	7	0.0	600.0	450.0	0.0	700.0	0.0		1750.0
Jaipur	34	0.0	1800.0	2250.0	2300.0	2800.0	825.0	950.0	10925.0
Jaisalmer	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jalor	3	0.0	300.0	0.0	0.0	0.0	0.0	0.0	300.0
Jhalawar	1	0.0	0	0.0	0.0	0.0	0.0	0.0	0
Jhunjhunun	7	0.0	1200.0	0.0	0.0	0.0	0.0	0.0	1200.0
Jodhpur	12	0.0	1800.0	0.0	0.0	0.0	0.0	0.0	1800.0
Karauli	2	0.0	300.0	0.0	0.0	0.0	0.0	0.0	300.0
Kota	9	0.0	1800.0	0.0	0.0	0.0	0.0	0.0	1800.0
Nagaur	9	0.0	1200.0	450.0	1150.0		825.0		3625.0
Pali	9	0.0	1200.0	0.0	0.0	0.0	0.0	0.0	1200.0
Pratapgarh	2	0.0	300.0	0.0	0.0	0.0	0.0	0.0	300.0
Rajsamand	4	0.0	600.0	0.0	0.0	0.0	0.0	0.0	600.0

District	Fire Stations	Bay 1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Total Bay Cost
Sawai Madhopur	3	0.0	0	450.0	0.0	0.0	0.0	0.0	450.0
Sikar	11	0.0	2100.0		575.0				2675.0
Sirohi	5	0.0	900.0	0.0	0.0	0.0	0.0	0.0	900.0
Tonk	4	0.0		0.0	0.0	0.0	0.0	0.0	0
Udaipur	6	0.0	600.0	450.0	575.0	0.0	0.0	0.0	1625.0
Total	**233**	0.0	**25800.0**	**9450.0**	**5750.0**	**4200.0**	**4125.0**	**2850.0**	**52175.0**

Table 8-29: Additional cost of Fire Stations building (no of bays) required for rural Fire Stations

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Total Bay Cost
Ajmer	22	0.0	6600.0	0.0	0.0	0.0	6600.0
Alwar	24	0.0	5100.0	2250.0	1150.0	0.0	8500.0
Banswara	7	0.0	2100.0	0.0	0.0	0.0	2100.0
Baran	14	0.0	4200.0	0.0	0.0	0.0	4200.0
Barmer	32	0.0	9300.0	450.0	0.0	0.0	9750.0
Bharatpur	20	0.0	6000.0	0.0	0.0	0.0	6000.0
Bhilwara	18	0.0	5100.0	450.0	0.0	0.0	5550.0
Bikaner	32	0.0	9600.0	0.0	0.0	0.0	9600.0
Bundi	13	0.0	3900.0	0.0	0.0	0.0	3900.0
Chittaurgarh	17	0.0	4500.0	900.0	0.0	0.0	5400.0
Churu	28	0.0	8400.0	0.0	0.0	0.0	8400.0
Dausa	10	0.0	3000.0	0.0	0.0	0.0	3000.0
Dhaulpur	9	0.0	2700.0	0.0	0.0	0.0	2700.0
Dungarpur	9	0.0	2700.0	0.0	0.0	0.0	2700.0
Ganganagar	21	0.0	6300.0	0.0	0.0	0.0	6300.0
Hanumangarh	23	0.0	6600.0	450.0	0.0	0.0	7050.0
Jaipur	27	0.0	7500.0	900.0	0.0	0.0	8400.0
Jaisalmer	20	0.0	6000.0	0.0	0.0	0.0	6000.0
Jalor	23	0.0	6900.0	0.0	0.0	0.0	6900.0
Jhalawar	26	0.0	7800.0	0.0	0.0	0.0	7800.0
Jhunjhunun	19	0.0	5400.0	450.0	0.0	0.0	5850.0
Jodhpur	47	0.0	13200.0	1350.0	0.0	0.0	14550.0
Karauli	15	0.0	4500.0	0.0	0.0	0.0	4500.0
Kota	19	0.0	5700.0	0.0	0.0	0.0	5700.0
Nagaur	27	0.0	7200.0	1350.0	0.0	0.0	8550.0
Pali	21	0.0	5700.0	450.0	575.0	0.0	6725.0
Pratapgarh	6	0.0	1800.0	0.0	0.0	0.0	1800.0
Rajsamand	11	0.0	3300.0	0.0	0.0	0.0	3300.0
Sawai Madhopur	14	0.0	3900.0	450.0	0.0	0.0	4350.0
Sikar	16	0.0	3600.0	1800.0	0.0	0.0	5400.0
Sirohi	14	0.0	4200.0	0.0	0.0	0.0	4200.0
Tonk	21	0.0	6300.0	0.0	0.0	0.0	6300.0
Udaipur	16	0.0	4800.0	0.0	0.0	0.0	4800.0
Total	**641**	**0.0**	**183900.0**	**11250.0**	**1725.0**	**0.0**	**196875.0**

Thus, total estimated capital cost for the Fire Stations building development for all the proposed and new urban Fire Stations will be about **Rs. 522 Crores**. In addition, about **Rs. 1,969 Crores** will be required for rural Fire Station building structure.

Vehicles and Equipment Cost:

The costs of different fire vehicles and specialized equipment including communication sets (Static and Mobile VHF sets) have been taken as approximate rates quoted by fire equipment supplier. Accordingly, capital cost for fire vehicles and equipment for all the districts in Rajasthan has been estimated (Tables 8-30 -8-35).

Table 8-30: 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	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Education Vans	Total Vehicles Cost
Ajmer	14	105.0	150.0	200.0	1,000.0	500.0	35.0	30.0	30.0	0.0	0.0	20.0	2,070.0
Alwar	10	280.0	210.0	120.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	1,225.0
Banswara	4	0.0	30.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	685.0
Baran	4	35.0	60.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	750.0
Barmer	4	35.0	180.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	830.0
Bharatpur	6	105.0	150.0	80.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	950.0
Bhilwara	8	210.0	210.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	1,075.0
Bikaner	12	350.0	120.0	160.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	1,245.0
Bundi	4	105.0	30.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	750.0
Chittaurgarh	6	35.0	150.0	80.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	880.0
Churu	10	420.0	180.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	1,215.0
Dausa	4	35.0	90.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	740.0
Dhaulpur	2	70.0	60.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	785.0
Dungarpur	2	0.0	0.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	655.0
Ganganagar	12	0.0	30.0	120.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	765.0
Hanumangarh	7	70.0	90.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	815.0
Jaipur	34	980.0	690.0	480.0	1,500.0	0.0	175.0	90.0	30.0	0.0	9.0	40.0	3,994.0
Jaisalmer	3	-35.0	0.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	580.0
Jalor	3	-35.0	0.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	620.0
Jhalawar	1	-70.0	0.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	585.0

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Education Vans	Total Vehicles Cost
Jhunjhunun	7	70.0	120.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	845.0
Jodhpur	12	70.0	90.0	160.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	935.0
Karauli	2	0.0	30.0	80.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	725.0
Kota	9	0.0	60.0	40.0	500.0	500.0	35.0	30.0	30.0	0.0	0.0	20.0	1,215.0
Nagaur	9	245.0	300.0	-40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	1,120.0
Pali	9	0.0	30.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	685.0
Pratapgarh	2	0.0	30.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	645.0
Rajasamand	4	35.0	30.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	720.0
Sawai Madhopur	3	70.0	90.0	0.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	775.0
Sikar	11	490.0	180.0	80.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	1,365.0
Sirohi	5	0.0	60.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	715.0
Tonk	4	0.0	0.0	40.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	655.0
Udaipur	6	35.0	180.0	120.0	500.0	0.0	35.0	30.0	30.0	0.0	0.0	20.0	950.0
Total	**233**	**3,710.0**	**3,630.0**	**2,200.0**	**18,000.0**	**1,000.0**	**1,295.0**	**1,050.0**	**990.0**	**0.0**	**9.0**	**680.0**	**32,564.0**

Table 8-31: Cost estimates (in Lakhs Rupees) for gap in firefighting vehicles for new rural Fire Stations

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Total Vehicles Cost
Ajmer	22	770.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	0.0	797.0
Alwar	24	1,190.0	330.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	162.0	67.5	1,749.5
Banswara	7	245.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	40.5	303.5
Baran	14	525.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	33.8	603.8
Barmer	32	1,225.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	126.0	74.3	1,455.3
Bharatpur	20	700.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	117.0	67.5	884.5
Bhilwara	18	875.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	117.0	67.5	1,059.5
Bikaner	32	1,120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	1,129.0
Bundi	13	490.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	13.5	569.5
Chittaurgarh	17	735.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	20.3	791.3
Churu	28	1,015.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	6.8	1,030.8
Dausa	10	350.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	33.8	428.8
Dhaulpur	9	315.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	27.0	378.0
Dungarpur	9	315.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	47.3	407.3
Ganganagar	21	735.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	27.0	798.0
Hanumangarh	23	875.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	13.5	945.5
Jaipur	27	1,050.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0	54.0	1,224.0
Jaisalmer	20	700.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	700.0
Jalor	23	875.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	60.8	1,016.8
Jhalawar	26	980.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	13.5	1,011.5

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Hydraulic Platform / Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Total Vehicles Cost
Jhunjhunun	19	735.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0	60.8	885.8
Jodhpur	47	1,785.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0	47.3	1,922.3
Karauli	15	525.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	33.8	603.8
Kota	19	665.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	60.8	806.8
Nagaur	27	980.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	171.0	108.0	1,259.0
Pali	21	875.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	47.3	1,033.3
Pratapgarh	6	210.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	20.3	257.3
Rajasamand	11	385.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.0	40.5	479.5
Sawai Madhopur	14	490.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	20.3	546.3
Sikar	16	735.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.0	47.3	920.3
Sirohi	14	525.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	6.8	570.8
Tonk	21	805.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	6.8	820.8
Udaipur	16	560.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.0	87.8	746.8
Total	**641**	**24,360.0**	**540.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1,980.0**	**1,255.5**	**28,135.5**

Table 8-32: Cost estimate (in Lakhs Rupees) for gap in specialized fire fighting 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
Ajmer	14	30.0	102.5	78.0	21.0	5.4	20.0	12.8	10.0	6.0	122.5	12.0	13.0	54.0	0.0
Alwar	10	45.0	82.5	63.2	27.0	4.4	30.0	10.4	9.0	5.4	122.5	10.2	19.5	46.0	0.0
Banswara	4	0.0	27.5	18.0	9.0	1.4	0.0	4.0	3.0	1.8	27.5	3.3	0.0	10.0	0.0
Baran	4	15.0	32.5	26.4	12.0	1.9	10.0	4.0	4.0	2.4	42.5	4.2	6.5	14.0	0.0
Barmer	4	30.0	47.5	42.8	16.5	3.0	20.0	4.0	5.5	3.3	65.0	5.7	13.0	26.0	0.0
Bharatpur	6	30.0	45.0	32.0	16.5	2.7	20.0	4.8	5.5	3.3	57.5	5.4	13.0	28.0	0.0
Bhilwara	8	45.0	75.0	55.2	19.5	3.7	30.0	7.2	6.0	3.9	92.5	8.7	19.5	38.0	0.0
Bikaner	12	15.0	85.0	64.0	31.5	4.6	10.0	11.2	10.5	6.3	112.5	10.2	6.5	48.0	0.0
Bundi	4	0.0	32.5	25.6	10.5	2.0	0.0	4.0	3.5	2.1	35.0	4.2	0.0	12.0	0.0
Chittaurgarh	6	15.0	50.0	33.6	16.5	2.7	10.0	4.8	5.5	3.3	52.5	6.0	6.5	24.0	0.0
Churu	10	15.0	62.5	49.6	27.0	3.9	10.0	9.6	9.0	5.4	87.5	7.8	6.5	46.0	0.0
Dausa	4	0.0	32.5	24.4	10.5	1.6	0.0	4.0	3.5	2.1	35.0	4.2	0.0	16.0	0.0
Dhaulpur	2	15.0	30.0	21.6	6.0	1.5	10.0	1.6	2.0	1.2	25.0	3.6	6.5	12.0	0.0
Dungarpur	2	15.0	25.0	18.0	6.0	1.3	10.0	1.6	2.0	1.2	20.0	3.0	6.5	8.0	0.0
Ganganagar	12	0.0	57.5	44.0	28.5	3.6	0.0	12.0	9.5	5.7	92.5	6.9	0.0	28.0	0.0
Hanumangarh	7	0.0	42.5	35.2	19.5	2.8	0.0	6.4	6.5	3.9	62.5	5.1	0.0	22.0	0.0
Jaipur	34	255.0	322.5	206.4	69.0	14.5	170.0	30.4	22.5	13.8	372.5	39.0	110.5	184.0	0.0
Jaisalmer	3	0.0	20.0	20.0	12.0	1.7	0.0	3.2	4.0	2.4	30.0	2.7	0.0	8.0	0.0

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
Jalor	3	15.0	27.5	25.2	12.0	1.9	10.0	3.2	3.5	2.4	37.5	3.3	6.5	6.0	0.0
Jhalawar	1	0.0	17.5	20.0	9.0	1.7	0.0	0.8	3.0	1.8	20.0	2.4	0.0	2.0	0.0
Jhunjhunun	7	0.0	47.5	38.0	18.0	2.7	0.0	6.4	6.0	3.6	62.5	6.0	0.0	24.0	0.0
Jodhpur	12	0.0	80.0	66.8	36.0	4.9	0.0	11.2	12.0	7.2	120.0	9.9	0.0	44.0	0.0
Karauli	2	0.0	27.5	21.6	7.5	1.6	0.0	1.6	2.5	1.5	27.5	3.3	0.0	8.0	0.0
Kota	9	0.0	57.5	43.2	22.5	3.2	0.0	8.8	7.5	4.5	72.5	6.9	0.0	30.0	0.0
Nagaur	9	30.0	70.0	56.8	24.0	4.1	20.0	8.0	8.0	4.8	100.0	8.4	13.0	44.0	0.0
Pali	9	0.0	45.0	36.8	22.5	2.8	0.0	8.8	7.0	4.5	75.0	5.7	0.0	20.0	0.0
Pratapgarh	2	0.0	17.5	13.6	6.0	1.0	0.0	1.6	2.0	1.2	17.5	2.4	0.0	6.0	0.0
Rajasamand	4	0.0	25.0	18.4	10.5	1.6	0.0	4.0	3.5	2.1	30.0	3.0	0.0	10.0	0.0
Sawai Madhopur	3	0.0	40.0	29.6	9.0	2.1	0.0	3.2	3.0	1.8	37.5	4.8	0.0	18.0	0.0
Sikar	11	15.0	75.0	56.8	24.0	3.9	10.0	10.4	8.0	4.8	105.0	9.3	6.5	46.0	0.0
Sirohi	5	0.0	35.0	27.6	13.5	1.6	0.0	3.2	4.5	2.7	40.0	4.5	0.0	16.0	0.0
Tonk	4	15.0	35.0	30.0	13.5	2.2	10.0	3.2	4.5	2.7	40.0	4.5	6.5	12.0	0.0
Udaipur	6	45.0	62.5	44.8	15.0	3.0	30.0	5.6	4.5	3.0	72.5	7.5	19.5	34.0	0.0
Total	**233**	**645.0**	**1835.0**	**1387.2**	**601.5**	**101.0**	**430.0**	**216.0**	**201.0**	**122.1**	**2312.5**	**224.1**	**279.5**	**944.0**	**0.0**

Table 8-33: Cost estimate (in Lakhs Rupees) for gap in specialized fire fighting equipment for operational and new urban 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 Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Ajmer	14	0.0	0.0	29.4	14.0	10.0	18.0	0.0	5.1	6.6	2.8	6.0	579.1
Alwar	10	0.0	0.0	21.0	10.0	15.0	15.2	0.0	4.9	7.5	4.1	5.4	558.1
Banswara	4	0.0	0.0	8.4	4.0	0.0	4.8	0.0	1.6	2.0	1.4	1.8	129.6
Baran	4	0.0	0.0	8.4	4.0	5.0	6.4	0.0	2.2	2.9	1.8	2.4	208.5
Barmer	4	0.0	0.0	8.4	4.0	10.0	10.0	0.0	3.0	4.8	2.6	3.3	328.4
Bharatpur	6	0.0	0.0	12.6	6.0	10.0	8.8	0.0	3.0	3.7	2.6	3.3	313.8
Bhilwara	8	0.0	0.0	16.8	8.0	15.0	12.0	0.0	3.5	6.1	3.0	3.9	472.5
Bikaner	12	0.0	0.0	25.2	12.0	5.0	16.0	0.0	5.7	6.8	4.9	6.3	497.2
Bundi	4	0.0	0.0	8.4	4.0	0.0	6.4	0.0	1.9	2.7	1.7	2.1	158.6
Chittaurgarh	6	0.0	0.0	12.6	6.0	5.0	9.6	0.0	3.0	4.3	2.5	3.3	276.6
Churu	10	0.0	0.0	21.0	10.0	5.0	12.4	0.0	4.9	5.3	4.2	5.4	407.9
Dausa	4	0.0	0.0	8.4	4.0	0.0	6.0	0.0	1.9	2.6	1.7	2.1	160.4
Dhaulpur	2	0.0	0.0	4.2	2.0	5.0	5.6	0.0	1.1	2.4	1.0	1.2	158.4
Dungarpur	2	0.0	0.0	4.2	2.0	5.0	4.4	0.0	1.1	1.9	1.0	1.2	138.3
Ganganagar	12	0.0	0.0	25.2	12.0	0.0	10.8	0.0	5.1	4.8	4.4	5.7	356.2
Hanumangarh	7	0.0	0.0	14.7	7.0	0.0	8.4	0.0	3.5	3.7	3.1	3.9	250.8
Jaipur	34	0.0	0.0	71.4	34.0	80.0	54.0	0.0	10.5	23.3	8.8	13.8	2105.9
Jaisalmer	3	0.0	0.0	6.3	3.0	0.0	4.8	0.0	2.2	2.0	1.8	2.4	126.5
Jalor	3	0.0	0.0	6.3	3.0	5.0	6.0	0.0	2.2	2.9	1.9	2.4	183.7
Jhalawar	1	0.0	0.0	2.1	1.0	0.0	4.8	0.0	1.6	2.2	1.6	1.8	93.3

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 Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Jhunjhunun	7	0.0	0.0	14.7	7.0	0.0	8.8	0.0	3.2	4.3	3.1	3.6	259.4
Jodhpur	12	0.0	0.0	25.2	12.0	0.0	16.8	0.0	6.5	7.5	5.6	7.2	472.8
Karauli	2	0.0	0.0	4.2	2.0	0.0	5.6	0.0	1.4	2.4	1.3	1.5	121.0
Kota	9	0.0	0.0	18.9	9.0	0.0	10.8	0.0	4.1	4.6	3.4	4.5	311.8
Nagaur	9	0.0	0.0	18.9	9.0	10.0	13.2	0.0	4.3	6.3	3.8	4.8	461.5
Pali	9	0.0	0.0	18.9	9.0	0.0	8.8	0.0	4.1	4.3	3.6	4.5	281.2
Pratapgarh	2	0.0	0.0	4.2	2.0	0.0	3.2	0.0	1.1	1.4	0.8	1.2	82.7
Rajasamand	4	0.0	0.0	8.4	4.0	0.0	4.8	0.0	1.9	2.0	1.7	2.1	133.0
Sawai Madhopur	3	0.0	0.0	6.3	3.0	0.0	7.2	0.0	1.6	3.2	1.6	1.8	173.7
Sikar	11	0.0	0.0	23.1	11.0	5.0	13.2	0.0	4.3	6.3	4.0	4.8	446.4
Sirohi	5	0.0	0.0	10.5	5.0	0.0	6.8	0.0	2.4	2.9	2.2	2.7	181.1
Tonk	4	0.0	0.0	8.4	4.0	5.0	7.6	0.0	2.4	3.2	2.2	2.7	214.6
Udaipur	6	0.0	0.0	12.6	6.0	15.0	11.2	0.0	2.7	4.8	2.4	3.0	404.6
Total	**233**	**0.0**	**0.0**	**489.3**	**233.0**	**210.0**	**342.4**	**0.0**	**107.7**	**151.5**	**92.5**	**122.1**	**11047.4**

Table 8-34: Cost estimate (in Lakhs Rupees) for gap fire fighting specialized 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
Ajmer	22	0.0	0.0	32.8	33.0	4.4	0.0	0.0	11.0	6.6	62.5	0.0	0.0	50.0	0.0
Alwar	24	0.0	0.0	65.6	36.0	5.7	0.0	0.0	12.0	7.2	160.0	0.0	0.0	126.0	0.0
Banswara	7	0.0	0.0	9.6	10.5	1.4	0.0	0.0	3.5	2.1	20.0	0.0	0.0	18.0	0.0
Baran	14	0.0	0.0	26.4	21.0	2.8	0.0	0.0	7.0	4.2	52.5	0.0	0.0	40.0	0.0
Barmer	32	0.0	0.0	60.8	48.0	6.5	0.0	0.0	16.0	9.6	125.0	0.0	0.0	100.0	0.0
Bharatpur	20	0.0	0.0	21.6	30.0	4.0	0.0	0.0	10.0	6.0	80.0	0.0	0.0	66.0	0.0
Bhilwara	18	0.0	0.0	37.6	27.0	3.7	0.0	0.0	9.0	5.4	97.5	0.0	0.0	76.0	0.0
Bikaner	32	0.0	0.0	50.4	48.0	6.4	0.0	0.0	16.0	9.6	82.5	0.0	0.0	66.0	0.0
Bundi	13	0.0	0.0	20.8	19.5	2.6	0.0	0.0	6.5	3.9	47.5	0.0	0.0	38.0	0.0
Chittaurgarh	17	0.0	0.0	32.0	25.5	3.6	0.0	0.0	8.5	5.1	55.0	0.0	0.0	50.0	0.0
Churu	28	0.0	0.0	45.6	42.0	5.6	0.0	0.0	14.0	8.4	75.0	0.0	0.0	60.0	0.0
Dausa	10	0.0	0.0	13.6	15.0	2.0	0.0	0.0	5.0	3.0	37.5	0.0	0.0	30.0	0.0
Dhaulpur	9	0.0	0.0	11.2	13.5	1.8	0.0	0.0	4.5	2.7	32.5	0.0	0.0	26.0	0.0
Dungarpur	9	0.0	0.0	10.4	13.5	1.8	0.0	0.0	4.5	2.7	32.5	0.0	0.0	28.0	0.0
Ganganagar	21	0.0	0.0	36.8	31.5	4.2	0.0	0.0	10.5	6.3	65.0	0.0	0.0	50.0	0.0
Hanumangarh	23	0.0	0.0	40.8	34.5	4.7	0.0	0.0	11.5	6.9	72.5	0.0	0.0	58.0	0.0
Jaipur	27	0.0	0.0	54.4	40.5	5.6	0.0	0.0	13.5	8.1	100.0	0.0	0.0	82.0	0.0
Jaisalmer	20	0.0	0.0	32.0	30.0	4.0	0.0	0.0	10.0	6.0	52.5	0.0	0.0	40.0	0.0
Jalor	23	0.0	0.0	44.0	34.5	4.6	0.0	0.0	11.5	6.9	85.0	0.0	0.0	68.0	0.0

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
Jhalawar	26	0.0	0.0	43.2	39.0	5.2	0.0	0.0	13.0	7.8	75.0	0.0	0.0	60.0	0.0
Jhunjhunun	19	0.0	0.0	36.8	28.5	3.9	0.0	0.0	9.5	5.7	77.5	0.0	0.0	62.0	0.0
Jodhpur	47	0.0	0.0	88.0	70.5	9.7	0.0	0.0	23.5	14.1	152.5	0.0	0.0	122.0	0.0
Karauli	15	0.0	0.0	20.0	22.5	3.0	0.0	0.0	7.5	4.5	50.0	0.0	0.0	40.0	0.0
Kota	19	0.0	0.0	37.6	28.5	3.8	0.0	0.0	9.5	5.7	75.0	0.0	0.0	56.0	0.0
Nagaur	27	0.0	0.0	63.2	40.5	5.7	0.0	0.0	13.5	8.1	112.5	0.0	0.0	94.0	0.0
Pali	21	0.0	0.0	45.6	31.5	4.5	0.0	0.0	10.5	6.3	90.0	0.0	0.0	70.0	0.0
Pratapgarh	6	0.0	0.0	7.2	9.0	1.2	0.0	0.0	3.0	1.8	25.0	0.0	0.0	18.0	0.0
Rajasamand	11	0.0	0.0	12.8	16.5	2.2	0.0	0.0	5.5	3.3	42.5	0.0	0.0	34.0	0.0
Sawai Madhopur	14	0.0	0.0	27.2	21.0	2.9	0.0	0.0	7.0	4.2	42.5	0.0	0.0	36.0	0.0
Sikar	16	0.0	0.0	41.6	24.0	3.6	0.0	0.0	8.0	4.8	85.0	0.0	0.0	68.0	0.0
Sirohi	14	0.0	0.0	23.2	21.0	2.8	0.0	0.0	7.0	4.2	45.0	0.0	0.0	34.0	0.0
Tonk	21	0.0	0.0	34.4	31.5	4.2	0.0	0.0	10.5	6.3	60.0	0.0	0.0	48.0	0.0
Udaipur	16	0.0	0.0	21.6	24.0	3.2	0.0	0.0	8.0	4.8	65.0	0.0	0.0	54.0	0.0
Total	**641**	**0.0**	**0.0**	**1148.8**	**961.5**	**131.3**	**0.0**	**0.0**	**320.5**	**192.3**	**2332.5**	**0.0**	**0.0**	**1868.0**	**0.0**

Table 8-35: Cost estimate (in Lakhs Rupees) for gap fire fighting specialized 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 Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Ajmer	22	0.0	0.0	46.2	0.0	0.0	8.8	0.0	5.9	3.7	5.3	6.6	276.9
Alwar	24	0.0	0.0	50.4	0.0	0.0	9.6	0.0	6.5	8.5	5.8	7.2	500.4
Banswara	7	0.0	0.0	14.7	0.0	0.0	2.8	0.0	1.9	1.2	1.7	2.1	89.5
Baran	14	0.0	0.0	29.4	0.0	0.0	5.6	0.0	3.8	3.2	3.4	4.2	203.5
Barmer	32	0.0	0.0	67.2	0.0	0.0	12.8	0.0	8.6	7.7	7.7	9.6	479.5
Bharatpur	20	0.0	0.0	42.0	0.0	0.0	8.0	0.0	5.4	3.4	4.8	6.0	287.2
Bhilwara	18	0.0	0.0	37.8	0.0	0.0	7.2	0.0	4.9	5.1	4.3	5.4	320.9
Bikaner	32	0.0	0.0	67.2	0.0	0.0	12.8	0.0	8.6	5.4	7.7	9.6	390.3
Bundi	13	0.0	0.0	27.3	0.0	0.0	5.2	0.0	3.5	2.6	3.1	3.9	184.4
Chittaurgarh	17	0.0	0.0	35.7	0.0	0.0	6.8	0.0	4.6	3.7	4.1	5.1	239.7
Churu	28	0.0	0.0	58.8	0.0	0.0	11.2	0.0	7.6	4.9	6.7	8.4	348.2
Dausa	10	0.0	0.0	21.0	0.0	0.0	4.0	0.0	2.7	1.9	2.4	3.0	141.1
Dhaulpur	9	0.0	0.0	18.9	0.0	0.0	3.6	0.0	2.4	1.5	2.2	2.7	123.5
Dungarpur	9	0.0	0.0	18.9	0.0	0.0	3.6	0.0	2.4	1.5	2.2	2.7	124.7
Ganganagar	21	0.0	0.0	44.1	0.0	0.0	8.4	0.0	5.7	4.3	5.0	6.3	278.1
Hanumangarh	23	0.0	0.0	48.3	0.0	0.0	9.2	0.0	6.2	4.6	5.5	6.9	309.6

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 Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Jaipur	27	0.0	0.0	56.7	0.0	0.0	10.8	0.0	7.3	6.6	6.5	8.1	400.1
Jaisalmer	20	0.0	0.0	42.0	0.0	0.0	8.0	0.0	5.4	3.4	4.8	6.0	244.1
Jalor	23	0.0	0.0	48.3	0.0	0.0	9.2	0.0	6.2	5.4	5.5	6.9	336.1
Jhalawar	26	0.0	0.0	54.6	0.0	0.0	10.4	0.0	7.0	4.8	6.2	7.8	334.0
Jhunjhunun	19	0.0	0.0	39.9	0.0	0.0	7.6	0.0	5.1	4.8	4.6	5.7	291.6
Jodhpur	47	0.0	0.0	98.7	0.0	0.0	18.8	0.0	12.7	10.2	11.3	14.1	646.1
Karauli	15	0.0	0.0	31.5	0.0	0.0	6.0	0.0	4.1	2.6	3.6	4.5	199.7
Kota	19	0.0	0.0	39.9	0.0	0.0	7.6	0.0	5.1	4.8	4.6	5.7	283.8
Nagaur	27	0.0	0.0	56.7	0.0	0.0	10.8	0.0	7.3	8.3	6.5	8.1	435.2
Pali	21	0.0	0.0	44.1	0.0	0.0	8.4	0.0	5.7	5.6	5.0	6.3	333.5
Pratapgarh	6	0.0	0.0	12.6	0.0	0.0	2.4	0.0	1.6	1.0	1.4	1.8	86.1
Rajasamand	11	0.0	0.0	23.1	0.0	0.0	4.4	0.0	3.0	1.9	2.6	3.3	155.1
Sawai Madhopur	14	0.0	0.0	29.4	0.0	0.0	5.6	0.0	3.8	3.2	3.4	4.2	190.4
Sikar	16	0.0	0.0	33.6	0.0	0.0	6.4	0.0	4.3	5.4	3.8	4.8	293.4
Sirohi	14	0.0	0.0	29.4	0.0	0.0	5.6	0.0	3.8	2.6	3.4	4.2	186.1
Tonk	21	0.0	0.0	44.1	0.0	0.0	8.4	0.0	5.7	3.7	5.0	6.3	268.2
Udaipur	16	0.0	0.0	33.6	0.0	0.0	6.4	0.0	4.3	3.2	3.8	4.8	236.8
Total	**641**	**0.0**	**0.0**	**1346.1**	**0.0**	**0.0**	**256.4**	**0.0**	**173.1**	**140.8**	**153.8**	**192.3**	**9217.4**

8.4.2 RECURRING COST

Manpower Cost

The manpower cost estimation per year have been carried out by taking into account pay-scale structure for different levels of employee. Accordingly, cost estimate for manpower requirements at various levels (district level) is shown in Tables 8-36 and 8-37 considering 2-shifts duty pattern.

Table 8-36: Annual cost estimate (in Lakhs Rupees) for manpower for Rajasthan Fire Service after filling 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
Ajmer	14	14.8	13.8	8.6	0.0	32.0	40.0	75.8	197.8	235.0	1432.1	8.4	2058.2
Alwar	10	0.0	13.8	8.6	0.0	25.6	45.8	65.7	163.4	188.7	1253.9	-0.8	1764.5
Banswara	4	0.0	13.8	8.6	0.0	6.4	17.2	20.2	60.2	56.3	408.2	3.4	594.2
Baran	4	0.0	13.8	8.6	0.0	6.4	22.9	25.3	64.5	86.1	505.4	2.5	735.4
Barmer	4	0.0	13.8	8.6	0.0	25.6	22.9	35.4	81.7	115.9	699.8	3.4	1006.9
Bharatpur	6	14.8	13.8	8.6	0.0	19.2	34.3	30.3	94.6	112.5	654.5	-0.8	981.7
Bhilwara	8	0.0	13.8	8.6	0.0	19.2	22.9	60.6	137.6	185.4	1108.1	6.7	1562.8
Bikaner	12	14.8	13.8	8.6	0.0	38.4	62.9	55.6	163.4	188.7	1309.0	10.1	1865.1
Bundi	4	0.0	13.8	8.6	0.0	12.8	22.9	25.3	64.5	72.8	427.7	2.5	650.8
Chittaurgarh	6	0.0	13.8	8.6	0.0	6.4	34.3	35.4	90.3	119.2	738.7	3.4	1050.0
Churu	10	0.0	13.8	8.6	0.0	32.0	57.2	50.5	124.7	122.5	978.5	8.4	1396.1
Dausa	4	0.0	13.8	8.6	0.0	12.8	22.9	30.3	60.2	66.2	492.5	-2.5	704.7
Dhaulpur	2	0.0	13.8	8.6	0.0	6.4	11.4	30.3	43.0	62.9	424.4	0.8	601.7
Dungarpur	2	0.0	13.8	8.6	0.0	6.4	5.7	20.2	38.7	56.3	356.4	1.7	507.7
Ganganagar	12	0.0	13.8	8.6	0.0	25.6	45.8	30.3	146.2	119.2	764.6	10.1	1164.1
Hanumangarh	7	0.0	13.8	8.6	0.0	25.6	34.3	20.2	94.6	96.0	570.2	5.9	869.2
Jaipur	34	29.5	0.0	8.6	0.0	44.8	85.8	267.7	576.2	794.4	4766.0	21.8	6594.9
Jaisalmer	3	0.0	13.8	8.6	0.0	19.2	17.2	10.1	47.3	53.0	317.5	1.7	488.3
Jalor	3	0.0	13.8	8.6	0.0	6.4	11.4	25.3	51.6	56.3	356.4	2.5	532.2
Jhalawar	1	0.0	13.8	8.6	0.0	6.4	5.7	20.2	30.1	43.0	265.7	0.0	393.5

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
Jhunjhunun	7	0.0	13.8	8.6	0.0	19.2	40.0	40.4	94.6	92.7	699.8	5.9	1015.0
Jodhpur	12	14.8	0.0	8.6	0.0	44.8	62.9	60.6	154.8	139.0	1127.5	6.7	1619.8
Karauli	2	0.0	13.8	8.6	0.0	12.8	11.4	25.3	38.7	56.3	398.5	1.7	567.0
Kota	9	14.8	13.8	8.6	0.0	19.2	28.6	40.4	116.1	92.7	654.5	5.9	994.5
Nagaur	9	0.0	13.8	8.6	0.0	25.6	45.8	55.6	137.6	168.8	1053.0	7.6	1516.2
Pali	9	0.0	13.8	8.6	0.0	19.2	17.2	25.3	116.1	109.2	605.9	0.0	915.2
Pratapgarh	2	0.0	13.8	8.6	0.0	0.0	11.4	10.1	34.4	43.0	281.9	1.7	404.9
Rajsamand	4	0.0	13.8	8.6	0.0	12.8	17.2	10.1	55.9	62.9	340.2	3.4	524.8
Sawai Madhopur	3	0.0	13.8	8.6	0.0	6.4	17.2	30.3	64.5	96.0	554.0	2.5	793.3
Sikar	11	0.0	13.8	8.6	0.0	19.2	40.0	60.6	150.5	165.5	1169.6	9.2	1637.1
Sirohi	5	0.0	13.8	8.6	0.0	19.2	22.9	30.3	68.8	76.1	505.4	2.5	747.6
Tonk	4	0.0	13.8	8.6	0.0	6.4	22.9	30.3	64.5	72.8	541.1	0.8	761.2
Udaipur	6	14.8	13.8	8.6	0.0	19.2	22.9	55.6	107.5	152.3	881.3	5.0	1280.8
Total	**233**	**118.1**	**426.3**	**284.1**	**0.0**	**601.6**	**983.8**	**1409.0**	**3534.6**	**4157.4**	**26642.5**	**142.0**	**38299.3**

Table 8-37: Additional annual cost estimates (in Lakhs Rupees) for manpower requirement for new rural Fire Stations

District	Fire Stations	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Ajmer	22	0.0	0.0	15.2	249.4	195.3	1134.0	18.5	1612.3
Alwar	24	0.0	0.0	212.1	382.7	450.2	2676.2	20.2	3741.4
Banswara	7	0.0	0.0	10.1	81.7	92.7	392.0	5.9	582.4
Baran	14	0.0	5.7	55.6	172.0	158.9	1017.4	11.8	1421.3
Barmer	32	6.4	28.6	146.5	408.5	390.6	2417.0	26.9	3424.5
Bharatpur	20	0.0	5.7	65.7	270.9	268.1	1140.5	16.8	1767.7
Bhilwara	18	0.0	0.0	136.4	253.7	268.1	1645.9	15.1	2319.2
Bikaner	32	0.0	0.0	5.1	348.3	268.1	1626.5	26.9	2274.8

District	Fire Stations	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Bundi	13	0.0	0.0	30.3	154.8	132.4	793.8	10.9	1122.2
Chittaurgarh	17	0.0	0.0	40.4	210.7	205.2	1153.4	14.3	1624.0
Churu	28	0.0	0.0	10.1	305.3	241.6	1477.4	23.5	2058.0
Dausa	10	0.0	0.0	30.3	129.0	125.8	612.4	8.4	905.8
Dhaulpur	9	0.0	5.7	20.2	111.8	109.2	499.0	7.6	753.5
Dungarpur	9	0.0	5.7	25.3	116.1	125.8	518.4	7.6	798.8
Ganganagar	21	0.0	0.0	45.5	240.8	208.5	1309.0	17.6	1821.4
Hanumangarh	23	0.0	5.7	35.4	266.6	228.4	1396.4	19.3	1951.8
Jaipur	27	0.0	0.0	111.1	344.0	334.3	2073.6	22.7	2885.7
Jaisalmer	20	0.0	17.2	0.0	215.0	165.5	1010.9	16.8	1425.3
Jalor	23	0.0	22.9	101.0	283.8	268.1	1717.2	19.3	2412.3
Jhalawar	26	12.8	34.3	20.2	288.1	231.7	1438.6	21.8	2047.5
Jhunjhunun	19	0.0	0.0	101.0	253.7	258.2	1519.6	16.0	2148.4
Jodhpur	47	0.0	17.2	111.1	563.3	513.1	3133.1	39.5	4377.2
Karauli	15	0.0	11.4	25.3	180.6	168.8	813.2	12.6	1211.9
Kota	19	0.0	0.0	101.0	240.8	235.0	1513.1	16.0	2105.9
Nagaur	27	0.0	0.0	217.2	387.0	427.0	2673.0	22.7	3726.8
Pali	21	0.0	0.0	106.1	279.5	284.7	1749.6	17.6	2437.5
Pratapgarh	6	0.0	0.0	15.2	77.4	76.1	337.0	5.0	510.7
Rajsamand	11	0.0	0.0	30.3	141.9	142.3	622.1	9.2	945.9
Sawai Madhopur	14	0.0	5.7	45.5	172.0	162.2	1001.2	11.8	1398.3
Sikar	16	0.0	0.0	136.4	245.1	281.4	1726.9	13.4	2403.2
Sirohi	14	0.0	0.0	10.1	154.8	125.8	771.1	11.8	1073.6
Tonk	21	0.0	11.4	10.1	227.9	182.1	1124.3	17.6	1573.4
Udaipur	16	0.0	0.0	75.8	219.3	238.3	1088.6	13.4	1635.5
Total	**641**	**19.2**	**177.3**	**2100.8**	**7976.5**	**7,56**	**44122.3**	**538.4**	**62497.9**

Level 10: *Director/Joint Director****;*** ***Level 9:*** *CFO/ CO;* ***Level 8:*** *Deputy CFO;* ***Level 7:*** *Deputy Controller;* ***Level 6:*** *DFO/ADO/Fire Officer/Fire Supervisor/Astt. Controller/Revenue Inspector;* ***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.*

Annual 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 8-38). The total estimated cost on vehicle maintenance & repairs, and PDL will be **Rs. 17.87 Crores** per year for filling the gap in operational and urban areas in Rajasthan. The annual specialized equipment, building maintenance, office expanses, and training expanses will be **Rs. 8.90 Crores, 17.57 Crores, 26.49 Crores** and **Rs. 4.62 Crores**, respectively

Table 8-38: Annual Recurring Cost estimates (in Lakhs Rupees) for petrol, diesel, and lubricants in operational and new urban areas

District	Num of Fire Stations	Annual Vehicle maintenance	Annual PDL Cost	Annual Equipment Maintenance	Annual Building Maintenance	Office Expenses	Training Expenses
Ajmer	14	65.40	49.05	46.72	108.00	144.51	25.23
Alwar	10	36.96	27.72	44.98	94.50	119.26	20.82
Banswara	4	20.04	15.03	10.52	34.50	39.69	6.93
Baran	4	21.36	16.02	16.69	30.00	48.62	8.49
Barmer	4	24.96	18.72	26.33	48.00	68.57	11.97
Bharatpur	6	27.84	20.88	25.80	46.50	67.73	11.83
Bhilwara	8	32.76	24.57	38.05	62.00	106.68	18.63
Bikaner	12	39.12	29.34	39.81	89.50	124.42	21.72
Bundi	4	20.64	15.48	12.70	24.00	47.38	8.27
Chittaurgarh	6	26.40	19.80	23.05	40.50	73.71	12.87
Churu	10	33.36	25.02	32.65	63.00	91.63	16
Dausa	4	21.12	15.84	12.85	21.00	47.42	8.28
Dhaulpur	2	20.52	15.39	12.67	12.00	40.82	7.13
Dungarpur	2	19.08	14.31	11.10	25.00	33.78	5.9
Ganganagar	12	29.16	21.87	28.55	68.50	85.19	14.88
Hanumangarh	7	24.60	18.45	20.09	53.00	63.29	11.05
Jaipur	34	145.02	108.76	171.20	342.00	449.19	78.43
Jaisalmer	3	18.12	13.59	10.14	15.00	32.51	5.68
Jalor	3	19.20	14.40	14.81	21.00	39.81	6.95
Jhalawar	1	16.56	12.42	7.67	9.00	25.86	4.52
Jhunjhunun	7	26.28	19.71	20.83	39.00	69.77	12.18
Jodhpur	12	48.36	36.27	38.06	81.50	119.19	20.81
Karauli	2	19.92	14.94	9.68	15.00	37.56	6.56
Kota	9	39.72	29.79	25.06	53.50	83.93	14.66
Nagaur	9	32.04	24.03	36.94	78.50	100.98	17.63
Pali	9	24.00	18.00	22.69	48.00	68.71	12
Pratapgarh	2	17.16	12.87	6.62	12.00	26.32	4.6
Rajsamand	4	19.80	14.85	10.69	27.00	36.48	6.37
Sawai Madhopur	3	21.96	16.47	13.96	18.00	55.28	9.65
Sikar	11	35.04	26.28	35.73	71.50	107.22	18.72

District	Num of Fire Stations	Annual Vehicle maintenance	Annual PDL Cost	Annual Equipment Maintenance	Annual Building Maintenance	Office Expenses	Training Expenses
Sirohi	5	22.20	16.65	14.66	30.00	52.67	9.2
Tonk	4	21.48	16.11	17.19	18.00	51.37	8.97
Udaipur	6	31.20	23.40	32.42	58.00	90.19	15.75
Total	**233**	**1,021.38**	**766.04**	**890.91**	**1,757.00**	**2,649.76**	**462.66**

8.5 Detailed Roadmap for Financial and Investment Plan

State level summary of Capital and recurring expenditure required for filling the gap is shown in Table 8-39 and 8-40 respectively.

Table 8-39: State level summary of capital expenditure required for filling the gap (in Crores rupees)

Capital Expenditure				
Operational Type	Fire Station Building Infrastructure	Vehicles Cost	Equipment Cost	Total Capital Cost
Operational Fire Stations	356.75	99.94	0.89	457.57
Gap in Operational Fire Stations	111.75	226.14	69.62	407.51
New Urban Fire Stations	410.00	99.50	40.85	550.35
Total Gap in New Urban and Operational Fire Stations	521.75	325.64	110.47	957.86
New Rural Fire Stations	1,968.75	281.36	92.17	2,342.28
Total Gap in New Urban ,New Rural and Operational Fire Stations	2,490.50	607.00	202.65	3,300.14

Table 8-40: 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	37.6	2.40	0.07	1.80	7.14	2.37	0.41	51.79
Gap in Operational Fire Stations	224.86	5.43	5.57	4.07	2.24	14.17	2.47	258.81
New Urban Fire Stations	158.13	2.39	3.27	1.79	8.20	9.96	1.74	185.48
Total Gap in New Urban and Operational Fire Stations	382.99	7.82	8.84	5.86	10.44	24.13	4.21	444.28
New Rural Fire Stations	624.98	6.75	7.37	5.06	39.38	39.38	6.88	729.79
Total Gap in New Urban ,New Rural and Operational Fire Stations	1,007.97	14.57	16.21	10.93	49.81	63.50	11.09	1,174.08

All the above detailed capital and recurring expenses have been taken into consideration, while finalizing the detailed investment plan for Rajasthan State. The detailed investment plan for next 10-years for Rajasthan Fire Services considering 2-shifts duty pattern are given in Tables 8-41 and 8-42.

A few assumptions have been made, while preparing the detailed roadmap for investment plan for the next 10 years. For example, existing gaps in terms of manpower, fire fighting vehicles, and equipment will be filled up in first two years and 40% gaps in Fire Station buildings will be filled up in first two year, and subsequently 10% gap in each year. The average annual rate on expenses on fire vehicle maintenance, petrol, diesel & lubricants, and office expenses, training, uniform will remain the same as that in F.Y. 2010-11, however, on top of that an annual inflation factor of 8% (fire vehicle maintenance, petrol, diesel & lubricants), 5% (office expenses, training, uniform) has been added. Building construction cost will increase on an average by about 0.96% per year (construction cost index) and building maintenance cost by about 1% of total building construction cost as in 2010-11. The salary costs at each level have been estimated from the present pay scales for each level and an annual growth of 12% has been added for subsequent years.

Table 8-41: State level Investment plan (in Crores Rupees) for Rajasthan Fire Services for filling gap in operational and new urban Fire Stations

	Capital Expenditure		Recurring Expenditure					
Year	Building Infrastructure	Vehicles and Equipment	Annual Vehicle Maintenance & PDL AMC	Annual Staff Salary	Annual Office Expenses	Annual Training Office Expenses	Annual Bldg. maintenance	Total
First Year	104.35	147.88	11.80	150.04	9.45	1.65	8.25	433.43
Second Year	115.83	155.27	20.88	293.97	18.52	3.03	9.46	616.97
Third Year	64.28	30.95	24.29	368.91	23.24	3.57	11.23	526.48
Forth Year	71.35	32.49	28.11	457.61	28.83	4.15	13.03	635.58
Fifth Year	79.21	17.06	31.37	537.41	33.86	4.57	14.02	717.49
Sixth Year	87.92	17.91	34.98	629.77	39.67	5.02	15.02	830.28
Seventh Year	97.59	18.81	38.96	736.55	46.40	5.50	16.04	959.84
Eighth Year	108.33	19.75	43.35	859.89	54.17	6.02	17.08	1,108.59
Ninth Year	0.00	20.74	48.20	1,002.23	63.14	6.58	18.14	1,159.02
Tenth Year	0.00	21.77	53.54	1,166.35	73.48	7.18	19.22	1,341.53
Total	**728.86**	**482.64**	**335.47**	**6,202.72**	**390.77**	**47.25**	**141.49**	**8,329.20**

Table 8-42: Investment plan (in Crores Rupees) for Rajasthan Fire Services for filling gap in operational, new urban and new rural Fire Stations

	Capital Expenditure		Recurring Expenditure					
Year	Building Infrastructure	Vehicles and Equipment	Annual Vehicle Maintenance & PDL AMC	Annual Staff Salary	Annual Office Expenses	Annual Training Office Expenses	Annual Bldg. Maintenance	Total
First Year	498.10	147.88	11.80	150.04	9.45	1.65	8.25	827.18
Second Year	552.89	155.27	20.88	293.97	18.52	3.03	9.46	1,054.03
Third Year	306.85	113.31	28.77	525.71	33.12	5.08	19.27	1,032.11
Forth Year	340.60	118.97	37.78	808.83	50.96	7.33	29.26	1,393.74
Fifth Year	378.08	62.46	44.43	1,029.12	64.83	8.74	34.50	1,622.17
Sixth Year	419.67	65.59	51.89	1,290.62	81.31	10.28	39.85	1,959.21
Seventh Year	465.82	68.87	60.27	1,600.06	100.80	11.95	45.30	2,353.07
Eighth Year	517.08	72.31	69.66	1,965.19	123.81	13.76	50.85	2,812.65
Ninth Year	0.00	75.93	80.16	2,394.90	150.88	15.72	56.51	2,774.11
Tenth Year	0.00	79.72	91.90	2,899.46	182.67	17.84	62.28	3,333.87
Total	**3,479.10**	**960.31**	**497.55**	**12,957.88**	**816.35**	**95.39**	**355.54**	**19,162.13**

8.6 Prioritization of Fire Stations/Fire Posts

For prioritization of Fire Stations, the RMSI team has strictly followed risk categorization and population as criteria. Accordingly, the priority for establishing new urban Fire Stations and rural Fire Stations/Posts has been given in Tables 8-44 and 8-45, respectively.

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 by PWD. Hence, Rajasthan State Fire Services may change the priority of a Fire Station depending upon the local situation and requirements.

8.7 Avenues of Fund Generation

Rajasthan 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 types of occupancies (residential, commercial, and industrial) for adoption of fire safety measures besides training public for use of first aid firefighting equipment
- Training programs at different levels and duration to private sector employee on chargeable basis
- Capitation fees can be charged for scrutiny of building plans
- Fire service charges on clearance of building plans from fire safety point of view
- Sale of condemned fire appliances, equipment, uniform articles and general store items
- The fee on deployment of members of fire services along-with necessary equipment and appliances beyond the jurisdiction of the State Fire Services
- Standby charges on deployment of members of fire services along-with equipment and appliances in the area to stand by for a specific duration, which can be made exceptional for the visits of government authorities or in public interest asked by the district administration

8.8 Capacity Building and Training Facilities

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. The State has framed Recruitment Rules (RR) for each level, and these are being adhered to for filling the vacant positions. 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 Services, it is mandatory that every fire personnel needs to undergo professional training.

Presently, Rajasthan State does not have a Fire Training Centre and there is an urgent need of a training centre for basic training for fireman and leading fireman. A few senior level officials have been trained at NFSC Nagpur. A few firemen have been trained for short duration basic training courses at neighbouring States fire training institute. Civil defence fire personnel were trained in basic fire fighting at Central Training Institute (CTI) and National Civil Defence (NCD), Nagpur. However, in general, Rajasthan State lacks trained manpower in firefighting.

In order to strengthen the Rajasthan Fire Service, the gap in training has been estimated for each type of training. The Fire Station survey and gap analysis reveal that there is significant gap in training need for existing staff. The previous section (section 8.3.3.) details about huge gap in manpower in for operational Fire Stations and need of additional fire personnel for new urban and new rural Fire Stations. As the guidelines of SFAC, immediately after recruitment, fire personnel should undertake professional training. Moreover, there should be refresher training courses at an interval of 3 to 5 years for every fire personnel. The following sections details about the estimation of training need at every level (fireman, leading fireman, station officer, sub-officer etc.).

8.8.1 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 8-43. Additional requirement of Refresher Training Course for Fireman after 3-5 years service as fireman is also shown the Table 8-43. Some of the the special training for specialized equipment such as Breathing Apparatus, Global-positioning system etc should also be part of the refresher course. As a whole Rajasthan Fire Service would require to train 34,065 fire personnel in basic and refresher training in next 10 years. Therefore, State training centre should have adequate capacity and infrastructure for meeting such training requirement.

Table 8-43: Estimated training requirements for fire personnel in Rajasthan Fire Services

Basic Training for Fireman		
	Number of Fire Personnel in Operational Fire Stations	4,918
	Number of Fire Personnel in New Urban Fire Stations	3,606
	Number of Fire Personnel in New Rural Fire Stations	13,618
	Total Number of Fire Personnel for Training	**22,142**
Refresher Training for Fireman		
	Total Number of Fire Personnel	**11,923**
Leading Fireman Training Course		
	Number of Fire Personnel in Operational Fire Stations	774
	Number of Fire Personnel in New Urban Fire Stations	493
	Number of Fire Personnel in New Rural Fire Stations	2,286
	Total Number of Fire Personnel for Training	**3,553**
Other specialized Training Course		
	Total Number of Fire Personnel for Training	**1,267**
Junior Officer Training Course		
	Number of Fire Personnel in Operational Fire Stations	673
	Number of Fire Personnel in New Urban Fire Stations	431
	Number of Fire Personnel in New Rural Fire Stations	2,271
	Total Number of Fire Personnel for Training	**3,375**
Divisional Officer Training Course		
	Number of Fire Personnel in Operational Fire Stations	261
	Number of Fire Personnel in New Urban Fire Stations	83
	Number of Fire Personnel in New Rural Fire Stations	34
	Total Number of Fire Personnel for Training	**378**
Fire Prevention Course		
	Total Number of Fire Personnel for Training	**409**

8.8.2 TRAINING COURSE FOR LEADING FIREMAN

While promotion from fireman to leading fireman, fire personnel should undertake a training course for Leading Fireman. This training will provide both theoretical and practical training required for effective deployment of fire vehicles and fire equipment and personal. In case, State Training Centre does not have adequate infrastructure and capacity, the Leading Fireman training should be provided at NFSC Nagpur, or any other suitable State Training Centre. Presently, Rajasthan State does not have such a training centre and there is an urgent need of a training centre for providing training to firemen and leading firemen.

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 8-43.

8.8.3 OTHER SPECIALIZED TRAINING COURSES

Besides undertaken 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, 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. Thus, it is important that they undergo other specialized training as well.

Following are some of the other specialized trainings courses:

- Medical First Responder,
- 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 Response

The syllabus of above courses are provided in SFAC guidelines. In due course of time, every leading fireman should undertake at least one special training course. Number of leading fireman needed for specialized course is also shown in Table 8-43. In total, Rajasthan Fire Service would need to train at least 1,267 leading fireman for specialized course in next 10 years. Therefore, State training centre should have adequate capacity and infrastructure for meeting such training requirement.

8.8.4 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 also command a fire crew in case of an emergency. Upon successful completion of training, Fire officers will be able to identify components of an effective fire service organization and planning requirement. He will be responsible for implementation of fire safety and prevention programs at their assigned Fire Station.

Junior Officer Training Course should be undertaken at national training centre such as NFSC, Nagpur or similar upcoming national training centers. Every region comprising of few State should have a regional national training centre.

Estimated number of fire officers who require 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 8-43. After filling gap in operational Fire Stations and new urban and rural Fire Stations, Rajasthan Fire Service would require to train 3,375 junior officers in next 10 years. Therefore, national training centre should have adequate capacity and infrastructure for meeting such training requirement from Rajasthan fire service.

8.8.5 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, the principles and practice 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 prepare them for their roles as senior fire officers. Upon successful completion of training, officer will be able to identify components of an effective fire service organization, and implementation of fire prevention and fire safety programs at their assigned Fire Station and its jurisdiction area.

Divisional Officer Training Course should be undertaken at national or international training institutes, such as NFSC, Nagpur or similar upcoming national training institute.

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 8-43. There would be 378 fire officers in Rajasthan Fire Service who would require this training in next 10 years.

8.8.6 AWARENESS GENERATION PROGRAMS

Besides attending regular fire and other recue calls, the State fire services should also work in awareness generation programs, and it should conduct regular awareness programs in schools, residential areas, NCC camps, Oil and Gas Plants, Govt. Offices etc.. Present numbers of awareness programs conducted so far by Rajasthan Fire Service are not up to satisfactory levels. There is urgent need to enhance such activities. For capacity development, 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 generated by MHA and Rajasthan Fire Services, and live- demonstrations of how to use “Portable Extinguishers” and handle small kitchen fires. Fire service should use these in their awareness generation programs.

8.9 Limitations of the Study

- 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 also 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.
- 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.
- 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.
- Non-availability of a uniform level of fire statistics of all the fire events in the past 5 years.
- 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.
- 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..
-

8.10 Recommendations for Rajasthan State Fire Services

- At present, State does not have Rajasthan Fire Act and Fire Policy. So there is an urgent need for such an act and strict implementation of National Building Code (NBC) for high rise buildings, industrial units, and public and private buildings.
- The Rajasthan State lacks trained manpower and there are a large number of vacancies at all levels in the State in operational Fire Stations, which need to be filled up soonest possible.
- Fire statistics of the past fire events (last past 5 years) in the State is scanty. The State Fire Services should issue strict order to all the Fire Stations to prepare fire – statistics data in the prescribed performa for future fire calls, and ensure their compliance.
- Since availability of trained manpower is an issue, and it is more pertinent in case of Rajasthan, there is a need that State should fill up the gap of manpower in operational Fire Stations and provide at-least 6-months training at NFSC, Nagpur or in the training centre of some other States. In parallel, State Fire Services should take proactive measures to start a Rajasthan State Fire Training Institute for leading fireman and lower levels, as their numbers will be large for ideal requirement of Fire Stations and manpower.
- Many of the fire services like UK and Delhi fire services do not have rank of driver, instead they do have post of Fireman designated as Fire Operator who will be person with heavy vehicle driving license as well. Thus, State fire services should abolish the rank of Driver in fire services, and 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 requirement. Since, these may not be readily available, the State should train the new recruit in a systematic manner, and encourage all existing staff, specially, firemen and leading firemen to obtain heavy vehicle driving license. The State may offer some incentive towards this, as this will help in optimization of resources. The other advantages are in term of heavy additional vehicles can be used as water carrier, in case of bigger fire incidence. This ensures that absence of lone driver, which can lead to whole of the fire crew immobile. This can also solve problem of drivers, who don't have promotional avenue during their long service leading to frustration, and last but not least, in terms of optimization of resources. Even presently working fireman and leading fireman can be encouraged to get a license for heavy vehicle Driver by providing additional incentives.
- The State fire service should adopt a system of payment of incentives for driving specialized vehicles like ALP / TTL/Hydraulic Platform.
- Based on prioritization of Fire Stations, State Fire Services needs to add new Fire Stations at a faster pace, as there is a huge gap both in urban and rural areas.
- To have a Computerization of Rajasthan Fire Services, training of fire personnel in use of computers is most important aspect, which is very important from the modernization point of view.
- Online Vehicle tracking through GPS and development of a fully computerized response system is another area for improvement.
- Though fire services in the State are creating public awareness programs for schools, colleges, shopping malls, cinema halls Govt. offices, etc. however, it is not

to the desired level. For that purpose sufficient manpower at senior officer levels are recommended to have an effective 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 be repeated in future. The State should have a dedicated “Education Van” in each district for the purpose. The van should be equipped with short video films as produced by MHA, distribution of pamphlets on “DO”s and “DON’T”s generated by MHA and DFS, and live demonstration of how to use “portable extinguishers” and handle small fires.

- Periodic fire drills and fire-inspection of important buildings, such as schools, hospitals, multi-storied buildings, and major industrial centres should be taken care by the State fire services.
- Fire fighting vehicles should not be diverted for cleaning drains, sever linings, and water supply. This may delay the response, in case; there is a fire incidence during that time. Such use of fire vehicles should be discouraged at all levels, as a small fire incident can turn into a major fire disaster.
- 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.
- As emphasized in section 8.3.3 (manpower gap analysis), the Rajasthan States is having Municipal Fire Services and there is not much coordination among them at State level. At Municipal level, fire service does not have promotional avenues, and fire officer is struck up at the level of Chief Fire Office. Hence, 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. Moreover, there is no uniformity on the applicability of building by-laws on fire safety and Municipalities can deviate from the applicability of National Building Code of fire safety (NBC). Each Municipality cannot be made self sufficient in isolation to deal with serious nature of fire emergency, and in general, municipalities do not have mutual aid schemes. Hence, because of these reasons, RMSI team recommends that Municipal fire services should come under State fire services. Accordingly, a hierarchy should be created to have proper co-ordination at all levels as suggested in section 8.3.3.
- Audit by a central authority should be carried out routinely to ensure good finance mechanism for capital, and O&M expenditures.
-

Table 8-44: Details of operational and new proposed urban Fire Stations with their estimated ideally served population under ideal jurisdiction, population density, and Fire Station priority ranking

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Ajmer	RJ811	Kishangarh Fire Station	KISHANGARH (M)	Operational	216,987	17,262	4.54	
Ajmer	RJ426	Azad Park Fire Station	AJMER (M CORP)	Operational	64,604	13,348	0.12	
Ajmer	RJ459	Ajmer Civil Defence Fire Station	AJMER (M CORP)	Operational	104,174	9,170	0.12	
Ajmer	RJ851	Beawar Fire Station	BEAWAR (M CL)	Operational	104,865	7,043	2.61	
Ajmer	RJ797	Delhi Gate Fire Station (Not Operational)	AJMER (M CORP)	Operational	149,097	5,840	1.49	
Ajmer	RJ798	Sendhriya Fire Station (Not Operational)	AJMER (M CORP)	Operational	48,593	5,677	2.65	
Ajmer	RJ803	Kekdi Fire Station	KEKRI (M)	Operational	62,093	2,662	12.11	
Ajmer	RJ428	Pushkar Fire Station	PUSHKAR (M)	Operational	31,040	951	7.17	
Ajmer	New 12	New_Urban_NEAR N.R.L. FILLING STATION_KISHANGARH	KISHANGARH (M)	New Urban	183,222	16,301	4.54	41
Ajmer	New 7	New_Urban_NEAR PARSHVANATH HOSPITAL_BEAWAR	BEAWAR (M CL)	New Urban	144,187	8,928	2.61	49
Ajmer	New 11	New_Urban_NEAR KISAN BHAWAN_AJMER	AJMER (M CORP)	NewUrban	104,145	8,460	3.60	50
Ajmer	New 10	New_Urban_GULAB BARI_AJMER	AJMER (M CORP)	New Urban	68,606	6,497	2.65	59
Ajmer	New 14	New_Urban_SARWAR (M)	SARWAR (M)	New Urban	71,625	4,400	7.37	63
Ajmer	New 9	New_Urban_BALDEV NAGAR_AJMER	AJMER (M CORP)	New Urban	36,916	4,323	3.16	64
Alwar	New 17	New_Urban_PAPARI ROAD_ALWAR	ALWAR (M CORP)	New Urban	244,897	15,599	2.37	7
Alwar	RJ740	Khairthal Fire Station	KHAIRTHAL (M)	Operational	54,099	11,462	9.33	

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Alwar	RJ752	Alwar Civil Defence Fire Station	ALWAR (M CORP)	Operational	79,215	11,447	1.21	
Alwar	RJ776	Kherli Fire Station	KHERLI (M)	Operational	24,494	10,984	12.86	
Alwar	RJ731	Alwar Fire Station	ALWAR (M CORP)	Operational	90,966	10,063	1.21	
Alwar	RJ750	Rajgarh Fire Station	RAJGARH (M)	Operational	45,664	4,166	16.03	
Alwar	RJ742	Behrore Fire Station	BEHROR (M)	Operational	89,952	2,505	6.75	
Alwar	RJ739	Riico Fire station, MIA alwar	ALWAR (M CORP)	Operational	26,903	1,546	7.05	
Alwar	New 22	New_Urban_DAUDPUR_ALWAR	ALWAR (M CORP)	New Urban	168,592	14,789	2.37	10
Alwar	New 20	New_Urban_BHIWADI (CT)	BHIWADI (CT)	New Urban	291,344	13,808	11.45	12
Banswara	RJ795	Kushalgadh Fire Station	KUSHALGARH (M)	Operational	12,130	24,259	27.45	
Banswara	RJ791	Mai Sarover Nagar Fire Station (Not Operational)	BANSWARA (M)	Operational	41,317	4,368	1.71	
Banswara	RJ784	Banswara Fire Station	BANSWARA (M)	Operational	83,141	4,272	1.71	
Banswara	New 28	New_Urban_PARTAPUR (CT)	PARTAPUR (CT)	New Urban	34,708	2,883	6.19	107
Baran	RJ761	Baran Fire Station	BARAN (M)	Operational	92,658	14,825	1.98	
Baran	RJ770	Chabra Fire Station	CHHABRA (M)	Operational	23,291	7,301	14.51	
Baran	New 31	New_Urban_BARAN(EAST)_BARAN	BARAN (M)	New Urban	163,494	9,567	1.98	77
Baran	New 32	New_Urban_ANTAH (M)	ANTAH (M)	New Urban	39,906	1,128	7.70	99
Barmer	RJ804	Adarsh Stadium Fire Station	BARMER (M)	Operational	178,251	13,372	0.45	
Barmer	RJ806	Balotra Fire Station	BALOTRA (M)	Operational	187,965	8,670	3.56	
Barmer	RJ702	Barmer Civil Defence Fire Station	BARMER (M)	Operational	132,066	8,666	0.45	
Barmer	New 35	New_Urban_SIWANA	SIWANA	New Urban	38,250	7,176	10.04	82
Bharatpur	RJ769	Deeng Fire Station	DEEG (M)	Operational	66,572	10,534	11.01	
Bharatpur	RJ756	Bharatpur Civil Defence Fire	BHARATPUR (M	Operational	131,332	10,333	0.64	

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
		Station	CORP)					
Bharatpur	RJ771	Nadbhai Fire Station	NADBAI (M)	Operational	25,962	9,510	6.55	
Bharatpur	RJ768	Bharatpur Fire Station	BHARATPUR (M CORP)	Operational	121,495	8,760	0.64	
Bharatpur	RJ836	Bayana Fire Station	BAYANA (M)	Operational	50,405	2,827	3.68	
Bharatpur	New 41	New_Urban_U.I.T. COLONY_BHARATPUR	BHARATPUR (M CORP)	New Urban	166,920	7,862	2.35	80
Bhilwara	RJ727	Bhilwara Fire Station	BHILWARA (M CORP)	Operational	214,034	28,052	1.92	
Bhilwara	RJ729	Patel Nagar Fire Station, Bhilwara	BHILWARA (M CORP)	Operational	155,043	12,453	2.95	
Bhilwara	RJ765	Jahajpur Fire Station	JAHAZPUR (M)	Operational	18,391	2,709	8.71	
Bhilwara	New 45	New_Urban_R.K. COLONY_BHILWARA	BHILWARA (M CORP)	New Urban	197,395	22,406	2.12	40
Bhilwara	New 47	New_Urban_NEAR COURT_SHAHPURA	SHAHPURA (M)	New Urban	95,004	12,451	15.27	46
Bhilwara	New 46	New_Urban_CHANDRASHEKHAR AZAD NAGAR_BHILWARA	BHILWARA (M CORP)	New Urban	131,814	10,622	1.92	47
Bhilwara	New 44	New_Urban_GULABPURA (M)	GULABPURA (M)	New Urban	133,200	7,487	8.20	53
Bhilwara	New 48	New_Urban_BEEJOLIYA KALAN (CT)	BEEJOLIYA KALAN (CT)	New Urban	53,338	6,803	12.26	57
Bikaner	RJ821	Murlidhar Vyas Colony Fire Station	BIKANER (M CORP)	Operational	121,614	9,721	2.44	
Bikaner	RJ716	Bikaner Civil Defence Fire Station	BIKANER (M CORP)	Operational	59,961	9,126	2.33	
Bikaner	RJ862	Nokha Fire Station	NOKHA (M)	Operational	99,314	2,981	20.55	

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Bikaner	RJ864	Deshnok Fire Station	DESHNOKE (M)	Operational	18,793	1,908	8.81	
Bikaner	RJ822	Bichauli Fire Station	BIKANER (M CORP)	Operational	34,249	1,443	4.90	
Bikaner	New 55	New_Urban_OLD CITY RAMPURIYA_BIKANER	BIKANER (M CORP)	New Urban	146,837	22,943	2.44	39
Bikaner	New 52	New_Urban_GANGASHAHR_BIKANER	BIKANER (M CORP)	New Urban	129,418	14,962	2.95	42
Bikaner	New 56	New_Urban_LUKHRANSAR	LUKHRANSAR	New Urban	98,124	13,066	11.21	43
Bikaner	New 51	New_Urban_MUKTA PRASAD COLONY_BIKANER	BIKANER (M CORP)	New Urban	156,705	12,771	3.27	44
Bikaner	New 53	New_Urban_PANCH MUKH_BIKANER	BIKANER (M CORP)	New Urban	118,521	8,046	2.33	52
Bikaner	New 57	New_Urban_NAPASAR	NAPASAR	New Urban	43,683	7,057	12.04	56
Bikaner	New 54	New_Urban_RAJEEV COLONY_BIKANER	BIKANER (M CORP)	New Urban	135,120	4,154	3.09	65
Bundi	RJ778	Lakheri Fire Station	LAKHERI (M)	Operational	100,578	10,048	6.53	
Bundi	RJ807	Bundi Fire Station	BUNDI (M)	Operational	137,862	6,321	9.55	
Bundi	New 66	New_Urban_DEYI	DEYI	New Urban	45,994	20,625	8.14	103
Bundi	New 63	New_Urban_NAINWA (M)	NAINWA (M)	New Urban	45,581	12,454	11.91	105
Chittaurgarh	RJ757	Chittaurgarh Municipal Corporation Fire Station	CHITTAURGARH (M)	Operational	92,197	9,285	1.82	
Chittaurgarh	RJ774	Nembahera Fire Station	NIMBAHERA (M)	Operational	169,695	6,655	12.41	
Chittaurgarh	RJ733	Rawatbhata Fire Station	RAWATBHATA (M)	Operational	89,687	3,934	8.39	
Chittaurgarh	RJ772	Chittaurgarh Gramin Fire Station	CHITTAURGARH (M)	Operational	33,065	2,836	3.02	
Chittaurgarh	New 68	New_Urban_CHANDERIYA_CHIT	CHITTAURGARH	New Urban	125,159	4,285	5.22	87

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
		TAURGARH	(M)					
Chittaurgarh	New 67	New_Urban_CHANDANPURA_CHITTAURGARH	CHITTAURGARH (M)	New Urban	99,234	4,027	1.82	89
Churu	RJ819	Churu Fire Station	CHURU (M)	Operational	161,281	7,806	9.21	
Churu	RJ706	Sardarshahar Fire station	SARDARSHAHAR (M)	Operational	91,951	7,275	14.16	
Churu	RJ721	Sujangarh Fire Station	SUJANGARH (M)	Operational	100,664	6,720	10.13	
Churu	New 79	New_Urban_RATANGARH (M)	RATANGARH (M)	New Urban	106,068	13,325	14.24	73
Churu	New 78	New_Urban_TARANAGAR (M)	TARANAGAR (M)	New Urban	59,212	12,336	14.74	75
Churu	New 77	New_Urban_NEAR KASAAN E NAGORI_RAJGARH	RAJGARH (M)	New Urban	84,285	9,688	12.32	76
Churu	New 80	New_Urban_RAJALDESAR (M)	RAJALDESAR (M)	New Urban	42,966	8,787	15.15	79
Churu	New 76	New_Urban_DUNGARGARH (M)	DUNGARGARH (M)	New Urban	64,456	6,092	13.61	84
Churu	New 82	New_Urban_SAHAWA	SAHAWA	New Urban	39,892	4,492	18.26	86
Churu	New 81	New_Urban_CHHAPAR (M)	CHHAPAR (M)	New Urban	87,538	3,390	8.02	92
Dausa	RJ793	Dausa Fire Station	DAUSA (M)	Operational	98,952	10,721	2.54	
Dausa	RJ794	Bandikui Fire Station	BANDIKUI (M)	Operational	101,752	6,875	8.99	
Dausa	RJ762	Lalsot Fire Station	LALSOT (M)	Operational	24,783	6,404	10.82	
Dausa	New 83	New_Urban_NEAR POST OFFICE_DAUSA	DAUSA (M)	New Urban	118,917	6,614	2.54	83
Dhaulpur	RJ840	Dhaulpur Fire Station	DHAULPUR (M)	Operational	185,931	11,643	4.94	
Dhaulpur	New 89	New_Urban_BARI (M)	BARI (M)	New Urban	88,389	2,737	11.21	108
Dungarpur	RJ812	Dungarpur Fire Station	DUNGARPUR (M)	Operational	153,779	14,345	6.85	
Dungarpur	New 91	New_Urban_SAGWARA (M)	SAGWARA (M)	New Urban	74,474	13,135	6.45	104

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Ganganagar	New 101	New_Urban_RIDHI SIDHI_GANGANAGAR	GANGANAGAR (M CORP)	New Urban	119,263	5,478	3.75	25
Ganganagar	New 94	New_Urban_GHARSANA	GHARSANA	New Urban	37,662	5,049	10.95	27
Ganganagar	New 100	New_Urban_LALGARH JATTAN	LALGARH JATTAN	New Urban	75,032	4,646	10.95	29
Ganganagar	New 92	New_Urban_SADHUWALA_GANGANAGAR	GANGANAGAR (M CORP)	New Urban	44,198	4,081	3.45	30
Ganganagar	New 93	New_Urban_ANUPGARH (M)	ANUPGARH (M)	New Urban	42,213	2,403	12.85	37
Ganganagar	RJ859	Ganganagar Fire station	GANGANAGAR (M CORP)	Operational	114,932	11,539	0.48	
Ganganagar	RJ738	Sriganganagar Civil Defence Fire Station	GANGANAGAR (M CORP)	Operational	58,281	8,006	0.48	
Ganganagar	RJ746	Suratgarh Civil Defence Fire Station	SURATGARH (M)	Operational	41,291	4,875	1.52	
Ganganagar	RJ817	Raisingh Nagar Fire Station	RAISINGHNAGAR (M)	Operational	58,365	2,268	13.94	
Ganganagar	RJ818	Suratgarh Fire Station	SURATGARH (M)	Operational	27,891	1,955	1.52	
Ganganagar	RJ852	Karanpur Fire Station	KARANPUR (M)	Operational	26,439	1,827	11.47	
Ganganagar	RJ825	Padampur Fire Station	PADAMPUR (M)	Operational	21,786	879	9.24	
Hanumangarh	RJ837	Sangaria Fire Station	SANGARIA (M)	Operational	44,068	6,907	6.02	
Hanumangarh	RJ854	Hanumangarh Fire Station	HANUMANGARH (M)	Operational	55,991	6,305	6.16	
Hanumangarh	RJ834	Nohar Fire Station	NOHAR (M)	Operational	49,833	6,048	11.24	
Hanumangarh	RJ844	Bhadra Fire Station	BHADRA (M)	Operational	37,618	4,299	11.81	
Hanumangarh	New 102	New_Urban_RAWATSAR (M)	RAWATSAR (M)	New Urban	64,769	5,883	14.92	60
Hanumangarh	New 108	New_Urban_COURT ROAD_HANUMANGARH	HANUMANGARH (M)	New Urban	143,623	5,200	6.16	61

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Hanumangarh	New 109	New_Urban_RAMPURA	RAMPURA	New Urban	102,257	2,678	8.45	69
Jaipur	New 152	New_Urban_SHYAM NAGAR_JAIPUR	JAIPUR (M CORP)	New Urban	268,144	26,392	2.46	1
Jaipur	New 111	New_Urban_TAGORE NAGAR_JAIPUR	JAIPUR (M CORP)	New Urban	227,432	24,883	1.82	2
Jaipur	New 141	New_Urban_SHASTRI NAGAR_JAIPUR	JAIPUR (M CORP)	New Urban	184,835	24,067	2.11	3
Jaipur	New 150	New_Urban_JHOTWARA_JAIPUR	JAIPUR (M CORP)	New Urban	193,065	20,132	2.45	4
Jaipur	New 117	New_Urban_MOJI NAGAR_JAIPUR	JAIPUR (M CORP)	New Urban	336,612	17,044	2.88	5
Jaipur	New 112	New_Urban_BAPU NAGAR_JAIPUR	JAIPUR (M CORP)	New Urban	210,946	16,728	2.57	6
Jaipur	New 153	New_Urban_VEER VIHAR_JAIPUR	JAIPUR (M CORP)	New Urban	151,243	15,155	2.40	8
Jaipur	New 142	New_Urban_KAGDIWARA_JAIPUR	JAIPUR (M CORP)	New Urban	218,108	14,837	3.35	9
Jaipur	New 118	New_Urban_SITAPURA_JAIPUR	JAIPUR (M CORP)	New Urban	163,393	14,733	2.83	11
Jaipur	New 149	New_Urban_SANGANER_JAIPUR	JAIPUR (M CORP)	New Urban	276,445	12,325	2.83	13
Jaipur	New 154	New_Urban_ANAND NAGAR_JAIPUR	JAIPUR (M CORP)	New Urban	148,017	11,747	2.40	14
Jaipur	New 145	New_Urban_PHULERA (M)	PHULERA (M)	New Urban	79,532	10,985	6.80	15
Jaipur	New 139	New_Urban_GOPALPURA BYPASS_JAIPUR	JAIPUR (M CORP)	New Urban	184,015	10,240	2.77	16
Jaipur	New 151	New_Urban_ARUN VIHAR_JAIPUR	JAIPUR (M CORP)	New Urban	142,456	8,495	3.22	17
Jaipur	New 146	New_Urban_MANOHARPURA_JAIPUR	JAIPUR (M CORP)	New Urban	134,830	7,665	3.17	18
Jaipur	New 144	New_Urban_KOTPUTLI (M)	KOTPUTLI (M)	New Urban	56,088	7,322	10.57	19

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Jaipur	New 147	New_Urban_KISHANGARH RENWAL (M)	KISHANGARH RENWAL (M)	New Urban	49,759	7,129	13.05	20
Jaipur	New 140	New_Urban_V.K. INDUS. AREA_JAIPUR	JAIPUR (M CORP)	New Urban	166,108	6,752	2.83	22
Jaipur	New 148	New_Urban_DUDU	DUDU	New Urban	45,804	3,990	9.66	31
Jaipur	New 143	New_Urban_NEAR ICFAI UNIV._JAIPUR	JAIPUR (M CORP)	New Urban	104,186	3,415	2.90	33
Jaipur	RJ446	Jaipur City Civil Defence Fire Station	JAIPUR (M CORP)	Operational	148,806	31,594	0.04	
Jaipur	RJ412	Ghat Gate Fire Station	JAIPUR (M CORP)	Operational	177,896	28,282	2.94	
Jaipur	RJ448	Jaipur Collectrate Civil Defence Fire Station	JAIPUR (M CORP)	Operational	56,712	26,751	0.04	
Jaipur	RJ414	22 Godam Fire Station	JAIPUR (M CORP)	Operational	171,316	22,542	1.82	
Jaipur	RJ419	Vishwakarma Fire Station	JAIPUR (M CORP)	Operational	171,940	20,666	2.83	
Jaipur	RJ421	Mansarovar Fire Station	JAIPUR (M CORP)	Operational	180,424	17,021	3.50	
Jaipur	RJ751	Chaumu Fire Station	CHOMU (M)	Operational	60,688	15,641	9.72	
Jaipur	RJ410	Banipark Fire Station	JAIPUR (M CORP)	Operational	99,132	12,925	2.11	
Jaipur	RJ711	Sambharlake Fire Station	SAMBHAR (M)	Operational	166,987	6,533	6.80	
Jaipur	RJ813	Chaksu Fire Station	CHAKSU (M)	Operational	33,637	4,335	8.27	
Jaipur	RJ422	Sitapura Fire Station	JAIPUR (M CORP)	Operational	32,009	3,138	3.17	
Jaipur	RJ814	Bagru Fire Station	BAGRU (M)	Operational	21,089	2,143	11.43	
Jaipur	RJ755	Shahpura Fire Station	SHAHPURA (M)	Operational	23,135	1,875	12.89	
Jaipur	RJ423	Amer Fire Station	JAIPUR (M CORP)	Operational	49,973	1,649	4.89	
Jaisalmer	RJ853	Jaisalmer Fire Station	JAISALMER (M)	Operational	30,543	1,969	1.91	
Jaisalmer	RJ856	Pokhran Fire Station	POKARAN (M)	Operational	29,044	1,099	10.91	

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Jaisalmer	RJ703	Jaiselmer Civil Defence Fire Station	JAISALMER (M)	Operational	9,850	794	1.91	
Jalor	RJ843	Sanchore Fire Station	SANCHORE (M)	Operational	49,520	4,822	7.25	
Jalor	RJ842	Bhinmal Fire Station	BHINMAL (M)	Operational	80,073	4,008	13.15	
Jalor	RJ808	Jalore Fire Station	JALOR (M)	Operational	81,948	3,936	16.01	
Jhalawar	RJ737	Jhalanwar Fire Station	JHALAWAR (M)	Operational	75,516	5,674	5.66	
Jhunjhunun	RJ848	Jhunjhunu Fire Station	JHUNJHUNUN (M)	Operational	106,025	12,415	2.23	
Jhunjhunun	RJ841	Pilani Fire Station	PILANI	Operational	121,681	7,906	10.66	
Jhunjhunun	RJ719	Navalgarh Fire station	NAWALGARH (M)	Operational	54,180	3,572	12.28	
Jhunjhunun	New 202	New_Urban_NEAR POLICE STATION_JHUNJHUNUN	JHUNJHUNUN (M)	New Urban	100,003	9,058	2.23	78
Jhunjhunun	New 204	New_Urban_CHIRAWA (M)	CHIRAWA (M)	New Urban	109,179	4,106	11.21	88
Jhunjhunun	New 205	New_Urban_GOTHRA (CT)	GOTHRA (CT)	New Urban	75,197	3,898	10.94	90
Jhunjhunun	New 203	New_Urban_BAGGAR (M)	BAGGAR (M)	New Urban	69,061	3,681	7.98	91
Jodhpur	New 209	New_Urban_KABIR NAGAR_JODHPUR	JODHPUR (M CORP)	New Urban	113,097	7,077	3.68	21
Jodhpur	New 208	New_Urban_ASHOK UDHYAN_JODHPUR	JODHPUR (M CORP)	New Urban	103,904	5,874	2.76	24
Jodhpur	New 210	New_Urban_MALVIYA NAGAR_JODHPUR	JODHPUR (M CORP)	New Urban	38,763	3,553	3.11	32
Jodhpur	New 213	New_Urban_SARAN NAGAR_JODHPUR	JODHPUR (M CORP)	New Urban	59,073	2,781	4.50	36
Jodhpur	RJ801	Nagori Gate Fire Station	JODHPUR (M CORP)	Operational	122,233	11,844	1.09	
Jodhpur	RJ799	Shashtri Nagar Fire Station	JODHPUR (M CORP)	Operational	101,285	11,009	3.49	

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Jodhpur	RJ701	Jodhpur Civil Defence Fire Station	JODHPUR (M CORP)	Operational	75,379	6,754	1.09	
Jodhpur	RJ800	Basni Fire Station	JODHPUR (M CORP)	Operational	99,869	5,713	3.11	
Jodhpur	RJ858	Phalodi Fire Station	PHALODI (M)	Operational	129,922	3,765	8.78	
Jodhpur	RJ827	Peepadshahar Fire Station	PIPAR CITY (M)	Operational	84,915	3,719	9.17	
Jodhpur	RJ802	Mandor Fire Station	MANDOR	Operational	77,417	2,694	7.03	
Jodhpur	RJ823	Bilara Fire Station	BILARA (M)	Operational	22,218	288	10.68	
Karauli	RJ763	Karauli Fire Station	KARAULI (M)	Operational	133,673	6,483	11.96	
Karauli	New 215	New_Urban_HINDAUN (M)	HINDAUN (M)	New Urban	107,952	7,909	6.24	106
Kota	New 217	New_Urban_S.G. NAGAR_KOTA	KOTA (M CORP)	New Urban	48,518	6,583	2.74	23
Kota	New 216	New_Urban_R.K. PURAM_KOTA	KOTA (M CORP)	New Urban	65,045	5,411	1.04	26
Kota	New 218	New_Urban_J.K. COLONY_KOTA	KOTA (M CORP)	New Urban	74,879	4,952	2.74	28
Kota	New 220	New_Urban_RAILWAY COLONY_KOTA	KOTA (M CORP)	New Urban	98,799	3,179	4.92	34
Kota	New 219	New_Urban_KUNARI_KOTA	KOTA (M CORP)	New Urban	97,152	2,946	2.14	35
Kota	New 223	New_Urban_MORAK	UDPURA (CT)	New Urban	28,874	879	8.56	38
Kota	RJ714	Kota Civil Defence Fire Station	KOTA (M CORP)	Operational	118,917	13,039	1.04	
Kota	RJ865	Sreenathpuram	KOTA (M CORP)	Operational	91,408	8,599	2.14	
Kota	RJ735	Ramganj Mandi Fire Station	RAMGANJ MANDI (M)	Operational	81,308	1,487	5.65	
Nagaur	New 230	New_Urban_NEAR BUS STAND_NAGAUR	NAGAUR (M)	New Urban	147,399	10,322	2.21	48
Nagaur	New 225	New_Urban_LADNU (M)	LADNU (M)	New Urban	71,602	7,175	9.70	54

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Nagaur	New 226	New_Urban_DIDWANA (M)	DIDWANA (M)	New Urban	95,370	6,711	15.26	58
Nagaur	New 229	New_Urban_GOREDI CHANCHA (CT)	GOREDI CHANCHA (CT)	New Urban	44,548	3,978	15.52	67
Nagaur	New 233	New_Urban_GOTAN	GOTAN	New Urban	52,429	2,256	15.87	70
Nagaur	RJ860	Nagaur Fire Station	NAGAUR (M)	Operational	112,672	17,633	2.21	
Nagaur	RJ710	Makrana Fire station	MAKRANA (M)	Operational	184,581	7,227	11.53	
Nagaur	RJ846	Medtacity Fire Station	MERTA CITY (M)	Operational	178,304	6,579	13.93	
Nagaur	RJ724	Kuchaman City Fire Station	KUCHAMAN CITY (M)	Operational	50,603	6,422	10.81	
Pali	New 236	New_Urban_NEAR B.S.N.L. OFFICE_PALI	PALI (MCI)	New Urban	30,389	4,793	2.59	62
Pali	New 237	New_Urban_TAKHATGARH (M)	TAKHATGARH (M)	New Urban	32,398	1,606	14.48	71
Pali	RJ849	Jaitaran Fire Station	JAITARAN (M)	Operational	30,150	11,641	7.89	
Pali	RJ777	Pali Fire Station	PALI (MCI)	Operational	109,878	8,413	2.59	
Pali	RJ745	Sumerpur Fire Station	SUMERPUR (M)	Operational	54,468	6,716	1.91	
Pali	RJ830	Sojat Fire Station	SOJAT (M)	Operational	84,982	5,688	9.33	
Pali	RJ786	Shivaji Nagar Fire Station	PALI (MCI)	Operational	60,845	4,783	2.63	
Pali	RJ712	Bali Fire station	BALI (M)	Operational	53,961	2,981	7.09	
Pali	RJ718	Khudla Falna Fire station	FALNA (M)	Operational	43,094	1,360	6.40	
Pratapgarh	RJ767	Partapgarh Fire Station	PRATAPGARH (M)	Operational	70,815	7,921	12.33	
Pratapgarh	New 241	New_Urban_NIMACH	NIMACH	New Urban	64,081	21,079	8.11	102
Rajsamand	RJ715	Rajsamand Fire Station	RAJSAMAND (M)	Operational	62,439	3,859	4.55	
Rajsamand	RJ789	Devgarh Fire Station	DEOGARH (M)	Operational	37,230	1,633	12.05	
Rajsamand	New 244	New_Urban_NATHDWARA (M)	NATHDWARA (M)	New Urban	59,292	2,568	10.33	93

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Rajsamand	New 242	New_Urban_AMET (M)	AMET (M)	New Urban	36,008	917	7.68	101
Sawai Madhopur	New 245	New_Urban_NEAR KOTWALI_SAWAI MADHOPUR	SAWAI MADHOPUR (M)	New Urban	134,910	7,605	3.44	81
Sawai Madhopur	RJ780	Madhopur Fire Station	SAWAI MADHOPUR (M)	Operational	134,400	12,632	3.44	
Sawai Madhopur	RJ758	Gangapur City Fire Station	GANGAPUR CITY (M)	Operational	147,066	4,780	10.49	
Sikar	New 248	New_Urban_RAILWAY COLONY_SIKAR	SIKAR (M CL)	New Urban	181,457	22,374	2.83	72
Sikar	New 247	New_Urban_LACHHMANGARH (M)	LACHHMANGARH (M)	New Urban	87,382	12,738	10.17	74
Sikar	New 135	New_Urban_NEEM-KA-THANA (M)	NEEM-KA-THANA (M)	New Urban	106,027	5,769	13.19	85
Sikar	New 136	New_Urban_SRI MADHOPUR (M)	SRI MADHOPUR (M)	New Urban	45,781	2,362	11.14	94
Sikar	New 246	New_Urban_RAMGARH (M)	RAMGARH (M)	New Urban	80,574	2,302	9.96	95
Sikar	RJ839	Sikar (RIICO) Fire Station	SIKAR (M CL)	Operational	104,946	13,629	4.52	
Sikar	RJ820	Fatehpur Fire Station	FATEHPUR (M)	Operational	139,635	12,846	9.16	
Sikar	RJ838	Nehru Park Fire Station	SIKAR (M CL)	Operational	90,554	10,073	2.83	
Sikar	New 134	New_Urban_KHANDELA (M)	KHANDELA (M)	New Urban	40,956	1,785	14.22	96
Sikar	New 137	New_Urban_REENGUS (M)	REENGUS (M)	New Urban	35,819	1,575	11.14	97
Sikar	New 133	New_Urban_LOSAL (M)	LOSAL (M)	New Urban	45,274	935	11.99	100
Sirohi	New 138	New_Urban_PINDWARA (M)	PINDWARA (M)	New Urban	63,850	1,172	8.00	98
Sirohi	RJ753	Sirohi Fire Station	SIROHI (M)	Operational	105,409	10,395	8.78	
Sirohi	RJ741	Sheoganj Fire Station	SHEOGANJ (M)	Operational	80,189	5,927	1.91	
Sirohi	RJ743	Mount Abu Fire Station	MOUNT ABU (M)	Operational	41,049	4,982	7.78	

District	FS Ref No	Name	TOWN CITY Name	Operational Type	Population (Est)	Pop density	Arial distance (in km) to nearest Fire Station	Priority Ranking
Sirohi	RJ730	Abu road Fire Station	ABU ROAD (M)	Operational	98,982	3,883	7.63	
Tonk	RJ810	Malpura Fire Station	MALPURA (M)	Operational	100,170	10,771	8.76	
Tonk	RJ796	Tonk Fire Station	TONK (M CI)	Operational	164,701	7,714	8.43	
Tonk	RJ805	Deoli Fire Station	DEOLI (M)	Operational	64,862	3,414	10.15	
Tonk	RJ809	Niwai Fire Station	NIWAI (M)	Operational	77,517	3,252	7.51	
Udaipur	New 250	New_Urban_SHAVRI COLONY_UDAIPUR	UDAIPUR (M CORP)	New Urban	92,049	12,644	3.71	**45**
Udaipur	New 252	New_Urban_HIRAN MAGRI_UDAIPUR	UDAIPUR (M CORP)	New Urban	191,859	8,356	4.31	**51**
Udaipur	New 251	New_Urban_AHINSA PURI_UDAIPUR	UDAIPUR (M CORP)	New Urban	151,564	7,149	2.79	**55**
Udaipur	New 253	New_Urban_BHINDER (M)	BHINDER (M)	New Urban	46,660	3,609		**68**
Udaipur	RJ815	Udaipur Fire Station	UDAIPUR (M CORP)	Operational	194,258	19,253	2.79	
Udaipur	RJ816	Prohit madri Fire Station	UDAIPUR (M CORP)	Operational	133,199	9,117	4.79	

Table 8-45: Details of operational and new proposed rural Fire Stations with estimated ideally served population and population density, and Fire Station priority ranking

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Ajmer	New Ru 18	Jethana	New Rural FS	66,126	188	187
Ajmer	New Ru 22	Kayar	New Rural FS	28,074	178	192
Ajmer	New Ru 14	Sathana	New Rural FS	37,940	165	202
Ajmer	New Ru 3	Near Vill Churli	New Rural FS	49,403	164	204
Ajmer	New Ru 20	Saradhna	New Rural FS	63,052	154	210
Ajmer	New Ru 5	Silora	New Rural FS	62,063	151	212
Ajmer	New Ru 21	Bir	New Rural FS	29,134	146	217
Ajmer	New Ru 10	Sawar	New Rural FS	54,073	145	218
Ajmer	New Ru 1	Rupnagar	New Rural FS	47,804	141	222
Ajmer	New Ru 6	Kaser	New Rural FS	40,712	137	223
Ajmer	New Ru 11	Kadera	New Rural FS	35,898	137	224
Ajmer	New Ru 8	Fatehgarh	New Rural FS	60,702	131	229
Ajmer	New Ru 16	Bandanwara	New Rural FS	72,430	127	234
Ajmer	New Ru 2	Kuchil	New Rural FS	35,232	126	236
Ajmer	New Ru 4	Arain	New Rural FS	48,004	123	239
Ajmer	New Ru 13	Jalia	New Rural FS	42,148	119	242
Ajmer	New Ru 9	Baghera	New Rural FS	35,177	105	256
Ajmer	New Ru 19	Pisangan	New Rural FS	36,997	96	261
Ajmer	New Ru 17	Gohona Aticmand	New Rural FS	31,281	94	263
Ajmer	New Ru 7	Ramsar	New Rural FS	35,919	92	267
Ajmer	New Ru 12	Champaneri	New Rural FS	33,388	73	291

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Ajmer	New Ru 15	Masuda	New Rural FS	38,012	68	297
Alwar	New Ru 35	Golawas	New Rural FS	217,492	834	1
Alwar	New Ru 24	Nimrana	New Rural FS	145,346	770	2
Alwar	New Ru 33	Nathu Ki Dhani	New Rural FS	211,625	746	3
Alwar	New Ru 36	Karora	New Rural FS	156,113	589	6
Alwar	New Ru 28	Narayanpur	New Rural FS	133,934	441	8
Alwar	New Ru 25	Dahan	New Rural FS	71,919	400	10
Alwar	New Ru 27	Tatarpur	New Rural FS	101,245	379	13
Alwar	New Ru 26	Bansur	New Rural FS	117,214	346	15
Alwar	New Ru 31	Kot Qasim	New Rural FS	89,177	346	16
Alwar	New Ru 43	Tapukrah	New Rural FS	105,874	345	17
Alwar	New Ru 42	Kathumar	New Rural FS	145,864	330	19
Alwar	New Ru 23	Jhirl	New Rural FS	89,120	323	20
Alwar	New Ru 34	Govindgarh	New Rural FS	61,167	321	23
Alwar	New Ru 29	Thana Ghazi	New Rural FS	104,315	290	29
Alwar	New Ru 39	Chikani	New Rural FS	70,053	278	33
Alwar	New Ru 32	Tijara	New Rural FS	95,446	267	39
Alwar	New Ru 30	Maujpur	New Rural FS	116,183	256	43
Alwar	New Ru 38	Malakhera	New Rural FS	151,546	244	46
Alwar	New Ru 40	Chowki	New Rural FS	102,670	212	64
Alwar	New Ru 44	Dilawarpur	New Rural FS	32,893	189	78
Alwar	New Ru 41	Tehla	New Rural FS	111,988	156	94
Alwar	New Ru 37	Kishangarh(Alwar)	New Rural FS	62,692	150	100

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Alwar	New Ru 45	Badrinagar	New Rural FS	38,252	109	132
Alwar	New Ru 892	Garhi	New Rural FS	43,781	89	144
Banswara	New Ru 50	Talwara	New Rural FS	47,398	289	549
Banswara	New Ru 47	Sakariya	New Rural FS	46,040	246	559
Banswara	New Ru 46	Lohariya	New Rural FS	45,602	213	568
Banswara	New Ru 48	Lokia	New Rural FS	48,970	178	579
Banswara	New Ru 49	Barodia	New Rural FS	45,184	130	617
Banswara	New Ru 51	Nauka	New Rural FS	48,190	122	620
Banswara	New Ru 52	Ghatol	New Rural FS	48,458	109	625
Baran	New Ru 53	Mangrol	New Rural FS	91,116	285	353
Baran	New Ru 65	Khajurna Kalan	New Rural FS	76,121	251	366
Baran	New Ru 54	Sarkanya	New Rural FS	114,399	248	369
Baran	New Ru 57	Rani Barod	New Rural FS	87,125	210	383
Baran	New Ru 64	Bamla	New Rural FS	68,281	204	388
Baran	New Ru 60	Atru	New Rural FS	59,846	180	400
Baran	New Ru 61	Kawai	New Rural FS	49,341	141	428
Baran	New Ru 66	Motpur	New Rural FS	41,828	141	429
Baran	New Ru 62	Barod	New Rural FS	94,051	112	441
Baran	New Ru 55	Relawan	New Rural FS	39,494	98	454
Baran	New Ru 63	Titarkheri	New Rural FS	50,179	96	455
Baran	New Ru 56	Jetpura	New Rural FS	42,031	92	459
Baran	New Ru 59	Kelwara	New Rural FS	48,686	81	472
Baran	New Ru 58	Hanoutiya	New Rural FS	42,029	37	513

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Barmer	New Ru 96	Jasol	New Rural FS	76,096	2,789	324
Barmer	New Ru 90	Sarup Ka Tala	New Rural FS	103,269	168	406
Barmer	New Ru 85	Samdari	New Rural FS	153,253	161	412
Barmer	New Ru 84	Mokalsar	New Rural FS	85,495	148	421
Barmer	New Ru 67	Gadra Road	New Rural FS	101,316	131	432
Barmer	New Ru 69	Harsani	New Rural FS	106,180	128	433
Barmer	New Ru 86	Kalanpur	New Rural FS	65,028	115	438
Barmer	New Ru 68	Ranasar	New Rural FS	113,830	112	442
Barmer	New Ru 71	Bijliar	New Rural FS	87,969	100	451
Barmer	New Ru 74	Padardi	New Rural FS	123,447	92	460
Barmer	New Ru 78	Shiv	New Rural FS	76,944	87	467
Barmer	New Ru 70	Sankli	New Rural FS	59,910	78	475
Barmer	New Ru 77	Marudi	New Rural FS	79,370	76	477
Barmer	New Ru 72	Chauhtan	New Rural FS	70,923	72	478
Barmer	New Ru 92	Sar Ka Par	New Rural FS	64,259	72	479
Barmer	New Ru 73	Sirwa	New Rural FS	90,344	71	480
Barmer	New Ru 79	Bhadka	New Rural FS	45,241	71	481
Barmer	New Ru 87	Madli	New Rural FS	38,667	69	484
Barmer	New Ru 93	Nand	New Rural FS	55,610	64	488
Barmer	New Ru 898	Bakhasar	New Rural FS	41,739	59	493
Barmer	New Ru 76	Sindari	New Rural FS	70,657	57	494
Barmer	New Ru 75	Dhorimanna	New Rural FS	50,918	56	495
Barmer	New Ru 83	Indrana	New Rural FS	60,949	51	500

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Barmer	New Ru 89	Patodi	New Rural FS	52,400	48	505
Barmer	New Ru 88	Bagundi	New Rural FS	33,092	44	509
Barmer	New Ru 80	Kanasar	New Rural FS	44,745	36	514
Barmer	New Ru 97	Panchiya Sinli	New Rural FS	22,501	36	515
Barmer	New Ru 81	Bataru	New Rural FS	14,285	22	527
Barmer	New Ru 91	Shwaubari	New Rural FS	29,315	22	528
Barmer	New Ru 82	Baetu	New Rural FS	17,104	21	529
Barmer	New Ru 95	Mangta	New Rural FS	25,205	20	530
Barmer	New Ru 94	Daraba	New Rural FS	26,769	19	531
Bharatpur	New Ru 116	Kumher	New Rural FS	56,757	525	326
Bharatpur	New Ru 100	Brahmbad	New Rural FS	73,694	376	333
Bharatpur	New Ru 99	Wer	New Rural FS	57,573	364	334
Bharatpur	New Ru 110	Kasba-Januthar	New Rural FS	68,411	361	335
Bharatpur	New Ru 98	Jurahara	New Rural FS	51,267	343	338
Bharatpur	New Ru 117	Dharki	New Rural FS	41,457	323	340
Bharatpur	New Ru 101	Rupbas	New Rural FS	59,477	301	345
Bharatpur	New Ru 109	Near Vill Jagina	New Rural FS	64,613	296	346
Bharatpur	New Ru 105	Suthira	New Rural FS	65,214	293	349
Bharatpur	New Ru 106	Kaman	New Rural FS	48,952	281	356
Bharatpur	New Ru 103	Birampura	New Rural FS	51,098	272	359
Bharatpur	New Ru 115	Near Vill Darapur Kalan	New Rural FS	47,335	258	363
Bharatpur	New Ru 104	Luharu	New Rural FS	57,196	257	364
Bharatpur	New Ru 111	Sitara	New Rural FS	50,504	254	365

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Bharatpur	New Ru 113	Bhasawar	New Rural FS	56,127	249	367
Bharatpur	New Ru 114	Sarthala	New Rural FS	50,503	241	372
Bharatpur	New Ru 102	Uchen	New Rural FS	59,874	210	384
Bharatpur	New Ru 108	Basaia	New Rural FS	64,911	201	391
Bharatpur	New Ru 112	Pahari	New Rural FS	44,297	199	393
Bharatpur	New Ru 107	Kaithwara	New Rural FS	58,103	156	419
Bhilwara	New Ru 121	Mandal	New Rural FS	126,043	337	167
Bhilwara	New Ru 126	Agarpura	New Rural FS	118,299	233	174
Bhilwara	New Ru 127	Karui	New Rural FS	76,282	207	179
Bhilwara	New Ru 130	Bhagwanpura	New Rural FS	84,559	189	186
Bhilwara	New Ru 120	Sareru	New Rural FS	98,637	181	190
Bhilwara	New Ru 131	Bigod	New Rural FS	98,762	179	191
Bhilwara	New Ru 135	Tilasma	New Rural FS	58,628	176	193
Bhilwara	New Ru 128	Gangapur	New Rural FS	92,903	172	197
Bhilwara	New Ru 119	Asind	New Rural FS	69,908	168	199
Bhilwara	New Ru 129	Bagor	New Rural FS	59,837	143	220
Bhilwara	New Ru 118	Shambhugarh	New Rural FS	66,924	134	226
Bhilwara	New Ru 134	Raipur(Bhilwara)	New Rural FS	76,267	125	238
Bhilwara	New Ru 132	Raghunathpura	New Rural FS	61,988	118	244
Bhilwara	New Ru 122	Kanechhan Kalan	New Rural FS	86,852	111	249
Bhilwara	New Ru 133	Uperro	New Rural FS	55,119	105	257
Bhilwara	New Ru 124	Kachola	New Rural FS	81,758	92	268
Bhilwara	New Ru 125	Kotri	New Rural FS	50,717	84	276

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Bhilwara	New Ru 123	Pander	New Rural FS	80,761	82	280
Bikaner	New Ru 162	Mar	New Rural FS	54,038	110	250
Bikaner	New Ru 141	Desilsar	New Rural FS	61,388	107	255
Bikaner	New Ru 144	Jasrasar	New Rural FS	40,597	94	264
Bikaner	New Ru 153	Nauran Desar	New Rural FS	37,886	86	273
Bikaner	New Ru 142	Gajner	New Rural FS	45,371	79	282
Bikaner	New Ru 163	Molania	New Rural FS	35,638	78	285
Bikaner	New Ru 152	Kalu	New Rural FS	43,622	76	287
Bikaner	New Ru 166	Khasira	New Rural FS	68,366	76	288
Bikaner	New Ru 143	Berasar	New Rural FS	44,043	72	293
Bikaner	New Ru 161	Kesardesar	New Rural FS	38,877	72	294
Bikaner	New Ru 154	Shaikhsar	New Rural FS	53,728	71	296
Bikaner	New Ru 145	Kuchaur Athuni	New Rural FS	23,565	63	300
Bikaner	New Ru 136	Near Vill Beriyanwali	New Rural FS	70,563	62	301
Bikaner	New Ru 167	Palana	New Rural FS	38,265	61	302
Bikaner	New Ru 147	Hadda	New Rural FS	40,785	60	303
Bikaner	New Ru 151	Jamsar	New Rural FS	36,851	56	305
Bikaner	New Ru 158	Nagrajsar	New Rural FS	27,158	55	306
Bikaner	New Ru 140	Siana	New Rural FS	32,872	48	307
Bikaner	New Ru 138	Bsddju	New Rural FS	33,141	42	309
Bikaner	New Ru 150	Jaimalsar	New Rural FS	29,374	41	310
Bikaner	New Ru 139	Bithnok	New Rural FS	25,915	39	312
Bikaner	New Ru 164	Ranjitpura	New Rural FS	39,262	37	313

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Bikaner	New Ru 160	Rajasar	New Rural FS	38,264	36	314
Bikaner	New Ru 159	Jalwali	New Rural FS	26,916	33	315
Bikaner	New Ru 165	Mahajan	New Rural FS	41,230	29	316
Bikaner	New Ru 146	Panchun	New Rural FS	35,260	25	317
Bikaner	New Ru 148	Turawala	New Rural FS	25,961	24	318
Bikaner	New Ru 156	Sadolar	New Rural FS	23,948	22	319
Bikaner	New Ru 157	Pugal	New Rural FS	25,389	22	320
Bikaner	New Ru 137	Dattohar	New Rural FS	26,127	21	321
Bikaner	New Ru 149	Agneu	New Rural FS	15,677	16	322
Bikaner	New Ru 155	Lakhanwala	New Rural FS	17,436	13	323
Bundi	New Ru 170	Keshorai Patan	New Rural FS	73,627	344	541
Bundi	New Ru 168	Kapren	New Rural FS	84,656	338	542
Bundi	New Ru 176	Chharakwara	New Rural FS	66,429	259	554
Bundi	New Ru 177	Thalera	New Rural FS	104,786	233	562
Bundi	New Ru 175	Ajita	New Rural FS	63,308	194	574
Bundi	New Ru 169	Dabi	New Rural FS	52,418	169	585
Bundi	New Ru 173	Jharbalapura	New Rural FS	56,135	157	594
Bundi	New Ru 178	Satur	New Rural FS	56,808	135	611
Bundi	New Ru 179	Indargarh	New Rural FS	53,300	109	626
Bundi	New Ru 171	Bundi Ka Gothra	New Rural FS	59,210	107	628
Bundi	New Ru 180	Raitoda	New Rural FS	28,064	76	637
Bundi	New Ru 172	Dugari	New Rural FS	24,508	61	640
Bundi	New Ru 174	Gaindoli	New Rural FS	22,709	61	641

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Chittaurgarh	New Ru 183	Begun	New Rural FS	80,409	231	376
Chittaurgarh	New Ru 186	Bari	New Rural FS	170,285	205	387
Chittaurgarh	New Ru 187	Shambhupura	New Rural FS	136,813	175	402
Chittaurgarh	New Ru 188	Rasmi	New Rural FS	72,156	173	403
Chittaurgarh	New Ru 185	Bassi	New Rural FS	71,054	166	408
Chittaurgarh	New Ru 181	Bari Sadri	New Rural FS	47,869	160	413
Chittaurgarh	New Ru 192	Fatehnagar	New Rural FS	69,448	159	416
Chittaurgarh	New Ru 182	Kapasan	New Rural FS	56,249	157	418
Chittaurgarh	New Ru 195	Dungla	New Rural FS	53,321	148	422
Chittaurgarh	New Ru 197	Gangrar	New Rural FS	52,071	124	435
Chittaurgarh	New Ru 189	Singpura	New Rural FS	44,343	109	444
Chittaurgarh	New Ru 184	Khatikhera	New Rural FS	28,615	100	452
Chittaurgarh	New Ru 190	Kanera	New Rural FS	28,079	91	462
Chittaurgarh	New Ru 191	Mangarwar	New Rural FS	34,361	90	463
Chittaurgarh	New Ru 194	Javda	New Rural FS	27,186	69	485
Chittaurgarh	New Ru 198	Haripura	New Rural FS	21,765	50	502
Chittaurgarh	New Ru 196	Anushakti	New Rural FS	21,065	46	507
Churu	New Ru 216	Salasar	New Rural FS	40,710	155	420
Churu	New Ru 217	Parihara	New Rural FS	80,758	125	434
Churu	New Ru 215	Khuri	New Rural FS	48,824	111	443
Churu	New Ru 213	Badela	New Rural FS	33,693	92	461
Churu	New Ru 202	Bukansar	New Rural FS	62,294	90	464
Churu	New Ru 214	Sandwa	New Rural FS	56,804	90	465

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Churu	New Ru 201	Jaitasar	New Rural FS	40,154	84	469
Churu	New Ru 207	Upni	New Rural FS	46,710	83	470
Churu	New Ru 223	Gogasar	New Rural FS	66,252	79	473
Churu	New Ru 225	Udasar	New Rural FS	55,168	79	474
Churu	New Ru 204	Arsisar	New Rural FS	38,768	78	476
Churu	New Ru 200	Mairasar	New Rural FS	43,270	71	482
Churu	New Ru 205	Kitasar	New Rural FS	49,780	71	483
Churu	New Ru 199	Binasar	New Rural FS	28,469	65	486
Churu	New Ru 222	Retano	New Rural FS	56,101	65	487
Churu	New Ru 209	Goshainsar	New Rural FS	36,974	63	489
Churu	New Ru 208	Gajpura	New Rural FS	39,196	62	490
Churu	New Ru 212	Kator Chhoti	New Rural FS	43,939	62	491
Churu	New Ru 218	Dudwa Khara	New Rural FS	50,405	59	492
Churu	New Ru 211	Sidmukh	New Rural FS	33,588	56	496
Churu	New Ru 210	Bandnau	New Rural FS	30,117	55	497
Churu	New Ru 220	Bairasar Chhota	New Rural FS	27,670	53	498
Churu	New Ru 206	Mummasar	New Rural FS	25,987	51	501
Churu	New Ru 203	Narsara	New Rural FS	26,414	50	503
Churu	New Ru 894	Bidasar	New Rural FS	32,706	50	504
Churu	New Ru 221	Bhanin	New Rural FS	31,993	45	508
Churu	New Ru 219	Changoti	New Rural FS	22,114	43	510
Churu	New Ru 224	Dadrewa	New Rural FS	28,755	42	511
Dausa	New Ru 900	Fs Mahwa	New Rural FS	66,048	1,539	325

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Dausa	New Ru 230	Bishanpura	New Rural FS	83,236	395	332
Dausa	New Ru 231	Nangal Sumersingh	New Rural FS	70,136	351	336
Dausa	New Ru 226	Mandaori	New Rural FS	69,961	249	368
Dausa	New Ru 233	Gurha	New Rural FS	68,622	141	430
Dausa	New Ru 228	Talchiri	New Rural FS	41,721	139	431
Dausa	New Ru 229	Charanvas	New Rural FS	59,843	107	447
Dausa	New Ru 896	Balma	New Rural FS	39,461	105	449
Dausa	New Ru 232	Patoli	New Rural FS	36,396	94	456
Dausa	New Ru 227	Bhandarej	New Rural FS	53,200	83	471
Dhaulpur	New Ru 234	Baseri	New Rural FS	71,034	271	552
Dhaulpur	New Ru 242	Rajakhera	New Rural FS	46,465	250	557
Dhaulpur	New Ru 236	Kolari	New Rural FS	74,580	225	565
Dhaulpur	New Ru 237	Angai	New Rural FS	63,127	207	571
Dhaulpur	New Ru 241	Sone Ka Gurja	New Rural FS	63,633	164	590
Dhaulpur	New Ru 235	Pachgaon	New Rural FS	50,289	138	610
Dhaulpur	New Ru 239	Maraina	New Rural FS	46,529	123	619
Dhaulpur	New Ru 240	Sir Muttra	New Rural FS	45,846	117	622
Dhaulpur	New Ru 238	Sohan	New Rural FS	40,750	108	627
Dungarpur	New Ru 250	Near Vill Baneshwar	New Rural FS	70,799	1,570	539
Dungarpur	New Ru 243	Chitri	New Rural FS	35,526	253	556
Dungarpur	New Ru 248	Jaipura	New Rural FS	54,244	248	558
Dungarpur	New Ru 247	Bhiluda	New Rural FS	42,608	231	563
Dungarpur	New Ru 245	Naravara	New Rural FS	32,857	159	593

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Dungarpur	New Ru 246	Obri	New Rural FS	43,309	143	603
Dungarpur	New Ru 244	Dariatti	New Rural FS	39,582	132	615
Dungarpur	New Ru 249	Kankradara	New Rural FS	32,469	104	629
Dungarpur	New Ru 251	Punali	New Rural FS	30,215	97	631
Ganganagar	New Ru 256	Matili	New Rural FS	104,005	223	55
Ganganagar	New Ru 252	Kesrisinghpur	New Rural FS	90,083	193	76
Ganganagar	New Ru 266	Ganeshgarh	New Rural FS	67,143	185	81
Ganganagar	New Ru 259	Binjbaila	New Rural FS	46,163	174	85
Ganganagar	New Ru 255	Bugian	New Rural FS	67,943	156	95
Ganganagar	New Ru 253	Gajsinghpur	New Rural FS	80,501	150	101
Ganganagar	New Ru 270	Tamkat	New Rural FS	50,059	149	102
Ganganagar	New Ru 254	Vijaynagar	New Rural FS	56,033	146	104
Ganganagar	New Ru 265	Tatarsar	New Rural FS	53,411	146	105
Ganganagar	New Ru 261	Tchan	New Rural FS	52,849	144	106
Ganganagar	New Ru 262	Ramsinghpur	New Rural FS	74,400	144	107
Ganganagar	New Ru 272	Rawla Head	New Rural FS	57,770	143	109
Ganganagar	New Ru 268	Nizampur	New Rural FS	59,587	141	110
Ganganagar	New Ru 258	Bhagsar Dabla	New Rural FS	43,915	137	112
Ganganagar	New Ru 257	Salimpura	New Rural FS	70,782	128	123
Ganganagar	New Ru 260	Morjhanda	New Rural FS	54,113	128	124
Ganganagar	New Ru 267	Satjanda	New Rural FS	58,019	128	125
Ganganagar	New Ru 269	Tangasinghpura	New Rural FS	83,181	119	129
Ganganagar	New Ru 271	Sakhi	New Rural FS	31,498	89	143

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Ganganagar	New Ru 263	Birmana	New Rural FS	64,740	66	152
Ganganagar	New Ru 264	Thakuraka	New Rural FS	45,736	54	156
Hanumangarh	New Ru 273	Pilibangan	New Rural FS	132,602	261	171
Hanumangarh	New Ru 293	Dhaban	New Rural FS	68,884	188	188
Hanumangarh	New Ru 279	Phephana	New Rural FS	44,567	184	189
Hanumangarh	New Ru 294	Chauli	New Rural FS	59,237	175	194
Hanumangarh	New Ru 290	Naurangdesar	New Rural FS	72,100	172	198
Hanumangarh	New Ru 274	Sangaria	New Rural FS	67,832	168	200
Hanumangarh	New Ru 288	Panditvali	New Rural FS	90,197	166	201
Hanumangarh	New Ru 282	Ninan	New Rural FS	75,288	164	205
Hanumangarh	New Ru 277	Baradjka	New Rural FS	58,698	163	207
Hanumangarh	New Ru 276	Bashir	New Rural FS	50,807	153	211
Hanumangarh	New Ru 275	Dholipal	New Rural FS	50,003	148	215
Hanumangarh	New Ru 280	Marieuggapir	New Rural FS	45,746	130	230
Hanumangarh	New Ru 289	Paka-Bhaduana	New Rural FS	40,002	129	232
Hanumangarh	New Ru 285	Pandusar	New Rural FS	38,771	110	251
Hanumangarh	New Ru 278	Deidas	New Rural FS	37,734	109	252
Hanumangarh	New Ru 291	Birkali	New Rural FS	41,526	90	270
Hanumangarh	New Ru 287	Kansar	New Rural FS	49,032	87	272
Hanumangarh	New Ru 295	Khardavali	New Rural FS	55,457	86	274
Hanumangarh	New Ru 284	Lalania	New Rural FS	37,951	84	277
Hanumangarh	New Ru 286	Pallu	New Rural FS	52,964	83	278
Hanumangarh	New Ru 292	Badbirana	New Rural FS	28,309	74	290

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Hanumangarh	New Ru 281	Dungrana	New Rural FS	36,658	66	298
Hanumangarh	New Ru 283	Utradabas	New Rural FS	32,740	64	299
Jaipur	New Ru 311	Paniyala	New Rural FS	65,337	348	14
Jaipur	New Ru 341	Nanosar	New Rural FS	77,632	288	30
Jaipur	New Ru 307	Banskhoh	New Rural FS	117,837	243	47
Jaipur	New Ru 297	Pragpura	New Rural FS	158,417	241	48
Jaipur	New Ru 301	Naraina	New Rural FS	92,199	237	52
Jaipur	New Ru 304	Khejrauli	New Rural FS	63,689	218	56
Jaipur	New Ru 305	Chandwaji	New Rural FS	138,348	217	57
Jaipur	New Ru 319	Jamroli	New Rural FS	50,616	216	59
Jaipur	New Ru 342	Mohana	New Rural FS	93,006	215	60
Jaipur	New Ru 310	Siroli	New Rural FS	71,478	210	68
Jaipur	New Ru 306	Sankotra	New Rural FS	123,076	207	69
Jaipur	New Ru 317	Amarsar	New Rural FS	66,006	202	71
Jaipur	New Ru 303	Bhaislana	New Rural FS	44,192	189	79
Jaipur	New Ru 318	Vennar	New Rural FS	49,240	184	82
Jaipur	New Ru 309	Amber	New Rural FS	66,347	180	83
Jaipur	New Ru 312	Junsiya	New Rural FS	72,132	180	84
Jaipur	New Ru 316	Khandel	New Rural FS	40,125	169	86
Jaipur	New Ru 298	Bairat	New Rural FS	82,382	168	87
Jaipur	New Ru 296	Jobner	New Rural FS	51,699	167	88
Jaipur	New Ru 302	Parasoli	New Rural FS	66,805	162	91
Jaipur	New Ru 315	Kala Dera	New Rural FS	71,271	156	96

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jaipur	New Ru 300	Mozamabad	New Rural FS	79,620	148	103
Jaipur	New Ru 314	Morra	New Rural FS	54,001	144	108
Jaipur	New Ru 299	Phagi	New Rural FS	93,903	135	115
Jaipur	New Ru 320	Thalli	New Rural FS	56,148	101	136
Jaipur	New Ru 308	Boraj	New Rural FS	37,530	90	142
Jaipur	New Ru 313	Kolkhadoa	New Rural FS	15,492	34	164
Jaisalmer	New Ru 346	Borana	New Rural FS	21,541	53	499
Jaisalmer	New Ru 355	Rasla	New Rural FS	34,114	48	506
Jaisalmer	New Ru 359	Ghulka	New Rural FS	62,968	39	512
Jaisalmer	New Ru 350	Binjorai	New Rural FS	30,356	36	516
Jaisalmer	New Ru 347	Ramdevra	New Rural FS	33,105	34	518
Jaisalmer	New Ru 348	Ujlan	New Rural FS	38,703	32	519
Jaisalmer	New Ru 349	Chilak	New Rural FS	46,405	32	520
Jaisalmer	New Ru 362	Sato	New Rural FS	33,570	26	521
Jaisalmer	New Ru 357	Shri Mohangarh	New Rural FS	22,093	25	522
Jaisalmer	New Ru 351	Jinjhiniali	New Rural FS	19,487	23	523
Jaisalmer	New Ru 354	Chandhan	New Rural FS	18,559	23	524
Jaisalmer	New Ru 356	Dholia	New Rural FS	32,003	23	525
Jaisalmer	New Ru 361	Barragaon	New Rural FS	23,917	23	526
Jaisalmer	New Ru 358	Sakria	New Rural FS	19,730	16	532
Jaisalmer	New Ru 343	Laungwala-Tor	New Rural FS	26,331	15	533
Jaisalmer	New Ru 352	Ramgarh	New Rural FS	34,245	13	534
Jaisalmer	New Ru 344	Kishangarh(Jaisalmer)	New Rural FS	22,814	12	535

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jaisalmer	New Ru 360	Siambar	New Rural FS	15,013	12	536
Jaisalmer	New Ru 353	Sultan	New Rural FS	20,535	10	537
Jaisalmer	New Ru 345	Bharewala	New Rural FS	11,875	9	538
Jalor	New Ru 383	Saila	New Rural FS	77,607	476	540
Jalor	New Ru 371	Odwara	New Rural FS	112,452	328	544
Jalor	New Ru 364	Amli	New Rural FS	86,233	317	545
Jalor	New Ru 377	Dantiya	New Rural FS	83,376	295	547
Jalor	New Ru 381	Harji	New Rural FS	85,078	293	548
Jalor	New Ru 375	Ahore	New Rural FS	85,174	274	551
Jalor	New Ru 380	Golasan	New Rural FS	41,030	268	553
Jalor	New Ru 373	Bhadrajan	New Rural FS	73,124	256	555
Jalor	New Ru 363	Chitalwana	New Rural FS	60,545	236	561
Jalor	New Ru 374	Ponchata	New Rural FS	96,477	229	564
Jalor	New Ru 378	Beria	New Rural FS	52,909	219	566
Jalor	New Ru 382	Morsim	New Rural FS	50,667	209	569
Jalor	New Ru 376	Bagra	New Rural FS	110,864	182	578
Jalor	New Ru 384	Malwara	New Rural FS	117,740	170	583
Jalor	New Ru 369	Bhadwi	New Rural FS	45,909	168	586
Jalor	New Ru 365	Maida	New Rural FS	60,407	167	587
Jalor	New Ru 370	Taliyana	New Rural FS	74,968	165	589
Jalor	New Ru 385	Ramsen	New Rural FS	54,817	157	595
Jalor	New Ru 379	Nasali	New Rural FS	45,037	146	598
Jalor	New Ru 368	Thobau	New Rural FS	37,311	145	600

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jalor	New Ru 372	Bala	New Rural FS	44,934	145	601
Jalor	New Ru 366	Mokhatra	New Rural FS	60,951	127	618
Jalor	New Ru 367	Jhab	New Rural FS	40,525	116	623
Jhalawar	New Ru 410	Bhawaniganj	New Rural FS	114,191	613	5
Jhalawar	New Ru 408	Sarvar	New Rural FS	58,542	395	11
Jhalawar	New Ru 387	Runji	New Rural FS	64,483	383	12
Jhalawar	New Ru 395	Khurchakia	New Rural FS	46,953	323	21
Jhalawar	New Ru 401	Dubilya	New Rural FS	58,705	309	27
Jhalawar	New Ru 399	Sunel	New Rural FS	61,493	279	32
Jhalawar	New Ru 407	Kolvi	New Rural FS	77,540	278	34
Jhalawar	New Ru 400	Raipur	New Rural FS	54,286	277	35
Jhalawar	New Ru 391	Dhabla Bhuj	New Rural FS	49,777	246	45
Jhalawar	New Ru 392	Galtana	New Rural FS	54,662	240	49
Jhalawar	New Ru 388	Jhalrapatan	New Rural FS	62,368	227	54
Jhalawar	New Ru 386	Pirawa	New Rural FS	49,249	217	58
Jhalawar	New Ru 398	Awar	New Rural FS	31,915	215	61
Jhalawar	New Ru 389	Aklera	New Rural FS	56,217	211	65
Jhalawar	New Ru 409	Bakani	New Rural FS	34,300	211	66
Jhalawar	New Ru 393	Osao	New Rural FS	44,688	198	73
Jhalawar	New Ru 396	Dogi	New Rural FS	30,556	196	74
Jhalawar	New Ru 390	Khanpur	New Rural FS	62,121	191	77
Jhalawar	New Ru 397	Piplia-Khurd	New Rural FS	27,888	161	92
Jhalawar	New Ru 406	Sarola	New Rural FS	47,519	156	97

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jhalawar	New Ru 402	Ratlai	New Rural FS	37,534	152	99
Jhalawar	New Ru 404	Sadlo	New Rural FS	39,715	136	113
Jhalawar	New Ru 394	Asnawar	New Rural FS	39,484	134	117
Jhalawar	New Ru 411	Manohar Thana	New Rural FS	44,593	111	131
Jhalawar	New Ru 403	Ghatoli	New Rural FS	46,349	108	133
Jhalawar	New Ru 405	Harigarh	New Rural FS	31,431	108	134
Jhunjhunun	New Ru 428	Gorir	New Rural FS	112,990	482	327
Jhunjhunun	New Ru 426	Makundgarh	New Rural FS	116,099	334	339
Jhunjhunun	New Ru 413	Mandawa	New Rural FS	66,792	316	341
Jhunjhunun	New Ru 424	Mandela	New Rural FS	79,942	295	348
Jhunjhunun	New Ru 419	Sultana	New Rural FS	96,909	292	351
Jhunjhunun	New Ru 421	Babai	New Rural FS	74,276	285	354
Jhunjhunun	New Ru 415	Surajgarh	New Rural FS	108,565	284	355
Jhunjhunun	New Ru 412	Udaipur	New Rural FS	113,434	277	357
Jhunjhunun	New Ru 416	Khetri	New Rural FS	78,387	274	358
Jhunjhunun	New Ru 423	Manaksas	New Rural FS	61,419	268	360
Jhunjhunun	New Ru 414	Bissau	New Rural FS	73,490	244	371
Jhunjhunun	New Ru 417	Malsisar	New Rural FS	68,039	240	373
Jhunjhunun	New Ru 425	Dhigal	New Rural FS	54,993	235	375
Jhunjhunun	New Ru 422	Bohana	New Rural FS	128,099	227	377
Jhunjhunun	New Ru 418	Dhandhuri	New Rural FS	74,524	212	382
Jhunjhunun	New Ru 430	Jakhara Ka Bas	New Rural FS	55,315	185	398
Jhunjhunun	New Ru 420	Gudha	New Rural FS	65,152	178	401

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jhunjhunun	New Ru 429	Dulaniya	New Rural FS	41,467	144	423
Jhunjhunun	New Ru 427	Chanana	New Rural FS	29,619	124	436
Jodhpur	New Ru 458	Mogra	New Rural FS	102,263	450	7
Jodhpur	New Ru 454	Khejarli Kalan	New Rural FS	75,344	321	24
Jodhpur	New Ru 448	Borunda	New Rural FS	67,143	319	25
Jodhpur	New Ru 474	Malhar	New Rural FS	133,626	298	28
Jodhpur	New Ru 456	Banar	New Rural FS	66,145	276	36
Jodhpur	New Ru 475	Baonri	New Rural FS	131,347	234	53
Jodhpur	New Ru 459	Luni	New Rural FS	47,287	215	62
Jodhpur	New Ru 457	Dangiawas	New Rural FS	57,856	213	63
Jodhpur	New Ru 447	Barlu	New Rural FS	130,541	211	67
Jodhpur	New Ru 455	Sheoki Kalan	New Rural FS	122,143	202	72
Jodhpur	New Ru 445	Asop	New Rural FS	89,225	195	75
Jodhpur	New Ru 477	Kankani	New Rural FS	26,857	188	80
Jodhpur	New Ru 461	Khatawas	New Rural FS	59,842	165	89
Jodhpur	New Ru 464	Manaklao	New Rural FS	87,762	165	90
Jodhpur	New Ru 452	Buchkala	New Rural FS	36,324	158	93
Jodhpur	New Ru 463	Barli	New Rural FS	59,903	154	98
Jodhpur	New Ru 453	Rawar	New Rural FS	50,588	136	114
Jodhpur	New Ru 460	Pipli	New Rural FS	53,567	132	118
Jodhpur	New Ru 446	Khangta	New Rural FS	51,066	131	119
Jodhpur	New Ru 470	Chandsama	New Rural FS	51,244	131	120
Jodhpur	New Ru 476	Bhetnanda	New Rural FS	27,227	131	121

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jodhpur	New Ru 449	Bhagasani	New Rural FS	19,840	129	122
Jodhpur	New Ru 466	Balesar	New Rural FS	69,054	128	126
Jodhpur	New Ru 433	Sird	New Rural FS	78,800	127	127
Jodhpur	New Ru 442	Dechu	New Rural FS	43,183	121	128
Jodhpur	New Ru 451	Khejaria	New Rural FS	25,724	114	130
Jodhpur	New Ru 465	Chandaliya	New Rural FS	65,075	106	135
Jodhpur	New Ru 444	Near Vill Kajnau Khurd	New Rural FS	51,919	101	137
Jodhpur	New Ru 431	Dedasri	New Rural FS	75,809	99	138
Jodhpur	New Ru 450	Bhawi	New Rural FS	26,168	94	140
Jodhpur	New Ru 472	Jalora	New Rural FS	44,308	93	141
Jodhpur	New Ru 439	Osiyan	New Rural FS	53,616	83	145
Jodhpur	New Ru 441	Nathrau	New Rural FS	49,451	80	146
Jodhpur	New Ru 462	Gram Panchayat Bambor	New Rural FS	41,451	74	147
Jodhpur	New Ru 436	Denog	New Rural FS	53,844	73	148
Jodhpur	New Ru 467	Shergarh	New Rural FS	43,148	73	149
Jodhpur	New Ru 434	Chakhu	New Rural FS	52,116	69	150
Jodhpur	New Ru 443	Lohawat	New Rural FS	41,407	69	151
Jodhpur	New Ru 471	Khara	New Rural FS	49,173	64	153
Jodhpur	New Ru 440	Chadi	New Rural FS	38,715	61	154
Jodhpur	New Ru 468	Lethaniya	New Rural FS	22,009	57	155
Jodhpur	New Ru 435	Ghantiali	New Rural FS	37,508	52	157
Jodhpur	New Ru 432	Shekasur	New Rural FS	35,018	51	158

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Jodhpur	New Ru 469	Shaitrawa	New Rural FS	25,830	51	159
Jodhpur	New Ru 437	Khindokor	New Rural FS	19,840	42	160
Jodhpur	New Ru 438	Matora	New Rural FS	21,601	41	161
Jodhpur	New Ru 473	Banasar	New Rural FS	11,771	35	162
Karauli	New Ru 480	Lipaoli	New Rural FS	50,773	337	543
Karauli	New Ru 479	Near Vill Jhalda	New Rural FS	51,748	296	546
Karauli	New Ru 481	Milkipura	New Rural FS	71,755	276	550
Karauli	New Ru 478	Garh Mora	New Rural FS	58,997	245	560
Karauli	New Ru 492	Kamalpura	New Rural FS	48,451	208	570
Karauli	New Ru 488	Milk Sarai	New Rural FS	47,248	207	572
Karauli	New Ru 487	Nadoti	New Rural FS	53,536	199	573
Karauli	New Ru 482	Banwaripur	New Rural FS	59,012	185	577
Karauli	New Ru 484	Mewlo	New Rural FS	65,145	146	599
Karauli	New Ru 486	Mohanpur	New Rural FS	58,638	144	602
Karauli	New Ru 489	Mandrael	New Rural FS	62,834	142	604
Karauli	New Ru 491	Unchi Gvari	New Rural FS	60,045	134	612
Karauli	New Ru 483	Mothiapur	New Rural FS	40,526	100	630
Karauli	New Ru 485	Asa Ka Gvari	New Rural FS	33,313	72	638
Karauli	New Ru 490	Near Vill Mahu	New Rural FS	28,930	72	639
Kota	New Ru 496	Jorawarpura	New Rural FS	107,245	634	4
Kota	New Ru 495	East of Lana Village	New Rural FS	91,227	439	9
Kota	New Ru 497	Mundli	New Rural FS	63,958	342	18
Kota	New Ru 761	Bapaur	New Rural FS	106,367	322	22

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Kota	New Ru 500	Tather	New Rural FS	80,166	318	26
Kota	New Ru 905	Idaipura	New Rural FS	96,621	285	31
Kota	New Ru 762	Khairabad	New Rural FS	88,542	274	37
Kota	New Ru 904	Narli	New Rural FS	49,371	270	38
Kota	New Ru 493	Khatoli	New Rural FS	61,559	262	40
Kota	New Ru 499	Sultanpur	New Rural FS	80,778	261	41
Kota	New Ru 758	Khedakarir	New Rural FS	66,412	260	42
Kota	New Ru 757	Near Vill Dadhdevi	New Rural FS	97,287	252	44
Kota	New Ru 498	Bodadit	New Rural FS	55,650	240	50
Kota	New Ru 760	Kanwas	New Rural FS	75,202	240	51
Kota	New Ru 494	Etawah	New Rural FS	34,923	204	70
Kota	New Ru 759	Mandana	New Rural FS	54,465	139	111
Kota	New Ru 756	Jagpura	New Rural FS	25,293	135	116
Kota	New Ru 763	Jamunya	New Rural FS	30,962	99	139
Kota	New Ru 768	Near Vill Chandbavri	New Rural FS	11,777	35	163
Nagaur	New Ru 777	Ranigaon	New Rural FS	125,394	234	173
Nagaur	New Ru 773	Dhiawa	New Rural FS	126,595	220	175
Nagaur	New Ru 776	Khunkhuna	New Rural FS	112,846	209	177
Nagaur	New Ru 774	Balsamand	New Rural FS	117,989	203	180
Nagaur	New Ru 771	Torana	New Rural FS	126,798	202	182
Nagaur	New Ru 785	Pydu	New Rural FS	120,231	202	183
Nagaur	New Ru 793	Maulasar	New Rural FS	97,417	173	196
Nagaur	New Ru 795	Pharrod	New Rural FS	116,689	161	208

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Nagaur	New Ru 779	Gachhipura	New Rural FS	85,143	149	213
Nagaur	New Ru 791	Khinala	New Rural FS	80,219	148	216
Nagaur	New Ru 784	Phalodi	New Rural FS	97,641	143	221
Nagaur	New Ru 786	Padu	New Rural FS	103,866	137	225
Nagaur	New Ru 770	Mandaora	New Rural FS	81,523	132	227
Nagaur	New Ru 792	Bharunda	New Rural FS	94,649	128	233
Nagaur	New Ru 775	Ratau	New Rural FS	65,480	126	237
Nagaur	New Ru 787	Sanju	New Rural FS	64,430	122	240
Nagaur	New Ru 783	Sankhwas	New Rural FS	97,206	119	243
Nagaur	New Ru 788	Burri	New Rural FS	95,587	118	245
Nagaur	New Ru 906	Butau	New Rural FS	51,310	112	248
Nagaur	New Ru 778	Khanpura	New Rural FS	87,565	109	253
Nagaur	New Ru 794	Chitawa	New Rural FS	69,595	109	254
Nagaur	New Ru 789	Indawar	New Rural FS	77,960	96	262
Nagaur	New Ru 772	Bursu	New Rural FS	46,807	94	265
Nagaur	New Ru 780	Khaonlisra	New Rural FS	101,791	93	266
Nagaur	New Ru 781	Kumhari	New Rural FS	71,067	85	275
Nagaur	New Ru 782	Khinwasar	New Rural FS	55,934	73	292
Nagaur	New Ru 769	Panchori	New Rural FS	29,808	43	308
Pali	New Ru 810	Lunawa	New Rural FS	95,176	279	168
Pali	New Ru 809	Bera	New Rural FS	105,125	267	169
Pali	New Ru 808	Sindroo	New Rural FS	200,746	264	170
Pali	New Ru 807	Dhola Ka Gaon	New Rural FS	134,165	203	181

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Pali	New Ru 802	Mayawas	New Rural FS	70,382	194	185
Pali	New Ru 806	Mandawas	New Rural FS	93,383	174	195
Pali	New Ru 811	Nadol	New Rural FS	107,747	165	203
Pali	New Ru 804	Hemawas	New Rural FS	82,345	132	228
Pali	New Ru 805	Khairla	New Rural FS	77,400	130	231
Pali	New Ru 816	Banjakudi	New Rural FS	78,450	121	241
Pali	New Ru 814	Khinwara	New Rural FS	54,114	114	247
Pali	New Ru 903	Rupawas	New Rural FS	55,256	105	258
Pali	New Ru 815	Khundawas	New Rural FS	64,911	102	259
Pali	New Ru 813	Sardar	New Rural FS	52,421	101	260
Pali	New Ru 796	Ras	New Rural FS	65,899	92	269
Pali	New Ru 798	Deoli	New Rural FS	50,369	88	271
Pali	New Ru 803	Awa	New Rural FS	35,511	77	286
Pali	New Ru 812	Saran	New Rural FS	35,557	75	289
Pali	New Ru 801	Jadan	New Rural FS	28,150	72	295
Pali	New Ru 797	Barr	New Rural FS	35,536	58	304
Pali	New Ru 799	Kelwad	New Rural FS	25,246	41	311
Pratapgarh	New Ru 821	Arnaud	New Rural FS	62,491	164	591
Pratapgarh	New Ru 819	Arniya	New Rural FS	38,329	162	592
Pratapgarh	New Ru 818	Magrara	New Rural FS	47,666	157	596
Pratapgarh	New Ru 820	Sagthali	New Rural FS	49,475	142	605
Pratapgarh	New Ru 817	Puniyakheri	New Rural FS	54,179	131	616
Pratapgarh	New Ru 889	Parsola	New Rural FS	43,375	78	636

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Rajsamand	New Ru 826	Pachhamata	New Rural FS	50,572	198	394
Rajsamand	New Ru 831	Piparda	New Rural FS	51,825	197	395
Rajsamand	New Ru 829	Thikarwas	New Rural FS	47,590	196	396
Rajsamand	New Ru 825	Kelwa	New Rural FS	59,756	186	397
Rajsamand	New Ru 830	Baneria	New Rural FS	63,477	170	404
Rajsamand	New Ru 824	Lawa	New Rural FS	52,581	168	407
Rajsamand	New Ru 832	Near Vill Bhim	New Rural FS	64,374	162	411
Rajsamand	New Ru 827	Koaria	New Rural FS	43,493	159	415
Rajsamand	New Ru 828	Haldi Ghat	New Rural FS	45,347	158	417
Rajsamand	New Ru 893	Basin	New Rural FS	43,050	109	446
Rajsamand	New Ru 823	Makhoda	New Rural FS	45,800	86	468
Sawai Madhopur	New Ru 839	Dubi	New Rural FS	143,410	398	331
Sawai Madhopur	New Ru 837	Bhaear	New Rural FS	122,930	307	344
Sawai Madhopur	New Ru 834	Bamanwas	New Rural FS	99,998	236	374
Sawai Madhopur	New Ru 846	Bonli	New Rural FS	101,150	223	379
Sawai Madhopur	New Ru 833	Seba	New Rural FS	58,009	220	380
Sawai Madhopur	New Ru 835	Sarson	New Rural FS	43,720	205	386
Sawai Madhopur	New Ru 844	Pipalwara	New Rural FS	35,385	170	405
Sawai Madhopur	New Ru 843	Adalvara Kalan	New Rural FS	49,775	144	424
Sawai Madhopur	New Ru 840	Shampura	New Rural FS	65,741	143	426
Sawai Madhopur	New Ru 845	Rawanjna-Dungpur	New Rural FS	44,639	116	437
Sawai Madhopur	New Ru 836	Barthun	New Rural FS	25,549	114	439
Sawai Madhopur	New Ru 841	Kundana	New Rural FS	56,915	105	448

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Sawai Madhopur	New Ru 838	Jirota	New Rural FS	20,796	94	457
Sawai Madhopur	New Ru 842	Behraonda	New Rural FS	43,624	94	458
Sikar	New Ru 847	2 Jharli	New Rural FS	122,566	413	329
Sikar	New Ru 915	Jharli	New Rural FS	132,313	408	330
Sikar	New Ru 857	Kanwat	New Rural FS	172,532	351	337
Sikar	New Ru 851	Bikamsur	New Rural FS	110,109	314	342
Sikar	New Ru 853	Narsas	New Rural FS	119,017	311	343
Sikar	New Ru 852	Sarupsar	New Rural FS	130,692	290	352
Sikar	New Ru 850	Thedi	New Rural FS	70,882	263	361
Sikar	New Ru 856	Patan	New Rural FS	159,312	226	378
Sikar	New Ru 858	Ruland	New Rural FS	116,968	208	385
Sikar	New Ru 849	Dhandhani	New Rural FS	53,188	203	389
Sikar	New Ru 322	Modni	New Rural FS	119,423	202	390
Sikar	New Ru 848	Nechwa	New Rural FS	100,957	201	392
Sikar	New Ru 854	Shopline	New Rural FS	94,842	166	410
Sikar	New Ru 323	Dhod	New Rural FS	69,849	143	425
Sikar	New Ru 859	Sangarwa	New Rural FS	84,638	143	427
Sikar	New Ru 855	Munpura	New Rural FS	44,106	114	440
Sirohi	New Ru 897	Deldar	New Rural FS	61,490	473	328
Sirohi	New Ru 334	Dodawa	New Rural FS	54,036	296	347
Sirohi	New Ru 332	Kojra	New Rural FS	46,338	292	350
Sirohi	New Ru 331	Bhauri	New Rural FS	54,517	259	362
Sirohi	New Ru 328	Sonwara	New Rural FS	58,378	246	370

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Sirohi	New Ru 336	Khejriya	New Rural FS	40,095	215	**381**
Sirohi	New Ru 327	Palri	New Rural FS	52,270	181	**399**
Sirohi	New Ru 326	Zawal	New Rural FS	53,143	166	**409**
Sirohi	New Ru 324	Mandar	New Rural FS	80,004	159	**414**
Sirohi	New Ru 329	Mero	New Rural FS	21,849	109	**445**
Sirohi	New Ru 335	Taunri	New Rural FS	37,464	103	**450**
Sirohi	New Ru 325	Manadar	New Rural FS	36,798	99	**453**
Sirohi	New Ru 333	Anadra	New Rural FS	19,688	90	**466**
Sirohi	New Ru 330	Dantrai	New Rural FS	10,419	34	**517**
Tonk	New Ru 862	Baroni	New Rural FS	51,020	215	**567**
Tonk	New Ru 340	Kalmande	New Rural FS	44,863	191	**575**
Tonk	New Ru 860	Nathri	New Rural FS	39,597	186	**576**
Tonk	New Ru 865	Naner	New Rural FS	41,513	178	**580**
Tonk	New Ru 874	Bansthali	New Rural FS	56,449	176	**581**
Tonk	New Ru 864	Mendwas	New Rural FS	66,205	175	**582**
Tonk	New Ru 867	Duni	New Rural FS	93,806	170	**584**
Tonk	New Ru 872	Banwara	New Rural FS	45,462	166	**588**
Tonk	New Ru 338	Gaoni	New Rural FS	72,913	154	**597**
Tonk	New Ru 868	Nagar	New Rural FS	60,859	142	**606**
Tonk	New Ru 875	Diggi	New Rural FS	52,347	142	**607**
Tonk	New Ru 339	Pachhewar	New Rural FS	48,457	140	**608**
Tonk	New Ru 861	Jhalai	New Rural FS	42,988	140	**609**
Tonk	New Ru 863	Bamhor	New Rural FS	33,481	134	**613**

District	FS Ref No	Fire Station Name	Operational Type	Population Estimated	Population Density	Priority Ranking
Tonk	New Ru 866	Toda Raisingh	New Rural FS	63,325	134	614
Tonk	New Ru 870	Banetha	New Rural FS	37,772	122	621
Tonk	New Ru 337	Rupawali	New Rural FS	56,127	113	624
Tonk	New Ru 871	Hatatli	New Rural FS	24,872	97	632
Tonk	New Ru 869	Sop	New Rural FS	29,107	88	633
Tonk	New Ru 321	Uniara	New Rural FS	33,830	86	634
Tonk	New Ru 873	Banakakhera	New Rural FS	35,511	85	635
Udaipur	New Ru 880	Debari	New Rural FS	111,276	376	165
Udaipur	New Ru 879	Chirwa	New Rural FS	74,499	374	166
Udaipur	New Ru 878	Thur	New Rural FS	52,502	260	172
Udaipur	New Ru 884	Bira	New Rural FS	72,639	214	176
Udaipur	New Ru 883	Dakan Kotra	New Rural FS	74,425	209	178
Udaipur	New Ru 876	Dhol	New Rural FS	72,767	197	184
Udaipur	New Ru 881	Mavli	New Rural FS	78,916	164	206
Udaipur	New Ru 891	Hita	New Rural FS	50,441	157	209
Udaipur	New Ru 882	Bhatewar	New Rural FS	59,379	149	214
Udaipur	New Ru 877	Gurach	New Rural FS	57,717	144	219
Udaipur	New Ru 895	Bamora	New Rural FS	50,679	127	235
Udaipur	New Ru 888	Salumbar	New Rural FS	100,236	118	246
Udaipur	New Ru 885	Umpura	New Rural FS	50,664	83	279
Udaipur	New Ru 887	Rakhabh Dev	New Rural FS	70,436	82	281
Udaipur	New Ru 886	Jharol	New Rural FS	54,866	79	283
Udaipur	New Ru 890	Hukaji Bhawan	New Rural FS	42,838	79	284

RMSI
Delivering a world of solutions

CMMi
A SEI CMMi Level 5 Company

TÜV NORD
TÜV NORD CERT GmbH
Certificate No.
44 100 090933
ISO 9001

RMSI is a professional services company providing geospatial solutions and application software services to clients worldwide

BSI
REGISTERED
ISO 27001

DQ TOP 20
Ranked amongst the Top 5 Indian IT's Best Employers for seven years in a row, since 2003

RANKED #1
Employer in India for 3 years in a row
GREAT PLACE TO WORK INSTITUTE

Business World - Great Places to Work Study 2009
RMSI ranked #1 across all industries, for the third year in a row