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

Final Report – State Wise Risk Assessment, Infrastructure and Institutional Assessment of Phase IV States (Andhra Pradesh, Bihar, Kerala, Lakshadweep, Tamil Nadu)

November 2012

Submitted by

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Acknowledgements

The assistance of Dr. P. M. Nair, Director General (DG), NDRF & CD, Shri Sandeep Rai Rathore, IG, NDRF & CD, Shri D. K. Shami, Dy. Fire Adviser, Shri Chandrashekhar, 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 Director General, State Disaster Response & Fire Services, Shri P. Venkateshwar, Director, State Disaster Response & Fire Services, and various other officials and staff of Andhra Pradesh State Disaster Response & Fire Services 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 Dr. P. M. Nair, DG, NDRF & CD, (Chairman), Dr G. A. Bhat (member), Lt. Col (retd.) P.K. Pathak, Consultant, NIDM (member), Shri D. K. Shami (member), and Shri Chandrashekhar (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 firefighting 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 Stations is 97.54%, in terms of firefighting and rescue vehicles is 80.04% and in terms of fire personnel is 96.28%, respectively, which is quite alarming (NDMA Guideline, 2012, CR SFAC, 2011). In consideration of this and the increasing fire risks from various hazards, the Directorate of NDRF&CD, Fire Cell, MHA planned a study called "**Fire Hazard and Risk Analysis in the Country for Revamping the Fire Services in the Country**", to identify existing gaps in terms of availability and requirement of Fire Stations, capacity-building, trained man-power and fire-fighting, rescue, and other specialized equipment.

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

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

Role of Fire Services

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

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

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

The role of fire services also includes effective fire prevention, creating awareness on fire safety, and enforcing the inbuilt fire protection arrangements for various types of occupancies in line with National Building Code (NBC) part – IV. However, 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 firefighting 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 initial pilot phase, the pilot study comprises of 6 States and UTs (Jammu & Kashmir, Rajasthan, Maharashtra, Delhi, Andaman & Nicobar Island, and Puducherry), and in subsequent phases (Phase I to Phase IV), rest of the States/UTs have been taken up as detailed in section 2.2.

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; firefighting 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 firefighting 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.

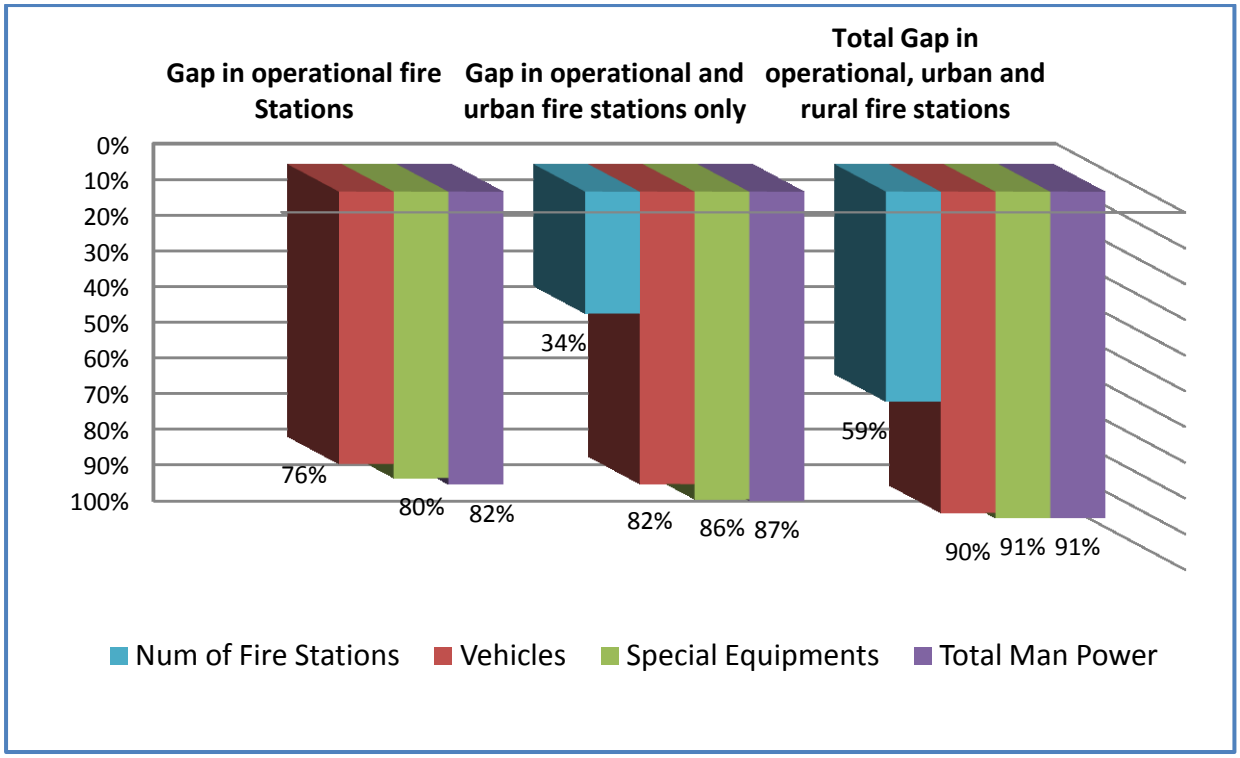
- ***Depending upon the risk category, the recommended response time for first fire tender is 5 to 7 minutes in urban areas and 20 minutes in rural areas***

Summary of Findings for Andhra Pradesh State

Presently, Andhra Pradesh State Disaster Response and Fire Services (AP SDR & FS) has 251 operational Fire Station, both in urban and rural areas and one fully functional training centre. Based on detailed demarcated built-up areas and GIS based network analysis (response time analysis), ideal jurisdiction boundaries have been demarcated for all operational Fire Stations excluding areas served by other agencies, such as airport, military cantonment, thermal power plants etc. The remaining areas, not covered under ideal jurisdiction of operational Fire Stations, are also divided for ideal jurisdictions of new proposed Fire Stations. The requirements for firefighting and rescue vehicles and specialized equipment are based on ideal served population, population density, and built-up areas within ideal jurisdiction boundary.

Fire Station Gap Analysis

As per detailed GIS based analysis, the State would require additional 130 Fire stations in urban areas and 228 stations in rural areas. Hence this study finds a overall gap of 59% in terms of number of Fire Stations in the State (for details, please refer to section 25.3.1).



Firefighting and Rescue Vehicles and Specialized Equipment Gap Analysis

For estimating the gap in firefighting 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 25.3.2. This finds an overall gap of 90% in the firefighting and rescue vehicle and about 91% 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 as proposed Fire Stations both in urban and rural areas, the RMSI team used Administrative Reform Department (ARD, Delhi) norms based on duty pattern (double-shift) prevalent in Delhi as ARD has already optimized the fire manpower requirement in comparison to what has been suggested in SFAC norms. The current duty pattern in Andhra Pradesh State is 24 hours, in general, and

RMSI team estimated for manpower requirement for double shift duty pattern (for details, please refer to section 25.3.3). Thus, in Andhra Pradesh State, this study finds an overall gap of about 91% in fire personnel considering double shift duty pattern.

Fire Prevention Wing

In addition to firefighting staff, AP SDR & FS is carrying out inspection, awareness generation, and training for schools, colleges, hospitals, high-rise buildings, shopping malls, cinema halls, govt. offices, public buildings etc.. However, there is a need for a dedicated Fire Prevention Wing in AP SDR & FS throughout the State (presently working in a few Municipal Corporations), 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 General, Andhra Pradesh, State Disaster Response, additional officers at the levels of Director (Technical), Additional Director (Technical), Deputy Director (Technical), Chief Fire Officers (CFO), Dy Chief Fire Officers (Dy-CFO), Division Officers (DO), and Assistant Divisional Officers (ADO) have been recommended (for details, please refer to section 25.2.2).

Fire Station, District and State Level Report Generation

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

Roadmap for Investment and Financial plan for next 10 years

The other tasks include the development of Investment and Financial Plan, Institutional assessment & Capacity Building Plan along with a dynamic web-based Fire Decision Support System (FDSS). As detailed in section 25.5, the detailed investment and financial plan at district level includes estimation of capital cost for infrastructure cost, firefighting and rescue vehicles, and specialized fire and communication equipment. The recurring expenditure cost includes fire personnel cost depending upon pay-scales at various levels; staff uniform cost, and personal protective equipment (PPE); annual vehicle and specialized equipment maintenance cost, petrol, diesel, and lubricant (PDL); building maintenance; office and training expenses etc. The detailed roadmap and investment plan (section 25.5) for the next 10-years includes both capital and recurring expenditures. RMSI analysis estimates a total investment of **about Rs 26,423.49 Crores** (Table 25-36) spread over a period of 10 years for Andhra Pradesh State Disaster Response and 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 Andhra Pradesh for both rural and urban areas has been detailed in section 25.6. Accordingly, separate priority ranking for both urban and rural areas are given in Tables 25.38 and 25.39, respectively.

Avenues for Fund Generation

Andhra Pradesh State Disaster Response and Fire Services can generate new avenues for funds from the following:

- Introduction of Fire Tax (1% of existing property tax)
- Training programs at different levels and durations to private sector employees on chargeable basis
- Capitation fee can be charged for scrutiny of building plans
- Sale of condemned fire appliances, equipment, uniform articles and general items.

Capacity Building and Training Facilities

Andhra Pradesh State Disaster Response and Fire Services has a well functioning training centre. The study finds that there are some gaps for capacity building and training among the fire personnel within the Andhra Pradesh State Disaster Response and Fire Services. The detailed Capacity Building and Training need assessment for various levels have been discussed in section 25.8. Additionally, RMSI team is making a separate report on capacity building and training infrastructure for all States/UTs in the country.

Limitations of the Study

Limitations of study have been given in section 25.9.

Recommendations

The report concludes with the recommendations for the Andhra Pradesh State Disaster Response and Fire Services and is detailed in section 25.10. The present study made some recommendations to overcome some of the crucial issues such as lacks firefighting manpower, strict implementation of State Fire Service Act 1999 with its amendments in the years 2007 to 2011, and building bye-laws as per national building code (NBC- Part IV). In short, Andhra Pradesh State Disaster Response and Fire Services can be revamped in next 10 years to desired level provided sufficient funds and trained resources are made available.

Report Structure

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

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

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

Part B: This part comprises of Chapters 25-29, which are specific to the State/UT being discussed.

- Chapter 25 provides detailed analysis for the Andhra Pradesh State
- Chapter 26 provides detailed analysis for the Bihar State
- Chapter 27 provides detailed analysis for the Kerala State
- Chapter 28 provides detailed analysis for the Lakshadweep UT
- Chapter 29 provides detailed analysis for the Tamil Nadu State

For Part-B, this report consists of Chapter 25, which is for the Andhra Pradesh State.

PART -A

1 Introduction

1.1 Background

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

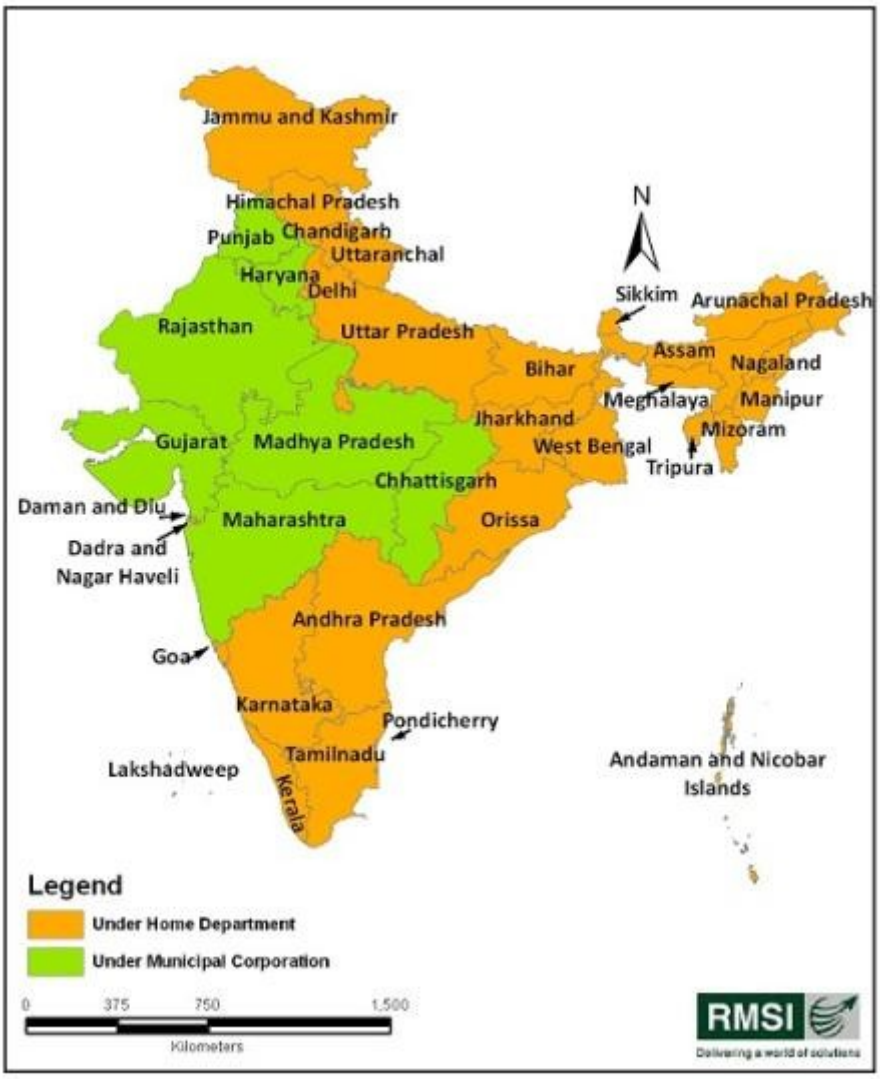


Figure 1-1: Distribution of fire services by various States/UTs by administrative organization

1.2 Role of Fire Services

As far as the role of fire services is concerned, the primary job of fire services has been to attend to fire incidents. However, they also attend to other emergencies like rescue from building collapse, road traffic accidents, human and animal rescue etc., and other special

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

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

The role of fire services also includes effective fire prevention, creating awareness on fire safety, and enforcing the inbuilt fire protection arrangements for various types of occupancies in line with National Building Code (NBC) part – IV. However, some of the States/Municipal Fire Services are unable to enforce the fire safety provisions due to a lack of appropriate directives from the authorities controlling the function of fire services. Some of the Fire Services do not adhere to NBC and have created their own fire-safety building 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 firefighting 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 firefighting & 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 firefighting 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 fire States/UTs Fire Services. ***However, it may please be noted that RMSI team is also making efforts to get details of areas served by other agencies as well, so that requirement of establishing Fire Stations in these areas does not become part of the Gap analyses.***

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

2.2 Study Area

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

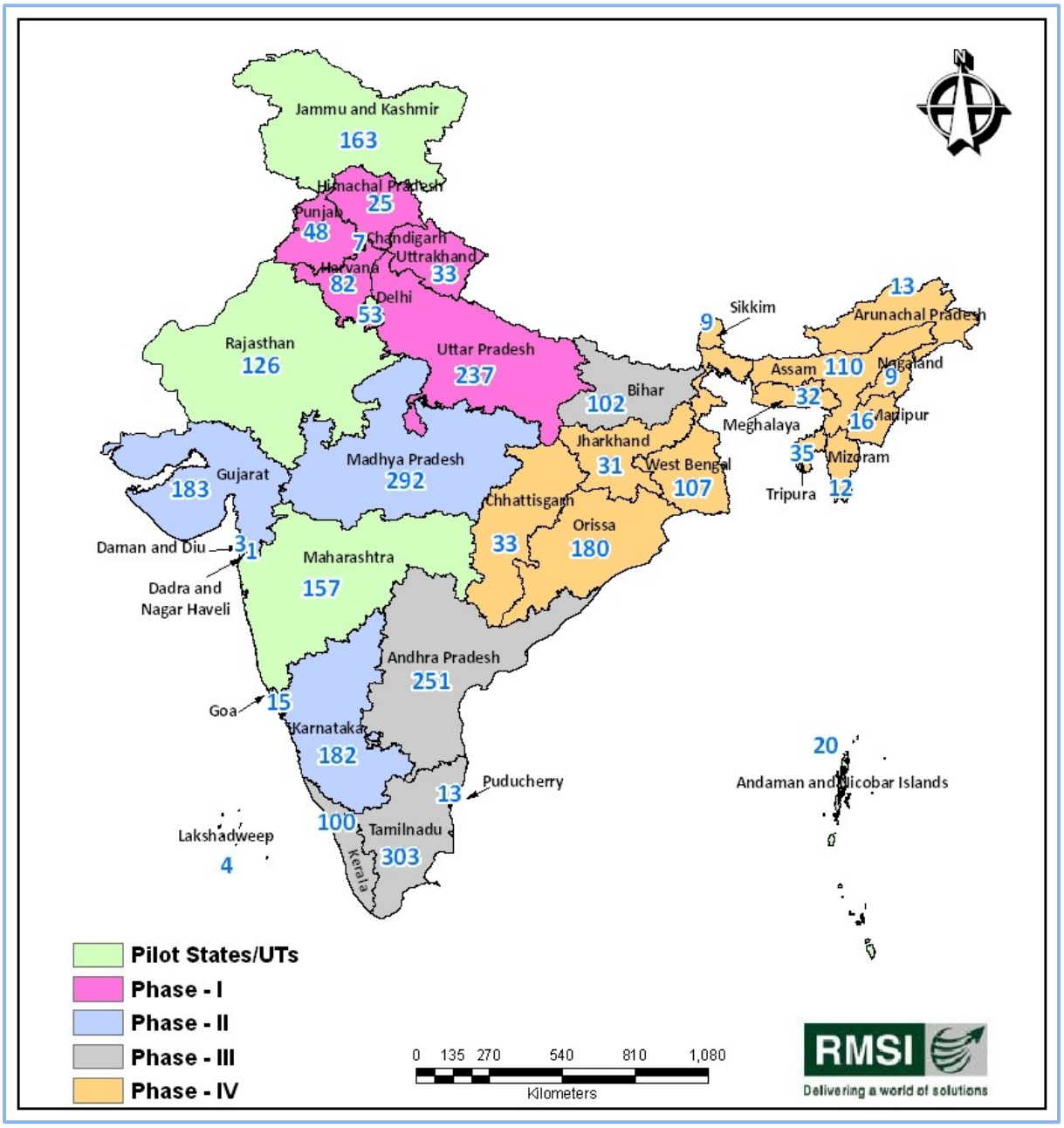


Figure 2-1 : State/UT wise distribution of fire service stations in India

2.3 Phased Approach

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

The initial phase pilot study comprises of six States and UTs - **Jammu & Kashmir, Rajasthan, Puducherry, Maharashtra, Andaman & Nicobar Island, and Delhi** and in subsequent phases (Phases I to Phase IV), the other States/UTs have taken up as detailed in section 2.2.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 are being used as a template for conducting the study for the remaining States/ UTs in the phased manner indicated in Table 2-1.

It may be noted that there could be region specific modifications and variations in the requirements of different kinds and types of 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).

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

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

States	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 adopted following approach for fire risk analysis of Indian States. 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 firefighting planning.

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

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

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

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

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

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

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

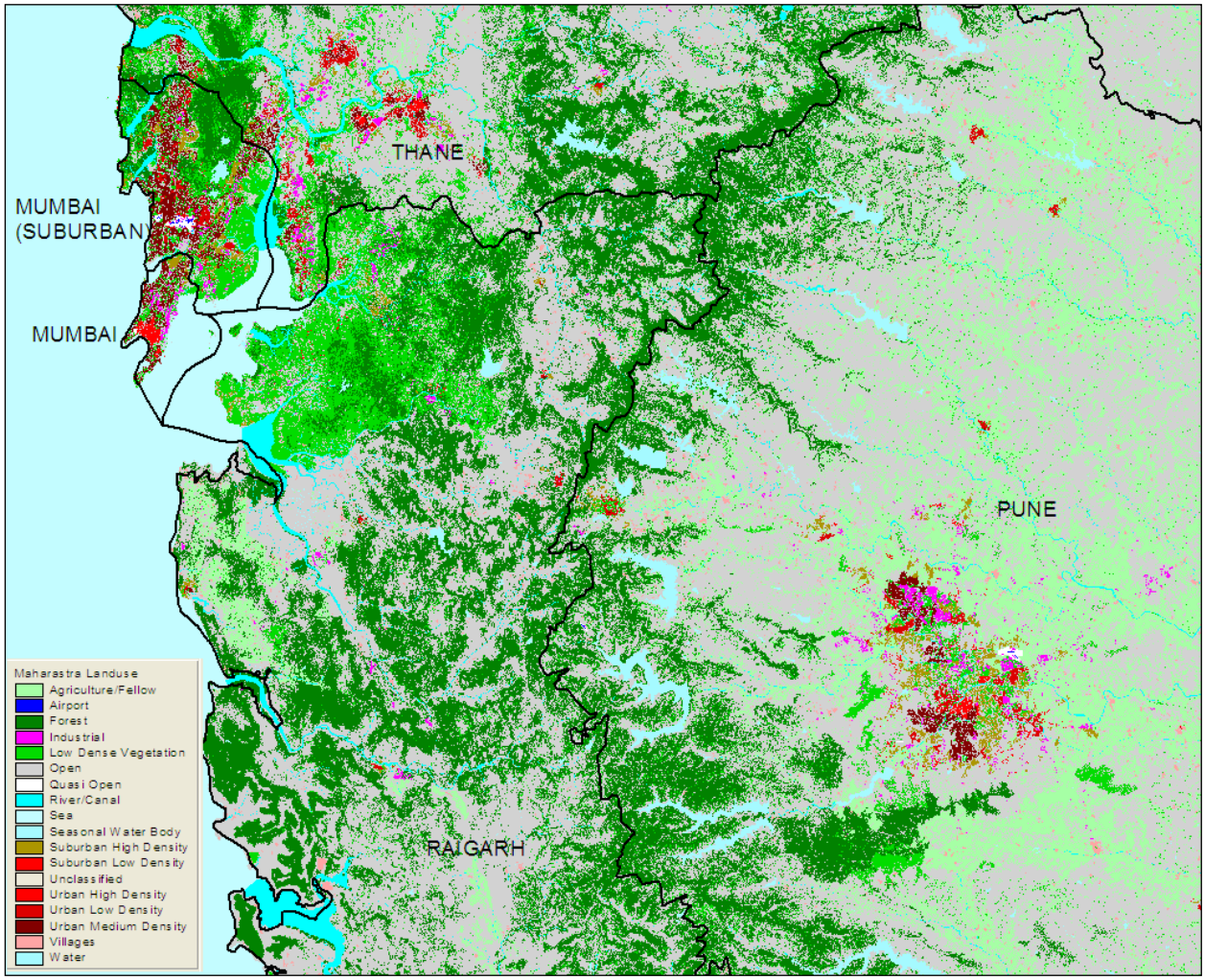


Figure 3-1 : An example of a Land use classification at 25m pixel. The example shows parts of Western Maharashtra (districts – Mumbai, Mumbai sub-urban, Thane, Pune, and Raigarh)

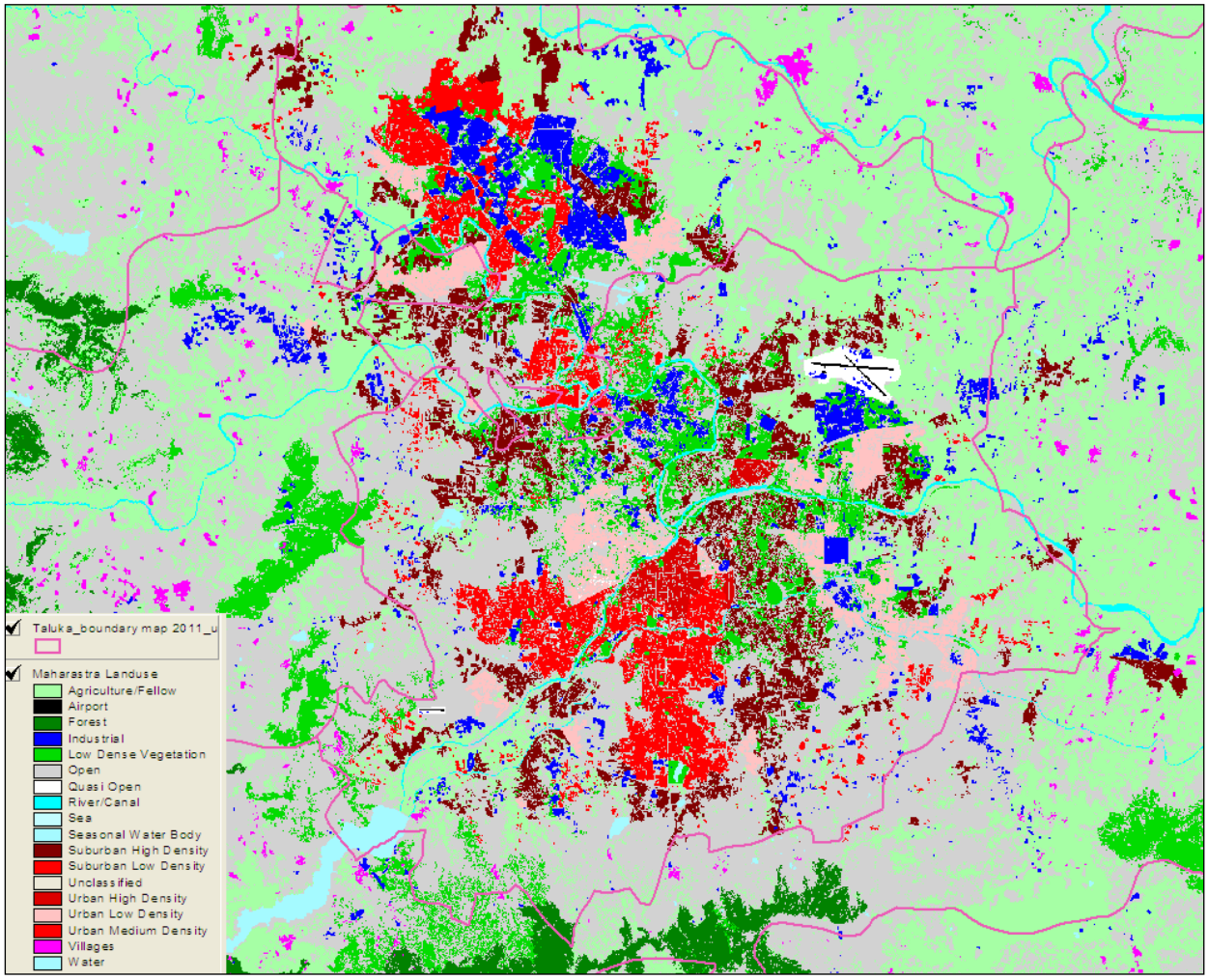


Figure 3-2 : Example of an enlarged view of classified. The example shows urban agglomeration classification in Pune city areas

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

3.1 GIS Overlay Analysis

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

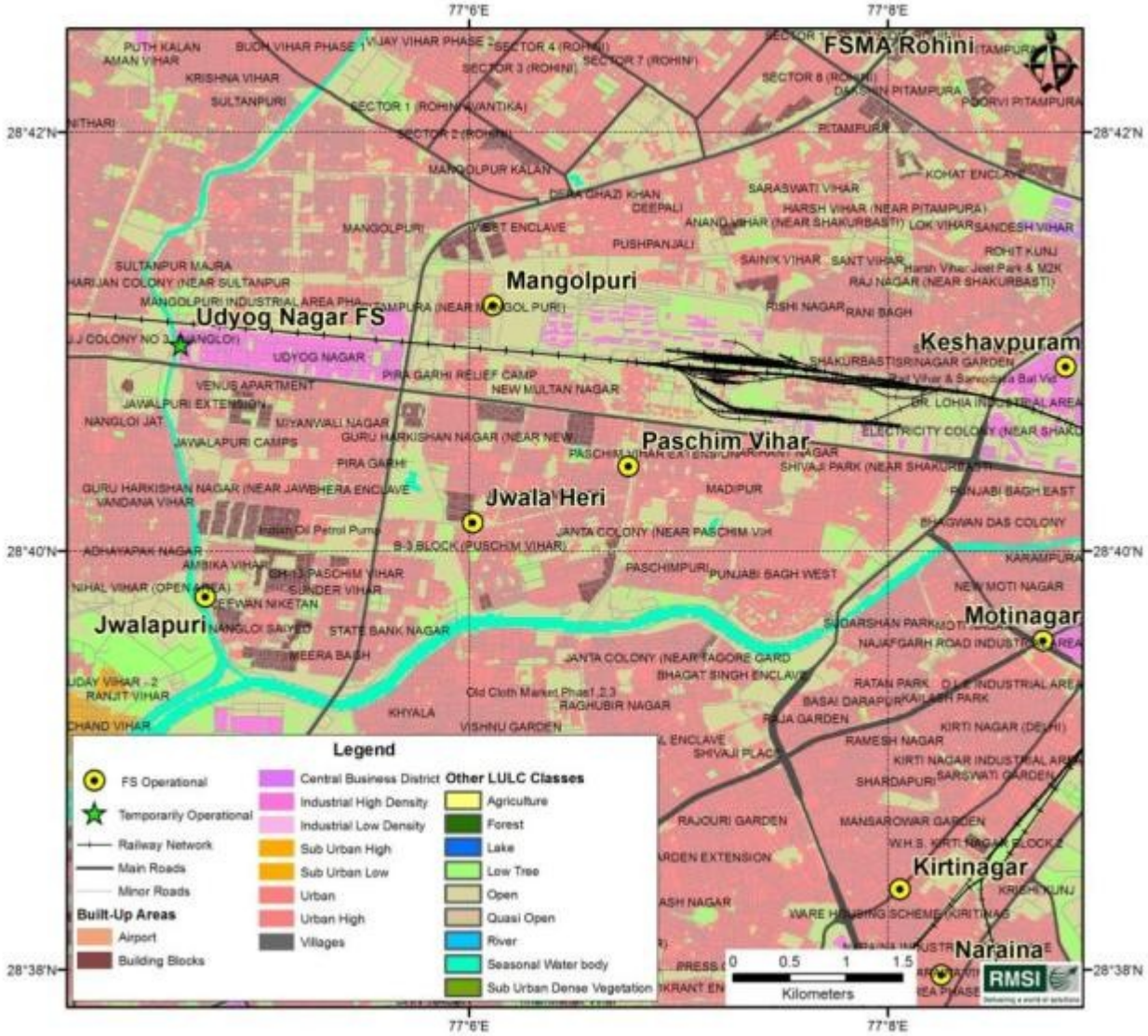


Figure 3-3 : An example of a detailed classified urban agglomerate area. The example shows parts of Delhi with overlay of GPS locations of Fire Stations

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

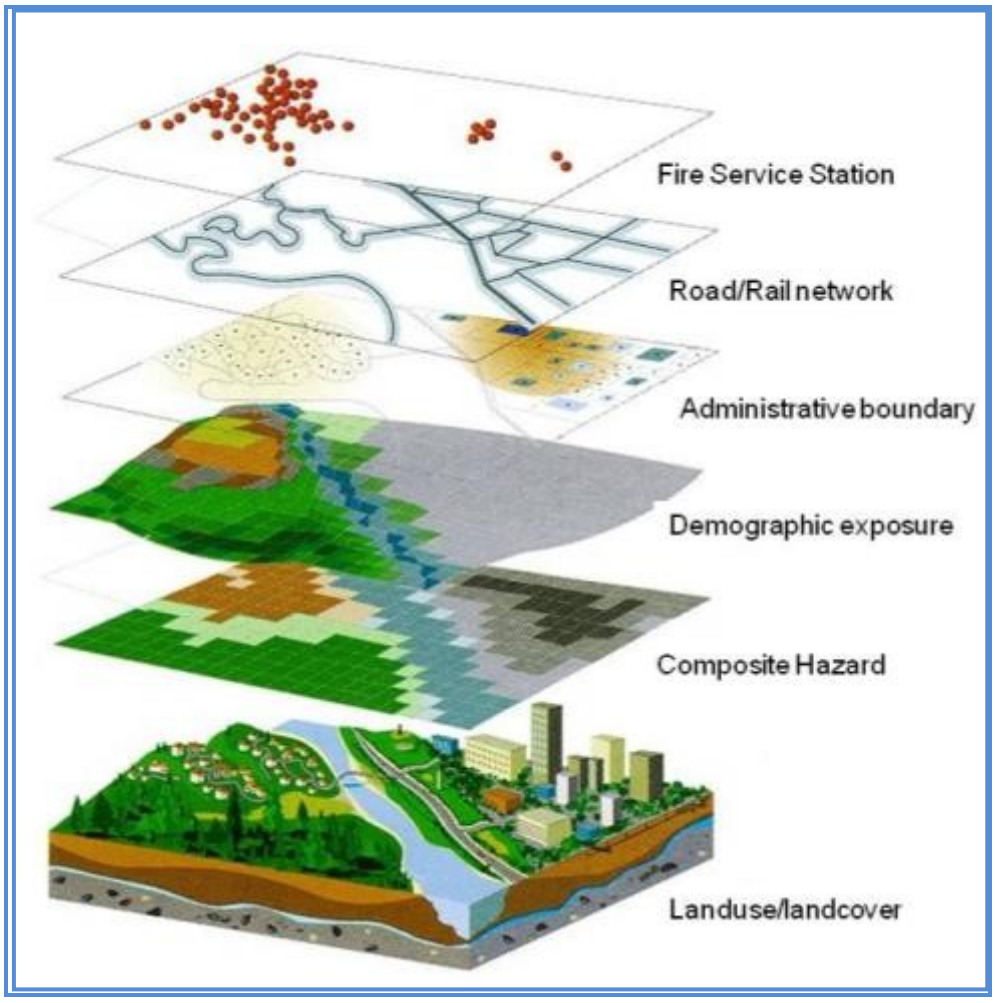


Figure 3-4 : Overlay analysis for Fire Risk Assessment

3.2 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 firefighting and rescue vehicles, specialized equipment and manpower should also take into consideration of fire risks in addition to road conditions and population distribution. Thus, hazard and risk analysis of the base unit (district) should be on a scientific basis.

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

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

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

3.3 Hazard Ranking

Earthquake (Seismic zones)

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

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

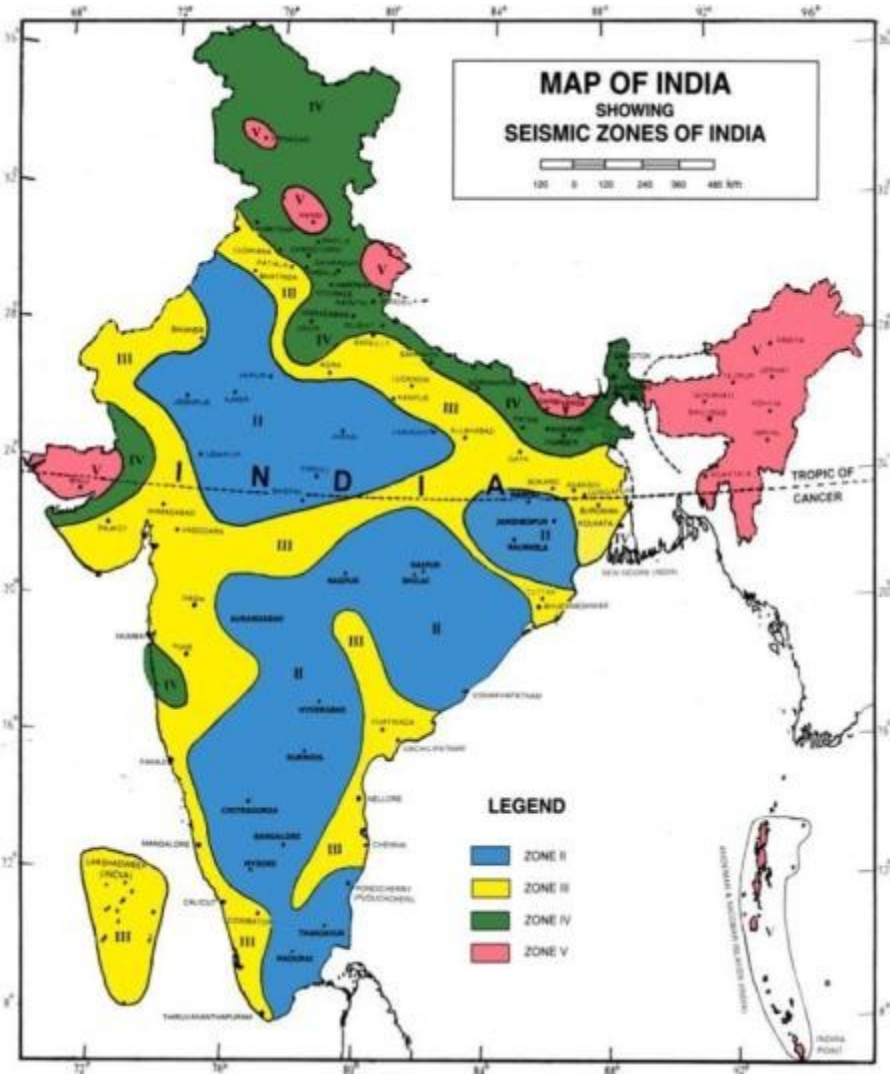


Figure 3-5 : Seismic zones of India

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

Wind Zones

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

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

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

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

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

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

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

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

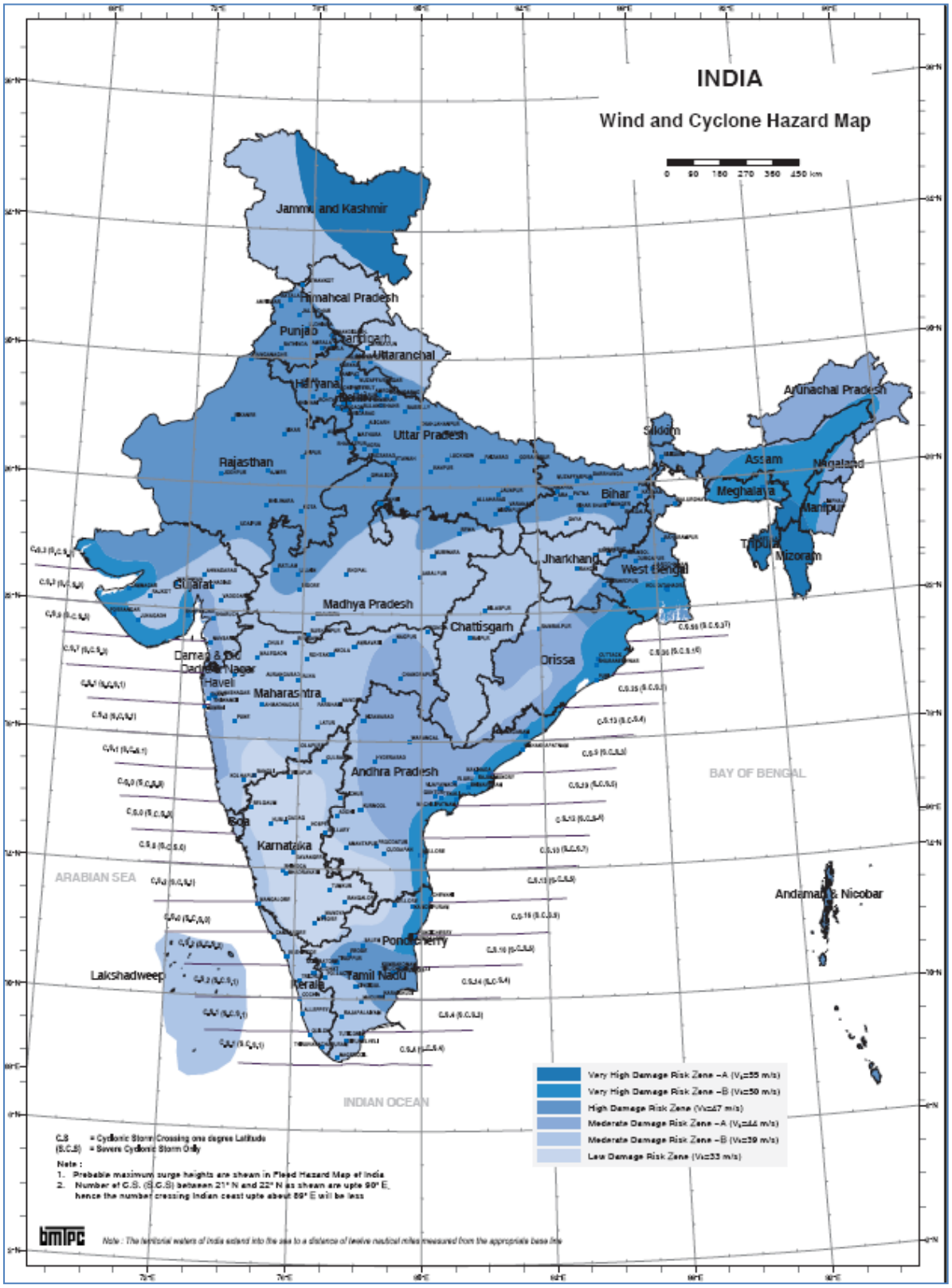


Figure 3-6 : Wind zone map of India (BMTPC, 2006)

Climatic Zones

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

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

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

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

Hilly Areas and Building Class Zones

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

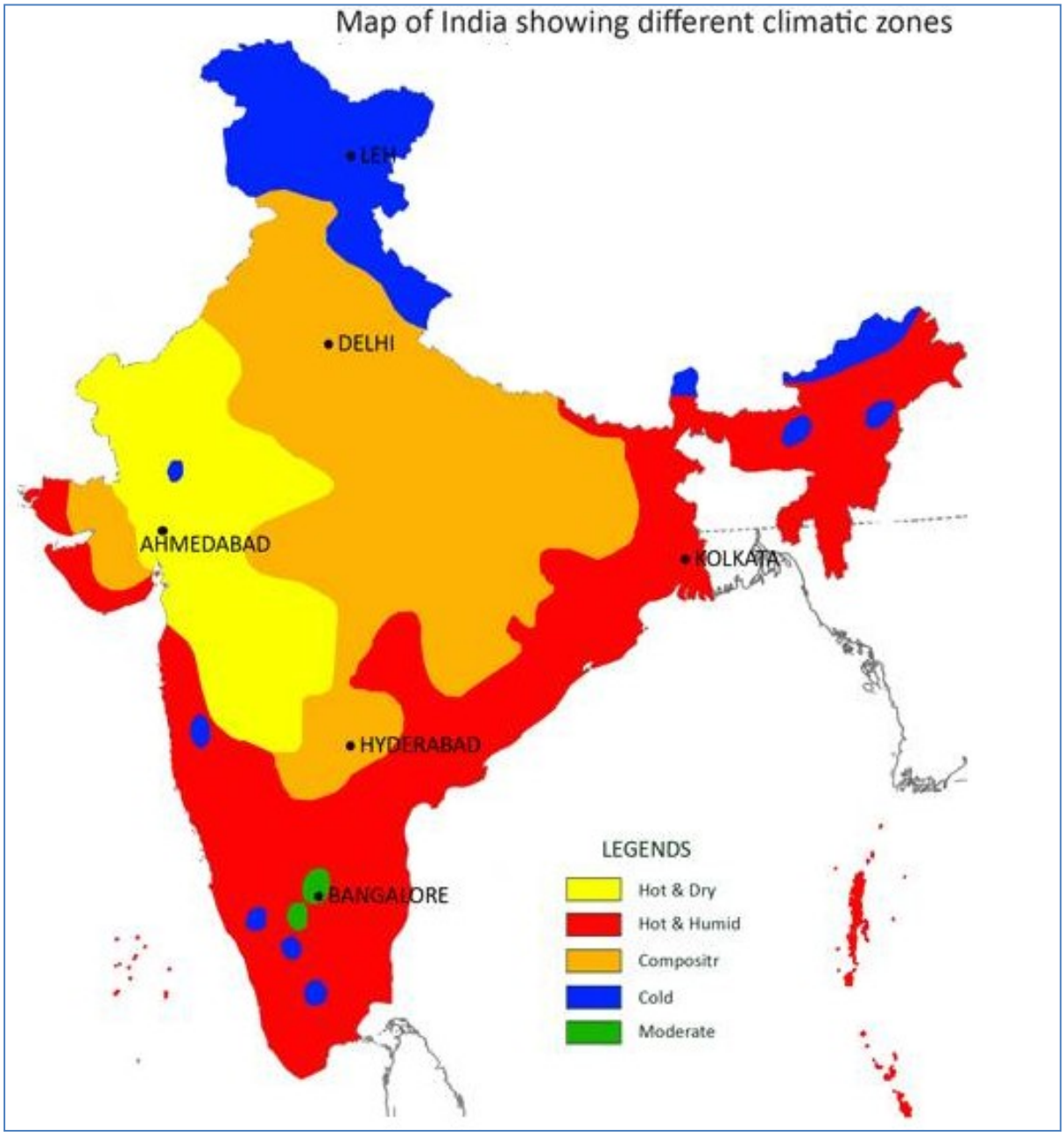


Figure 3-7 : Climatic Zones of India

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

Importance Factor			20%	20%	20%	40%	
State	State/District	Total Area	Wind Zoning	Seismic Zoning	Climate Zoning	Hill Zoning	Integrated Hazard Zoning
Andhra Pradesh							
	Adilabad	16,114	2.0	1.4	1.3	1.5	1.5
	Anantapur	19,182	1.1	1.0	1.1	1.0	1.0
	Chittoor	15,013	1.4	1.5	1.0	1.0	1.2
	East Godavari	10,840	2.9	1.8	1.0	1.0	1.5
	Guntur	11,400	2.3	1.4	1.0	1.0	1.3
	Hyderabad	192	2.0	1.0	2.0	2.0	1.8
	Karimnagar	11,845	2.0	1.2	1.9	2.0	1.8
	Khammam	15,968	2.0	1.9	1.0	1.0	1.4
	Krishna	8,754	2.6	2.0	1.0	1.0	1.5
	Kurnool	17,701	1.6	1.0	1.0	1.0	1.1
	Mahbubnagar	18,471	1.8	1.0	1.7	2.0	1.7
	Medak	9,726	1.9	1.0	2.0	2.0	1.8
	Nalgonda	14,233	2.0	1.0	1.4	1.5	1.5
	Nizamabad	7,971	1.9	1.0	2.0	2.0	1.8
	Prakasam	17,617	2.5	1.2	1.0	1.0	1.3
	Rangareddy	7,510	1.8	1.0	2.0	2.0	1.8
	Sri Potti Sriramulu Nellore	13,213	2.9	1.8	1.0	1.0	1.5
	Srikakulam	5,867	3.3	1.0	1.0	1.0	1.5
	Visakhapatnam	11,604	2.6	1.0	1.0	1.0	1.3
	Vizianagaram	6,169	2.6	1.0	1.0	1.0	1.3
	Warangal	12,911	2.0	1.3	1.6	2.0	1.8
	West Godavari	7,727	2.4	2.0	1.0	1.0	1.5
	Y.S.R.	15,356	1.4	1.1	1.0	1.0	1.1
Bihar							
	Araria	2,826	3.0	4.0	1.0	1.0	2.0
	Arwal	521	3.0	2.0	2.0	2.0	2.2
	Aurangabad	3,314	1.9	2.0	2.0	2.0	2.0
	Banka	3,055	2.8	2.8	1.4	1.5	2.0
	Begusarai	1,946	3.0	3.0	2.0	2.0	2.4
	Bhagalpur	2,578	3.0	3.0	1.0	1.0	1.8
	Bhojpur	2,431	3.0	2.0	2.0	2.0	2.2
	Buxar	1,668	3.0	2.0	2.0	2.0	2.2
	Darbhanga	2,524	3.0	3.5	1.8	2.0	2.5
	Gaya	4,985	1.5	2.0	2.0	2.0	1.9
	Gopalganj	2,044	3.0	3.0	2.0	2.0	2.4
	Jamui	3,121	1.6	2.4	2.0	2.0	2.0
	Jehanabad	1,060	2.8	2.0	2.0	2.0	2.2

Importance Factor			20%	20%	20%	40%	
State	State/District	Total Area	Wind Zoning	Seismic Zoning	Climate Zoning	Hill Zoning	Integrated Hazard Zoning
	Kaimur (Bhabua)	3,372	2.6	2.0	2.0	2.0	2.1
	Katihar	3,070	3.0	3.0	1.0	1.0	1.8
	Khagaria	1,504	3.0	3.0	1.4	1.5	2.1
	Kishanganj	2,012	3.0	3.4	1.0	1.0	1.9
	Lakhisarai	1,225	2.7	3.0	2.0	2.0	2.3
	Madhepura	1,816	3.0	3.6	1.0	1.0	1.9
	Madhubani	3,525	3.0	4.0	1.0	1.0	2.0
	Munger	1,421	3.0	3.0	2.0	2.0	2.4
	Muzaffarpur	3,191	3.0	3.0	1.9	2.0	2.4
	Nalanda	2,378	2.8	2.7	2.0	2.0	2.3
	Nawada	2,504	1.5	2.1	2.0	2.0	1.9
	Pashchim Champaran	5,245	3.0	3.0	1.7	2.0	2.3
	Patna	3,191	3.0	2.6	2.0	2.0	2.3
	Purba Champaran	3,982	3.0	3.0	1.4	1.5	2.1
	Purnia	3,245	3.0	3.3	1.0	1.0	1.9
	Rohtas	3,850	2.5	2.0	2.0	2.0	2.1
	Saharsa	1,677	3.0	3.3	1.4	1.5	2.1
	Samastipur	2,701	3.0	3.0	2.0	2.0	2.4
	Saran	2,686	3.0	2.8	2.0	2.0	2.4
	Sheikhpura	668	2.5	3.0	2.0	2.0	2.3
	Sheohar	444	3.0	3.0	1.0	1.0	1.8
	Sitamarhi	2,199	3.0	3.4	1.0	1.0	1.9
	Siwan	2,223	3.0	2.6	2.0	2.0	2.3
	Supaul	2,437	3.0	4.0	1.0	1.0	2.0
	Vaishali	2,030	3.0	3.0	2.0	2.0	2.4
Kerala							
	Alappuzha	1,423	1.5	2.0	1.0	1.0	1.3
	Ernakulam	3,067	1.5	2.0	1.0	1.0	1.3
	Idukki	4,377	1.5	2.0	1.0	1.0	1.3
	Kannur	2,979	1.5	2.0	1.0	1.0	1.3
	Kasaragod	1,998	1.5	2.0	1.0	1.0	1.3
	Kollam	2,495	1.5	2.0	1.0	1.0	1.3
	Kottayam	2,216	1.5	2.0	1.0	1.0	1.3
	Kozhikode	2,353	1.5	2.0	1.0	1.0	1.3
	Malappuram	3,579	1.4	2.0	1.0	1.0	1.3
	Palakkad	4,503	1.5	2.0	1.0	1.0	1.3
	Pathanamthitta	2,662	1.5	2.0	1.0	1.0	1.3
	Thiruvananthapuram	2,180	1.5	2.0	1.0	1.0	1.3
	Thrissur	3,053	1.5	2.0	1.0	1.0	1.3
	Wayanad	2,149	1.2	2.0	1.0	1.0	1.2

Importance Factor			20%	20%	20%	40%	
State	State/District	Total Area	Wind Zoning	Seismic Zoning	Climate Zoning	Hill Zoning	Integrated Hazard Zoning
Tamil Nadu							
	Ariyalur	1,940	3.0	1.0	1.0	1.0	1.4
	Chennai	167	3.5	2.0	1.0	1.0	1.7
	Coimbatore	3,857	1.5	2.0	1.0	1.0	1.3
	Cuddalore	3,718	3.3	1.0	1.0	1.0	1.5
	Dharmapuri	4,502	1.4	1.5	1.0	1.0	1.2
	Dindigul	6,063	1.8	1.1	1.0	3.0	2.0
	Erode	6,008	2.2	1.2	1.0	1.0	1.3
	Kancheepuram	4,477	3.3	1.4	1.0	1.0	1.5
	Kanniyakumari	1,688	1.5	2.0	1.0	1.0	1.3
	Karur	2,908	3.0	1.0	1.0	1.0	1.4
	Krishnagiri	5,138	1.1	1.2	1.0	1.0	1.0
	Madurai	3,717	1.6	1.0	1.0	1.0	1.1
	Nagapattinam	2,567	3.0	1.0	1.0	1.0	1.4
	Namakkal	3,425	3.0	1.1	1.0	1.0	1.4
	Perambalur	1,747	3.0	1.0	1.0	1.0	1.4
	Pudukkottai	4,670	3.0	1.0	1.0	1.0	1.4
	Ramanathapuram	4,254	1.8	1.0	1.0	1.0	1.2
	Salem	5,246	2.6	1.3	1.0	1.0	1.4
	Sivaganga	4,102	2.4	1.0	1.0	1.0	1.3
	Thanjavur	3,408	3.0	1.0	1.0	1.0	1.4
	The Nilgiris	2,576	1.2	2.0	1.0	1.0	1.2
	Theni	2,875	1.5	1.2	1.0	1.0	1.1
	Thiruvallur	3,401	3.0	2.0	1.0	1.0	1.6
	Thiruvarur	2,117	3.0	1.0	1.0	1.0	1.4
	Thoothukkudi	4,636	1.5	1.0	1.0	1.0	1.1
	Tiruchirappalli	4,499	3.0	1.0	1.0	1.0	1.4
	Tirunelveli	6,819	1.5	1.4	1.0	1.0	1.2
	Tiruppur	5,860	2.4	1.7	1.0	1.0	1.4
	Tiruvannamalai	6,192	1.6	1.6	1.0	1.0	1.3
	Vellore	6,077	1.2	2.0	1.0	1.0	1.2
	Viluppuram	7,290	2.4	1.0	1.0	1.0	1.3
	Virudhunagar	4,253	1.5	1.0	1.0	1.0	1.1

3.5 Exposure Vulnerability Ranking

For estimating exposure and its vulnerability, detailed urban agglomerate classification maps generated from high-resolution satellite images have been used. With the help of remote sensing techniques applied on high-resolution satellite imageries, 10 types of urban agglomeration areas have been delineated (Figures 3-1 and 3-2). For major city areas, even more detailed urban agglomerate classification has been created with high-resolution data

layers as shown in Figure 3-3. These include urban, semi-urban, building blocks, industrial and rural villages' built-up areas. District level census 2011 population has been distributed to each population agglomeration cluster. For exposure vulnerability, 4 different layers viz. population density, residential built-up areas, high-rise building block density, and industrial areas have been developed individually at district level. Table 3-4 shows district level geographical area, population, population density, residential built-up area, industrial area, and residential built-up area.

Table 3-4: District level geographical area, population, population density, residential built-up area, residential built-up area, and industrial area

State	District	Geographl. Area (sq km)	Population 2011	Pop. Density (persons/sq. km.)	Res Built-Up Area Sq Km	Industrial Area Sq Km	Res Built-Up Area (In %)
Andhra Pradesh							
	Adilabad	16,114	2,737,738	169.90	32.37	35.31	0.20%
	Anantapur	19,182	4,083,315	212.87	39.53	43.04	0.21%
	Chittoor	15,013	4,170,468	277.79	38.32	41.75	0.26%
	East Godavari	10,840	5,151,549	475.24	36.69	39.94	0.34%
	Guntur	11,400	4,889,230	428.87	39.62	43.24	0.35%
	Hyderabad	192	4,010,238	20,924.27	5.91	6.39	3.08%
	Karimnagar	11,845	3,811,738	321.80	33.68	36.92	0.28%
	Khammam	15,968	2,798,214	175.24	42.47	-	0.27%
	Krishna	8,754	4,529,009	517.39	48.16	-	0.55%
	Kurnool	17,701	4,046,601	228.61	26.74	-	0.15%
	Mahbubnagar	18,471	4,042,191	218.84	22.33	-	0.12%
	Medak	9,726	3,031,877	311.74	30.42	33.12	0.31%
	Nalgonda	14,233	3,483,648	244.76	38.44	-	0.27%
	Nizamabad	7,971	2,552,073	320.18	18.92	-	0.24%
	Prakasam	17,617	3,392,764	192.59	27.95	-	0.16%
	Rangareddy	7,510	5,296,396	705.24	112.25	122.53	1.49%
	Sri Potti Sriramulu Nellore	13,213	2,966,082	224.49	23.06	25.74	0.17%
	Srikakulam	5,867	2,699,471	460.14	8.66	9.53	0.15%
	Visakhapatnam	11,604	4,288,113	369.53	36.14	39.18	0.31%
	Vizianagaram	6,169	2,342,868	379.80	7.80	8.39	0.13%
	Warangal	12,911	3,522,644	272.85	290.54	7.00	2.25%
	West Godavari	7,727	3,934,782	509.24	237.97	10.43	3.08%
	Y.S.R.	15,356	2,884,524	187.85	40.15	43.84	0.26%
Bihar							
	Araria	2,826	2,806,200	993.12	150.62	0.33	5.33%

State	District	Geographl. Area (sq km)	Population 2011	Pop. Density (persons/sq. km.)	Res Built-Up Area Sq Km	Industrial Area Sq Km	Res Built-Up Area (In %)
	Arwal	521	699,563	1,343.16	16.61	0.01	3.19%
	Aurangabad	3,314	2,511,243	757.82	99.78	0.71	3.01%
	Banka	3,055	2,029,339	664.20	98.31	0.05	3.22%
	Begusarai	1,946	2,954,367	1,518.27	83.39	2.47	4.29%
	Bhagalpur	2,578	3,032,226	1,176.36	90.88	0.78	3.53%
	Bhojpur	2,431	2,720,155	1,118.83	89.13	0.50	3.67%
	Buxar	1,668	1,707,643	1,023.52	66.60	1.01	3.99%
	Darbhanga	2,524	3,921,971	1,554.09	98.57	0.80	3.91%
	Gaya	4,985	4,379,383	878.45	182.63	0.97	3.66%
	Gopalganj	2,044	2,558,037	1,251.62	123.98	0.30	6.07%
	Jamui	3,121	1,756,078	562.75	71.65	0.11	2.30%
	Jehanabad	1,060	1,124,176	1,060.89	49.26	0.40	4.65%
	Kaimur (Bhabua)	3,372	1,626,900	482.45	47.13	1.84	1.40%
	Katihar	3,070	3,068,149	999.55	112.79	0.31	3.67%
	Khagaria	1,504	1,657,599	1,102.23	55.26	0.01	3.67%
	Kishanganj	2,012	1,690,948	840.42	92.64	0.18	4.60%
	Lakhisarai	1,225	1,000,717	816.97	41.60	0.04	3.40%
	Madhepura	1,816	1,994,618	1,098.19	70.36	0.03	3.87%
	Madhubani	3,525	4,476,044	1,269.72	165.12	0.04	4.68%
	Munger	1,421	1,359,054	956.59	54.86	0.48	3.86%
	Muzaffarpur	3,191	4,778,610	1,497.46	181.37	1.87	5.68%
	Nalanda	2,378	2,872,523	1,207.92	90.99	0.72	3.83%
	Nawada	2,504	2,216,653	885.20	74.18	0.23	2.96%
	Pashchim Champaran	5,245	3,922,780	747.95	167.90	0.82	3.20%
	Patna	3,191	5,772,804	1,809.32	172.29	5.53	5.40%
	Purba Champaran	3,982	5,082,868	1,276.34	266.98	1.20	6.70%
	Purnia	3,245	3,273,127	1,008.76	153.10	0.10	4.72%
	Rohtas	3,850	2,962,593	769.45	118.87	2.16	3.09%
	Saharsa	1,677	1,897,102	1,130.94	54.84	0.09	3.27%
	Samastipur	2,701	4,254,782	1,575.26	169.97	0.12	6.29%
	Saran	2,686	3,943,098	1,467.96	123.02	0.71	4.58%
	Sheikhpura	668	634,927	950.84	17.44	0.13	2.61%
	Sheohar	444	656,916	1,480.71	41.70	0.15	9.40%

State	District	Geographl. Area (sq km)	Population 2011	Pop. Density (persons/sq. km.)	Res Built-Up Area Sq Km	Industrial Area Sq Km	Res Built-Up Area (In %)
	Sitamarhi	2,199	3,419,622	1,555.04	119.43	0.32	5.43%
	Siwan	2,223	3,318,176	1,492.72	158.36	0.37	7.12%
	Supaul	2,437	2,228,397	914.30	96.49	0.09	3.96%
	Vaishali	2,030	3,495,249	1,722.04	107.86	0.70	5.31%
Kerala							
	Alappuzha	1,423	2,121,943	1,491.08	230.06	1.32	16.17%
	Ernakulam	3,067	3,279,860	1,069.39	273.50	6.12	8.92%
	Idukki	4,377	1,107,453	253.02	87.65	0.07	2.00%
	Kannur	2,979	2,525,637	847.77	243.68	0.91	8.18%
	Kasaragod	1,998	1,302,600	651.93	149.47	1.25	7.48%
	Kollam	2,495	2,629,703	1,053.91	275.24	1.46	11.03%
	Kottayam	2,216	1,979,384	893.34	173.51	0.85	7.83%
	Kozhikode	2,353	3,089,543	1,312.77	157.94	1.74	6.71%
	Malappuram	3,579	4,110,956	1,148.75	350.83	1.00	9.80%
	Palakkad	4,503	2,810,892	624.20	341.73	2.73	7.59%
	Pathanamthitta	2,662	1,195,537	449.12	138.76	1.23	5.21%
	Thiruvananthapuram	2,180	3,307,284	1,516.92	145.57	5.66	6.68%
	Thrissur	3,053	3,110,327	1,018.83	325.72	1.89	10.67%
	Wayanad	2,149	816,558	379.93	57.74	0.26	2.69%
Tamil Nadu							
	Ariyalur	1,940	752,481	387.95	33.64	2.45	1.73%
	Chennai	167	4,681,087	28,025.00	93.72	4.42	56.11%
	Coimbatore	3,857	3,472,578	900.43	182.35	24.37	4.73%
	Cuddalore	3,718	2,600,880	699.48	127.64	7.53	3.43%
	Dharmapuri	4,502	1,502,900	333.82	39.76	1.70	0.88%
	Dindigul	6,063	2,161,367	356.49	196.03	8.42	3.23%
	Erode	6,008	2,259,608	376.09	117.41	9.08	1.95%
	Kancheepuram	4,477	3,990,897	891.48	212.63	21.76	4.75%
	Kanniyakumari	1,688	1,863,174	1,103.51	113.12	0.42	6.70%
	Karur	2,908	1,076,588	370.21	71.98	4.25	2.48%
	Krishnagiri	5,138	1,883,731	366.63	61.78	12.23	1.20%
	Madurai	3,717	3,041,038	818.19	109.33	10.79	2.94%
	Nagapattinam	2,567	1,614,069	628.81	112.68	0.95	4.39%
	Namakkal	3,425	1,721,179	502.53	79.26	15.24	2.31%

State	District	Geographl. Area (sq km)	Population 2011	Pop. Density (persons/sq. km.)	Res Built-Up Area Sq Km	Industrial Area Sq Km	Res Built-Up Area (In %)
	Perambalur	1,747	564,511	323.12	24.31	0.28	1.39%
	Pudukkottai	4,670	1,618,725	346.64	232.27	3.49	4.97%
	Ramanathapuram	4,254	1,337,560	314.46	103.34	0.83	2.43%
	Salem	5,246	3,480,008	663.39	113.90	18.23	2.17%
	Sivaganga	4,102	1,341,250	327.01	148.98	3.13	3.63%
	Thanjavur	3,408	2,402,781	704.98	245.74	1.73	7.21%
	The Nilgiris	2,576	735,071	285.39	34.30	0.67	1.33%
	Theni	2,875	1,243,684	432.62	57.12	2.75	1.99%
	Thiruvallur	3,401	3,725,697	1,095.45	168.85	23.10	4.96%
	Thiruvarur	2,117	1,268,094	599.07	125.81	0.47	5.94%
	Thoothukkudi	4,636	1,738,376	375.01	155.27	5.17	3.35%
	Tiruchirappalli	4,499	2,713,858	603.16	180.73	3.53	4.02%
	Tirunelveli	6,819	3,072,880	450.61	227.48	3.45	3.34%
	Tiruppur	5,860	2,471,222	421.74	174.60	21.28	2.98%
	Tiruvannamalai	6,192	2,468,965	398.73	105.21	1.54	1.70%
	Vellore	6,077	3,928,106	646.38	142.30	5.80	2.34%
	Viluppuram	7,290	3,463,284	475.11	183.51	3.35	2.52%
	Virudhunagar	4,253	1,943,309	456.89	123.38	9.68	2.90%

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

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

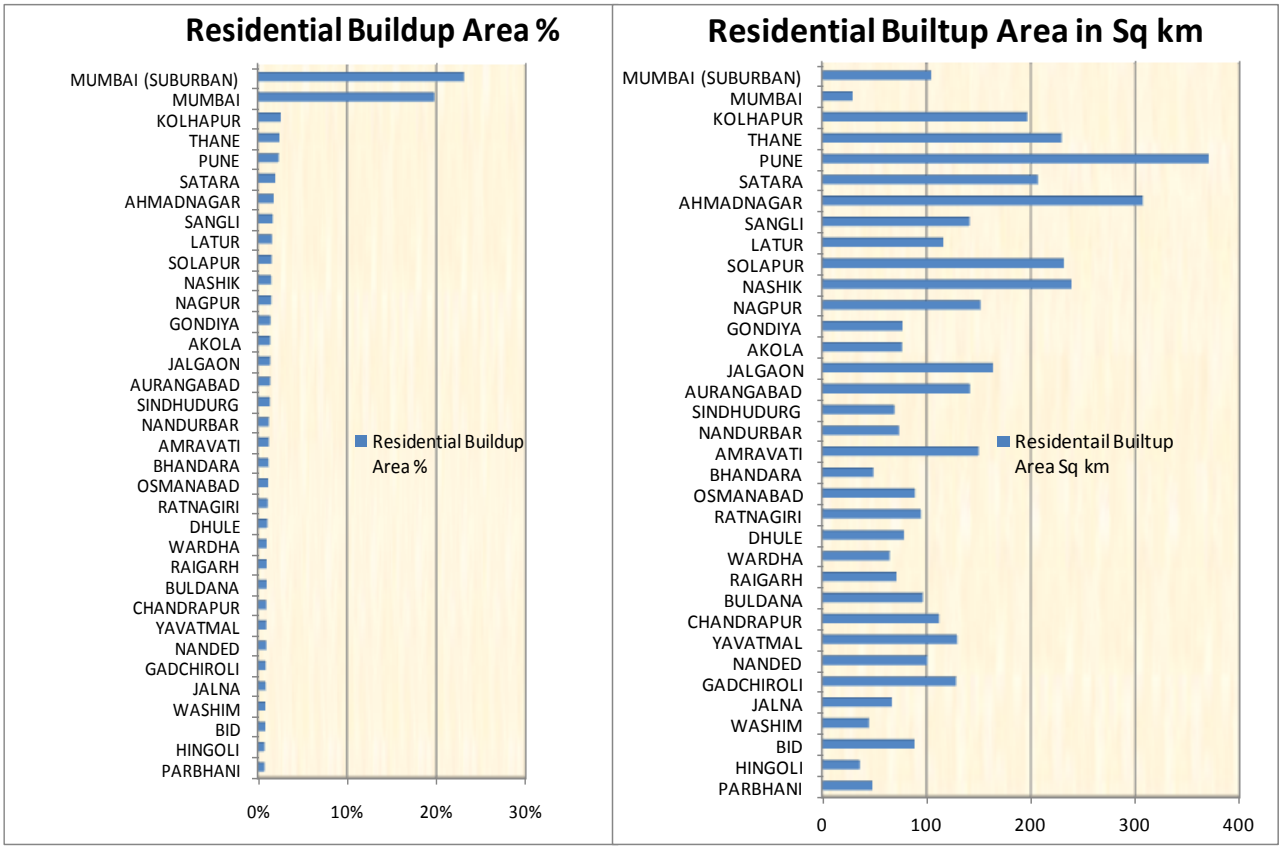


Figure 3-8 : Example of comparison of district level rankings for residential built-up area percentages and absolute areas (in sq km). The example shows a comparison for all 35 districts of Maharashtra State

An example of this is shown in Figure 3-8 for Maharashtra. It can be seen that Pune district has the highest residential built-up area, while in terms of residential built-up area in percentage, Pune district comes at fifth rank (Figure 3-8).

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

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

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

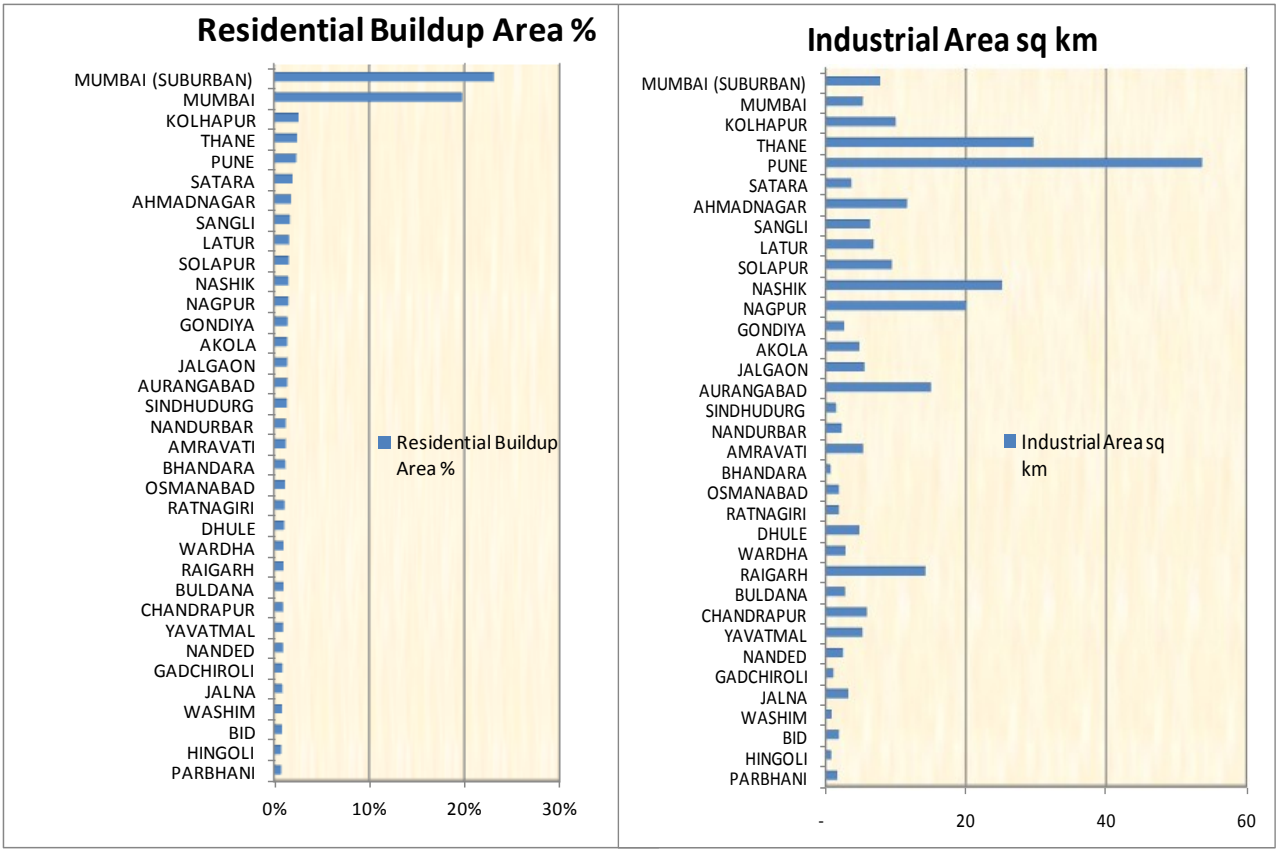


Figure 3-9 : Example of comparison of district level rankings for residential built-up areas and industrial areas (in sq km). The example shows a comparison for all 35 districts of Maharashtra State

Integrated Risk Analysis

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

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

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

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

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

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

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

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

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

Table 3-7: District risk rankings for four States of Phase III

State	District	Population Density Ranking	Res Built-up Area Sq km Ranking	Res Built-Up Area percentage Ranking	Industrial Area Sq km Ranking	Integrated Ranking	Overall District Risk Ranking
Andhra Pradesh							
	Adilabad	1	2	1	5	6	Medium
	Anantapur	2	2	1	5	6	Medium
	Chittoor	2	2	1	5	6	Medium
	East Godavari	2	2	1	5	7	Medium
	Guntur	2	2	1	5	6	Medium
	Hyderabad	5	1	3	4	8	High
	Karimnagar	2	2	1	5	7	Medium
	Khammam	1	2	1	1	3	Low
	Krishna	3	2	2	1	5	Low
	Kurnool	2	2	1	1	4	Low
	Mahbubnagar	2	2	1	1	4	Low
	Medak	2	2	1	5	7	Medium
	Nalgonda	2	2	1	1	4	Low
	Nizamabad	2	1	1	1	4	Low
	Prakasam	1	2	1	1	3	Low
	Rangareddy	3	4	2	5	9	Very High
	Sri Potti Sriramulu Nellore	2	2	1	5	7	Medium
	Srikakulam	2	1	1	4	5	Low
	Visakhapatnam	2	2	1	5	6	Medium
	Vizianagaram	2	1	1	4	5	Low
	Warangal	2	5	2	4	8	High
	West Godavari	3	5	3	5	9	Very High
	Y.S.R.	1	2	1	5	6	Medium
Bihar							
	Araria	3	4	3	1	8	High
	Arwal	4	1	3	1	7	Medium
	Aurangabad	3	4	3	1	7	Medium
	Banka	3	3	3	1	7	Medium
	Begusarai	4	3	3	3	9	Very High
	Bhagalpur	4	3	3	1	7	Medium
	Bhojpur	4	3	3	1	8	High
	Buxar	4	3	3	2	8	High
	Darbhanga	4	3	3	1	8	High
	Gaya	3	4	3	1	7	Medium
	Gopalganj	4	4	3	1	8	High
	Jamui	3	3	2	1	7	Medium

State	District	Population Density Ranking	Res Built-up Area Sq km Ranking	Res Built-Up Area percentage Ranking	Industrial Area Sq km Ranking	Integrated Ranking	Overall District Risk Ranking
	Jehanabad	4	3	3	1	8	High
	Kaimur (Bhabua)	2	2	2	2	6	Medium
	Katihar	4	4	3	1	8	High
	Khagaria	4	3	3	1	8	High
	Kishanganj	3	3	3	1	7	Medium
	Lakhisarai	3	2	3	1	7	Medium
	Madhepura	4	3	3	1	7	Medium
	Madhubani	4	4	3	1	8	High
	Munger	3	3	3	1	7	Medium
	Muzaffarpur	4	4	3	2	9	Very High
	Nalanda	4	3	3	1	8	High
	Nawada	3	3	3	1	7	Medium
	Pashchim Champaran	3	4	3	1	8	High
	Patna	4	4	3	4	10	Very High
	Purba Champaran	4	5	3	2	9	Very High
	Purnia	4	4	3	1	8	High
	Rohtas	3	4	3	3	9	Very High
	Saharsa	4	3	3	1	8	High
	Samastipur	4	4	3	1	8	High
	Saran	4	4	3	1	8	High
	Sheikhpura	3	1	3	1	6	Medium
	Sheohar	4	2	3	1	7	Medium
	Sitamarhi	4	4	3	1	8	High
	Siwan	4	4	3	1	8	High
	Supaul	3	3	3	1	7	Medium
	Vaishali	4	4	3	1	8	High
Kerala							
	Alappuzha	4	5	4	2	9	Very High
	Ernakulam	4	5	3	4	9	Very High
	Idukki	2	3	2	1	5	Low
	Kannur	3	5	3	1	7	Medium
	Kasaragod	3	4	3	2	7	Medium
	Kollam	4	5	3	2	8	High
	Kottayam	3	4	3	1	7	Medium
	Kozhikode	4	4	3	2	8	High
	Malappuram	4	5	3	1	8	High
	Palakkad	3	5	3	3	8	High
	Pathanamthitta	2	4	3	2	7	Medium

State	District	Population Density Ranking	Res Built-up Area Sq km Ranking	Res Built-Up Area percentage Ranking	Industrial Area Sq km Ranking	Integrated Ranking	Overall District Risk Ranking
	Thiruvananthapuram	4	4	3	4	9	Very High
	Thrissur	4	5	3	2	8	High
	Wayanad	2	3	3	1	6	Medium
Tamil Nadu							
	Ariyalur	2	2	2	3	6	Medium
	Chennai	5	3	5	4	10	Very High
	Coimbatore	3	4	3	5	9	Very High
	Cuddalore	3	4	3	4	8	High
	Dharmapuri	2	2	2	2	5	Low
	Dindigul	2	5	3	4	9	Very High
	Erode	2	4	2	4	7	Medium
	Kancheepuram	3	5	3	5	10	Very High
	Kanniyakumari	4	4	3	1	7	Medium
	Karur	2	3	2	4	7	Medium
	Krishnagiri	2	3	2	5	7	Medium
	Madurai	3	4	3	5	9	Very High
	Nagapattinam	3	4	3	1	7	Medium
	Namakkal	3	3	2	5	8	High
	Perambalur	2	2	2	1	5	Low
	Pudukkottai	2	5	3	3	8	High
	Ramanathapuram	2	4	2	1	6	Medium
	Salem	3	4	2	5	8	High
	Sivaganga	2	4	3	3	7	Medium
	Thanjavur	3	5	3	2	8	High
	The Nilgiris	2	2	2	1	5	Low
	Theni	2	3	2	3	6	Medium
	Thiruvallur	4	4	3	5	10	Very High
	Thiruvarur	3	4	3	1	7	Medium
	Thoothukkudi	2	4	3	4	8	High
	Tiruchirappalli	3	4	3	3	8	High
	Tirunelveli	2	5	3	3	8	High
	Tiruppur	2	4	3	5	8	High
	Tiruvannamalai	2	4	2	2	6	Medium
	Vellore	3	4	2	4	8	High
	Viluppuram	2	4	3	3	7	Medium
	Virudhunagar	2	4	3	4	8	High

4 Field Surveys of Fire Stations for Data Collection

At present, there is a lack of a comprehensive centralized database on the distribution of fire service infrastructure, and the stock of existing firefighting 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 had been highlighted along with RMSI's suggested solution.

In case required, as a last stage of the stakeholder analysis, RMSI will hold discussions with officials of the DG NDRF & CD to present the summary of observations for discussion as a close-door meeting by inviting only some of the identified senior personnel. By presenting this perception report collected from various States in a concise manner, RMSI expects a brain-storming session to get some concrete recommendation, which will be in line with various policy matters of the department.

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 access the information of Fire Agencies of entire India 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.

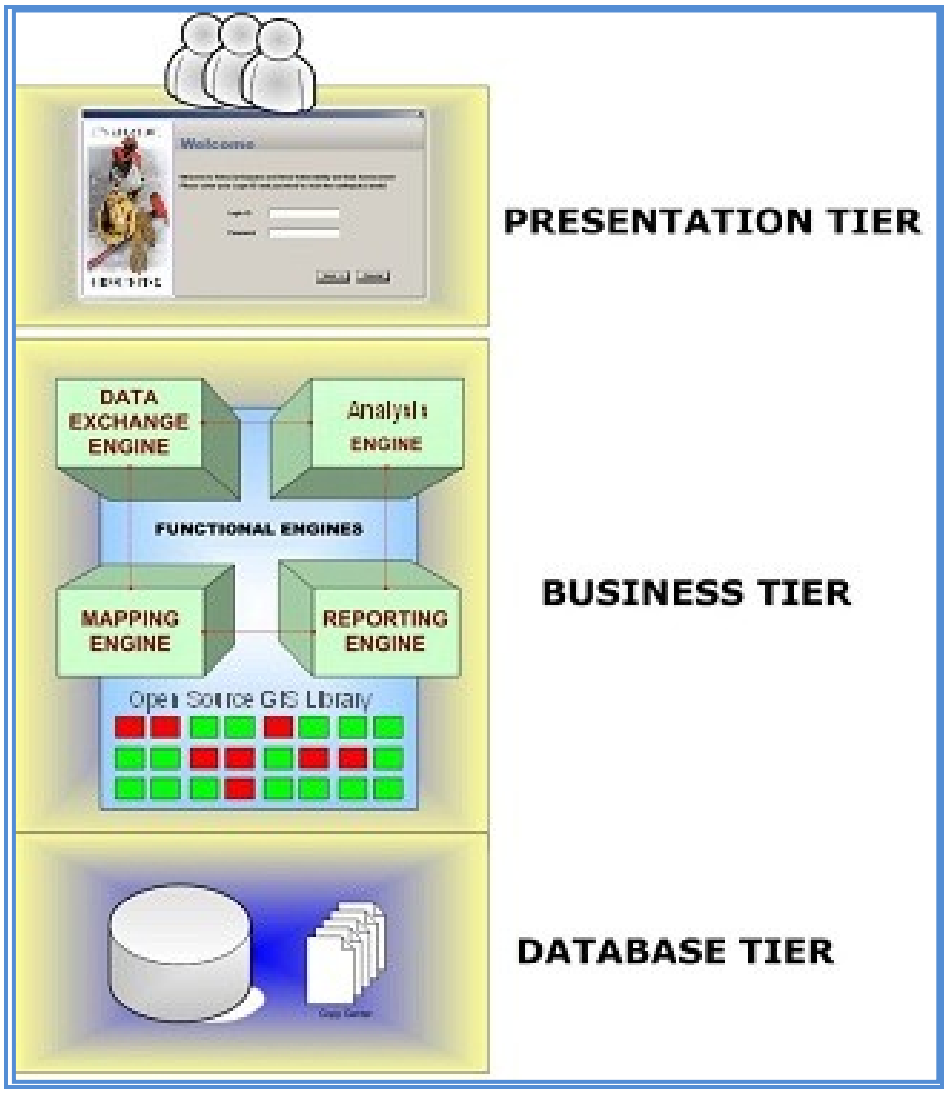


Figure 5-1 : Three-tier architecture

- **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 will be delivered by the FDSS platform.

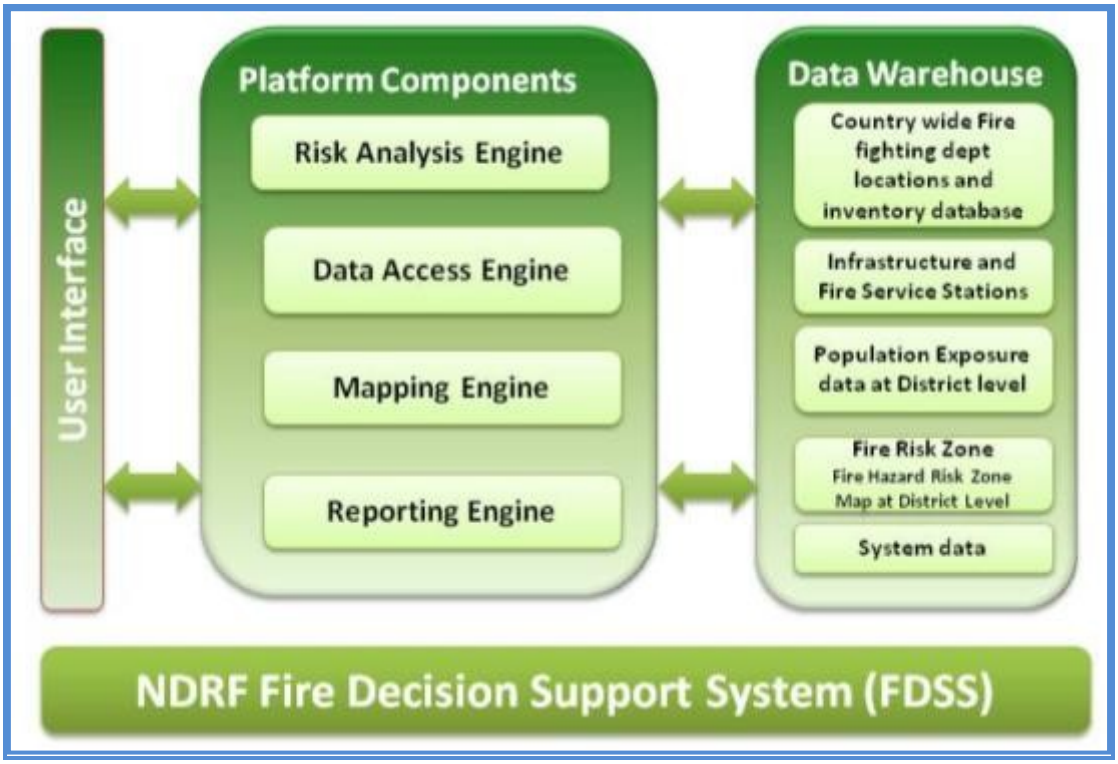


Figure 5-2 : High level design of FDSS

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:

- Risk Profile 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 vehicle, specialized equipment, firefighting manpower 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

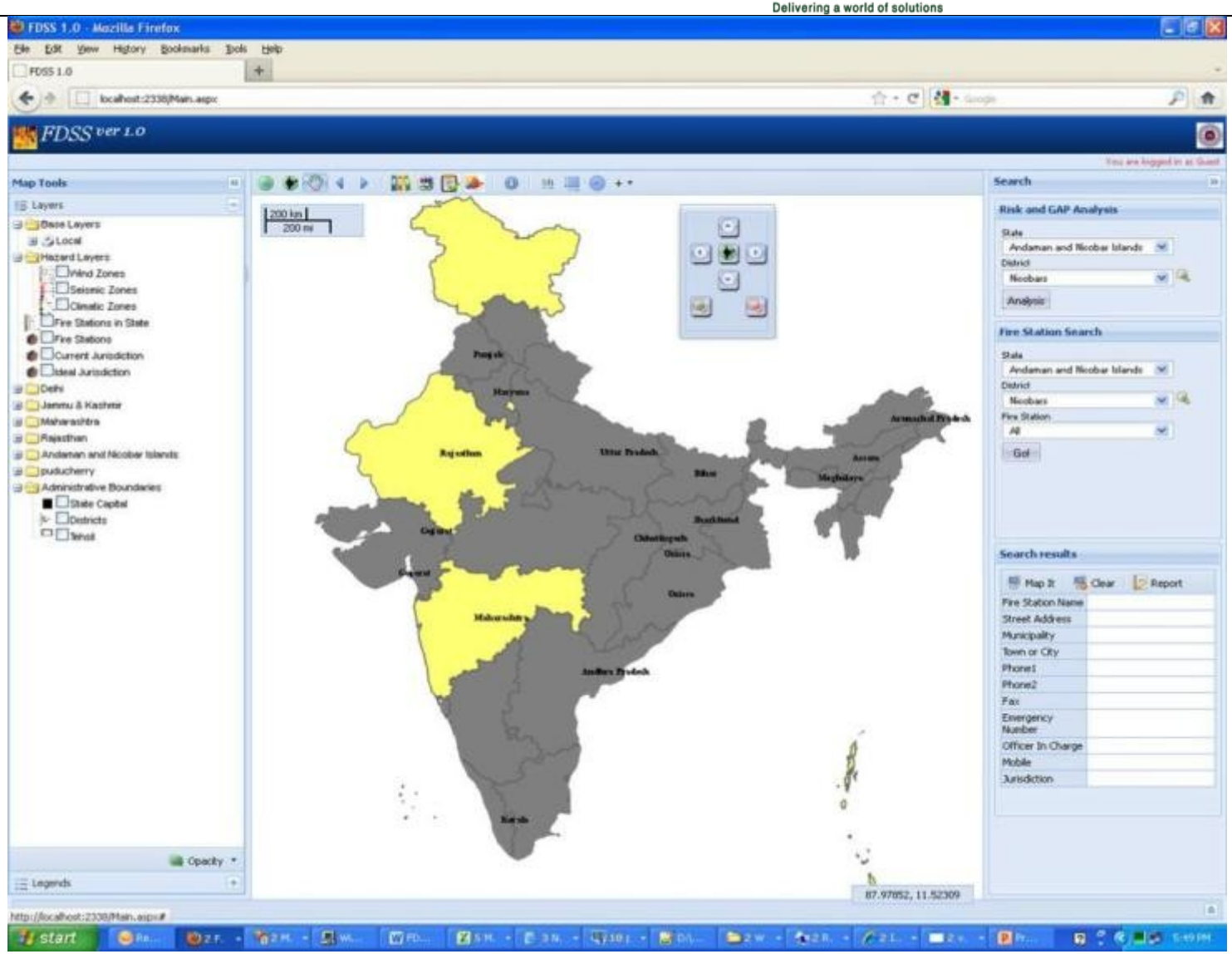


Figure 5-3 : User Interface for Base Analysis in FDSS. The example shows the States covered in the Pilot Phase of the study

5.4 System Administration Interface

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

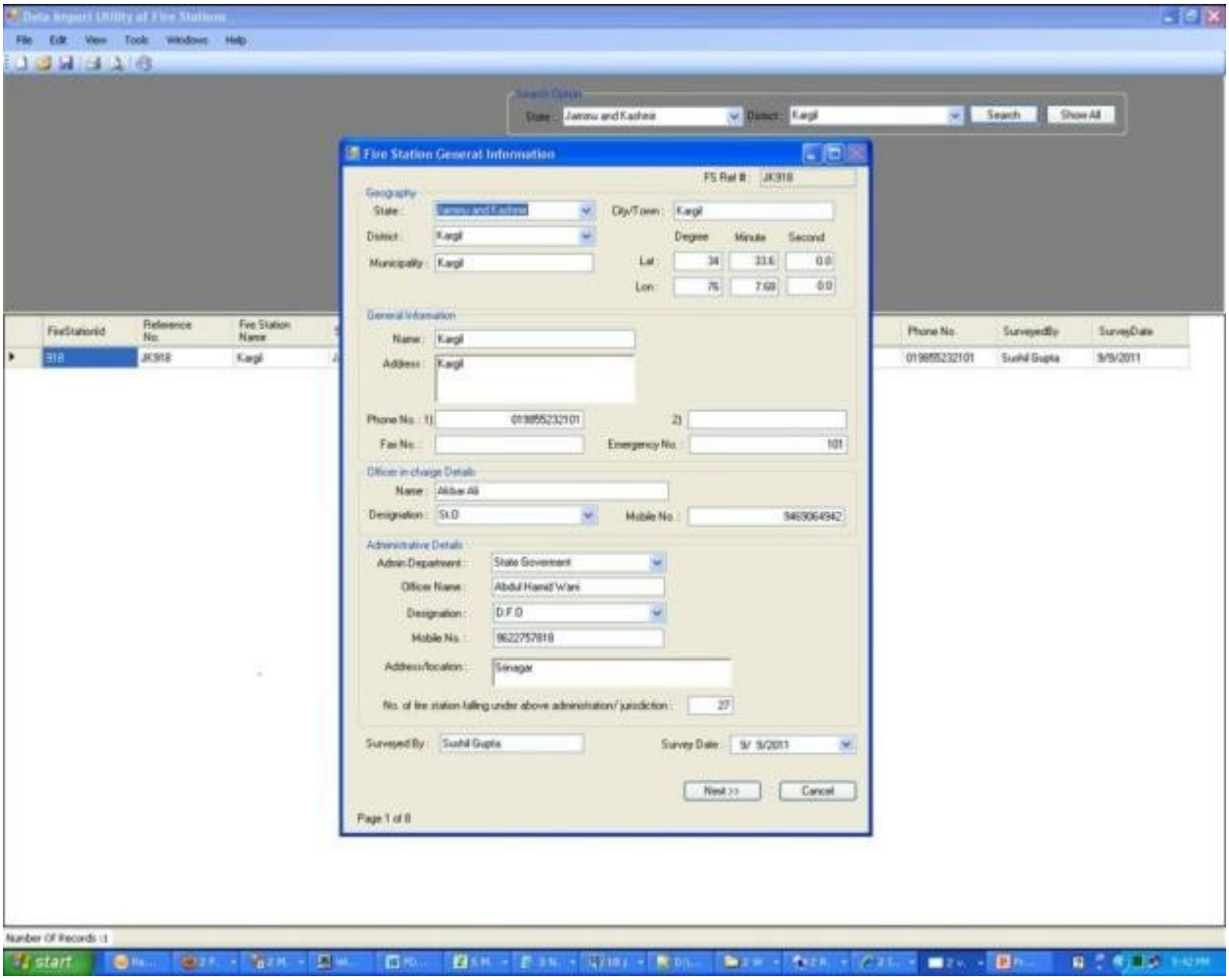


Figure 5-4 : System administration interface

5.5 Application Interface

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

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

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

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

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

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

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

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

5.5.1 TECHNOLOGY

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

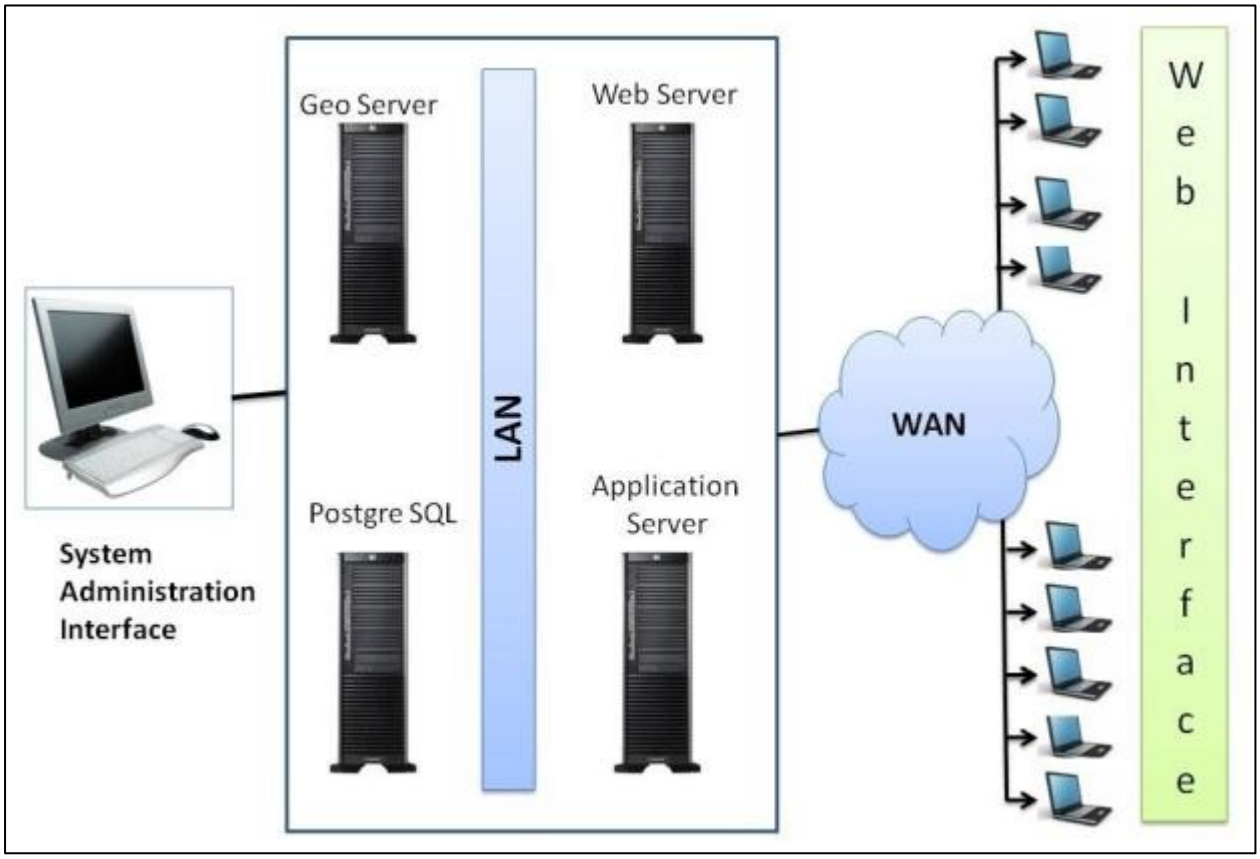


Figure 5-5 : FDSS - Systems Architecture

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

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

The technological framework for FDSS utilizes the following platforms:

Hardware Configuration

- Rack Server 2U having Intel Xeon (Quad Core) E5410 or higher processor support for dual multi core processor
- 16 GB DDR2-533 FB DIMM or higher ECC memory
- SVGA Video Controller with 16 MB RAM
- SAS Raid Controller having 128 MB buffer memory with battery backup and supporting RAID 0,1 and 5 Dual Gigabit Server Ethernet controller with teaming, load balancing and auto fail over feature
- 5X146GB SAS HS HDDD, IDE DVD ROM Drive with (N) hot swap Redunt Hot SEAP power supply

Software Configuration

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

Supported Browser

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

5.6 Advantages of Open Source Platform

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

Table 5-1: Advantages of Open Source Platform

Advantages	Open Source Platform	Proprietary Software Platform
Control and Audit 	Gives power to control software code and hence modification can be carried out to suit the requirements	Forces users to adhere to standards and flexibility provided in the software only. Modifications are based solely on vendor discretion
Low ownership Cost 	No license fees are required thereby reducing annual license fees cost to zero, zero cost of scale as open source doesn't require additional licenses as the installation grows	License fees are required
Quality and Excellence	It's available publicly. A large no. of reviewers analyze the code making it more secure, increasing the quality and	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 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. Through the input of field survey work, risk categorization, and infrastructure requirement norms, gap analysis is performed in FDSS at the district and State level.

Gaps will primarily address the three areas:

5.7.1 Infrastructure Gaps

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

5.7.2 Equipment Gaps

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

5.7.3 Capacity Gaps

This would cover the shortage of firefighting 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 firefighting 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 will

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

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

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

5.9 Institutional Assessment and Capacity Building Plan

The National Fire Service College (NFSC), Nagpur and other State Fire tTraining Centers 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 Centers 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 will be 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. For more detailed information, please refer to the National Level Training report as well as individual State/ UT report submitted by RMSI.

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 being 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 firefighting vehicle from the Fire Station to fire emergency scene, and turnout time is not included in it**)* differs from country to country.

6.2 Response Time

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

6.2.1 GERMANY

The response from Germany (27.10.2011) is as follows:

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

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

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

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

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

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

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

6.2.2 JAPAN

Fire Service laws of Japan and its background:

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

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

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

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

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

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

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

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

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

6.2.3 USA

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

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

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

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

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

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

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

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

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

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

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

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

6.2.4 UK

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

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

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

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

6.2.5 INDIA

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Annex-1: Fire Headquarter Data Collection Form

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

A. Fire Headquarters General Information

HQ Ref #.....

Location Details

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

Area under Jurisdiction

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

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

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

Name of Zonal office …….

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

Name of Zonal office …….

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

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

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

Please add additional sheets if required

C. Details of Proposed Fire Station

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

Please attach additional sheets if required

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

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

By State/ zonal Level

Zone Name ……..

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

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

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

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

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

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

5					
4					
3	FEOD				
2	Leading Fire Operator				
1	Fire Operator				
Any Other					

Staff Welfare:

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

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

Measures to Improve Staff Efficiency

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

E. Training Details

Name of State Training Centre and address: ……

Number of Faculty/Trainers with Designation: ……
……
……

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

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

Year	Type of Training Obtained/ name of training course	Within State Training Centre	At NFSC, Nagpur	Other State Training Centre (mention City, State)	Foreign country	Total Number of personnel Trained
2011						
2010						
2009						
2008						

2007						
2006						

Please provide yearly break-up for the last 5 years

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

……
……
……
……
……
……

F. Inventory of Equipment

Division Wise Fire Vehicles

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

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

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

Additional Equipment

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

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

Any other not covered in above list

…….

……..

……..

Please provide separate list for each division/district

G. Communication between HQ and Zonal/district office

Details of Control rooms

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

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

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

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

Frequency of Fire Report Transmission:

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

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

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

H. Financial Details

Name of Zone

……

(If information provided zone wise)

Budget for year ……..

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

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

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

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

Name of Station …….

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

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

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

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

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

(Attach additional sheets for each region/ and addition year)
Please provide definition of fire types

……
……
……

Severity of events: Small fire – estimated loss of Rs. 10 lakh, Medium – Rs. 10 to 50 lakh, Serious - >Rs. 50 lakh, any fire where there is human death to be consider as Serious fire. (As per the compendium, even there is causalities, it is considered as serious, but the causality severity not mentioned

J. Public Awareness Programmes

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

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

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

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

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

Postal Address:

Mr Sushil Gupta
General Manager,
Risk Modeling and Insurance,
A-7, RMSI, Sector-16, NOIDA
PIN 201301 (U.P.) INDIA

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(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 temporarly operational fromborrowed/ rented building of ……(Private, Muncipallity, 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 structrure types)

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

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

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

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

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

Structure of Bay/ Garrage- Pacca- RCC/Masonry Kaccha Tin Shade Open 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/ headquater 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 landline 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 Firefighting Purpose

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

Water sources used by Fire Vehicles within Fire station

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

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

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

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

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

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

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

E. Human Resources

Permanent Staff Details- :

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

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

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

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

Mode to maintain Physical Fitness

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

F. Fire Risk Covered in the Area under Jurisdiction

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

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

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

Availability of water for Firefighting 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 Firefighting Vehicles (attach separate sheet if number of vehicle are more than space provided below)

(Total number of Firefighting Vehicles at station ……..…)

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

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)
	High Pressure Light Van							Wireless / GPS	Minor/ Major/Condemned
	Any Other							Wireless / GPS	Minor/ Major/Condemned

Details of Vehicles- other than Firefighting/ Official Use

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

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

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

Insurance - YesNo A ☐ nt (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																
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9-Jun																
9-May																
9-Apr																
9-Mar																
9-Feb																
9-Jan																
8-Dec																
8-Nov																
8-Oct																
8-Sep																
8-Aug																

Please send Fire call statistics to :

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

PART B

7 Delhi State

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8 Rajasthan State

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9 Maharashtra State

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10 Jammu and Kashmir State

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11Puducherry UT

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12Andaman & Nicobar Islands UT

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13Chandigarh UT

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14Haryana State

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15Himachal Pradesh State

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16 Punjab State

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17 Uttarakhand State

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18 Uttar Pradesh State

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19 Dadra and Nagar Haveli UT

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20 Daman and Diu UT

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21Goa State

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22 Gujarat State

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23Karnataka State

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24Madhya Pradesh State

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25 Andhra Pradesh

25.1 Introduction

Andhra Pradesh, abbreviated as A.P. is one of the 28 States of India, situated on southeastern coast of country. It is fourth largest States by area and sharing its border with Maharashtra, Chhattisgarh and Orissa in the north and with Tamil Nadu in the south. In the east, it is connected with the Bay of Bengal and Karnataka lies in the west. It is located between longitude 80.09° East and latitude 17.04° North.

The State of Andhra Pradesh forms a part of the famous Deccan plateau. Two major rivers traversing this plateau are the Krishna and Godavari Rivers. While running across the State, the two rivers create huge deltas prior to pouring into the Bay of Bengal. Geographically, the State is divided in three distinct regions, namely northern part of the plateau as the Telangana region, the southern part as Rayalaseema and third region is Coastal Andhra. Most of the coastal plains are put to intense agricultural use. The west and southwest parts of Andhra Pradesh have semi-arid conditions.

The climate of Andhra Pradesh varies considerably, depending on the geographical region. Monsoons play a major role in determining the climate of the State. In the coastal plain, the summer temperatures are generally higher than the rest of the State, with temperature ranging between 20 °C and 41 °C. The State receives heavy rainfall from Southwest Monsoon as well as Northeast Monsoon.

Hyderabad is the capital of the State and, along with the adjoining twin city Secunderabad, is the largest city in the State. Visakhapatnam, Andhra Pradesh's main seaport, is the second largest city and is home to the Indian Navy's Eastern Naval Command. Due to its location and proximity to major rail and road routes, Vijayawada is a major trading center and is the third largest city of the State, Tirupati is the fourth largest city of the State, followed by Rajamundry, Guntur, Nellore, Warangal, and Kakinada.

As per census 2001 and 2011, there is increase of approximately 10% in urban population. Hence due huge urbanization and industrial setup, the fire risk is also increased manifold in one decade. Currently, the Andhra Pradesh Fire service is one of the largest fire Brigade networks in India with 251 operational Fire Stations spread over the length and breadth of Andhra Pradesh. The main objective of the department is to provide fire safety to the public, conduct firefighting, and rescue operations and thereby reduce loss of life and property. The department was established in November 1956, currently known as AP State Disaster Response and Fire Services (AP DRFS).The department is running with a number of firefighting vehicles and specialized equipment as well as 3,676 total firefighting manpower.

The 251 operational Fire Stations serve an average population of more than 3.3 Lakhs per Fire Station. (Figure 25.2 and Table 25-2).

Figure 25-1: District map of Andhra Pradesh

Table 25-1: Andhra Pradesh Demography as per Census 2011

Andhra Pradesh State	
Districts	23
Revenue Divisions	81
Towns	210
Mandals	1,128
Inhabitated Villages	26,613
Un-inhabitated Villages	1510
Population	
Total Persons (in thousands)	84,665
Males	42,509
Females	42,155
Rural	56,311
Urban	28,353
% of Urban Population	36.26 %
Sex Ratio (female per 1,000 male)	992

Table 25-2 provides the district wise details, i.e., number of operational Fire Stations, geographical, population as per Census 2011, and average estimated population served by each Fire Station in Andhra Pradesh.

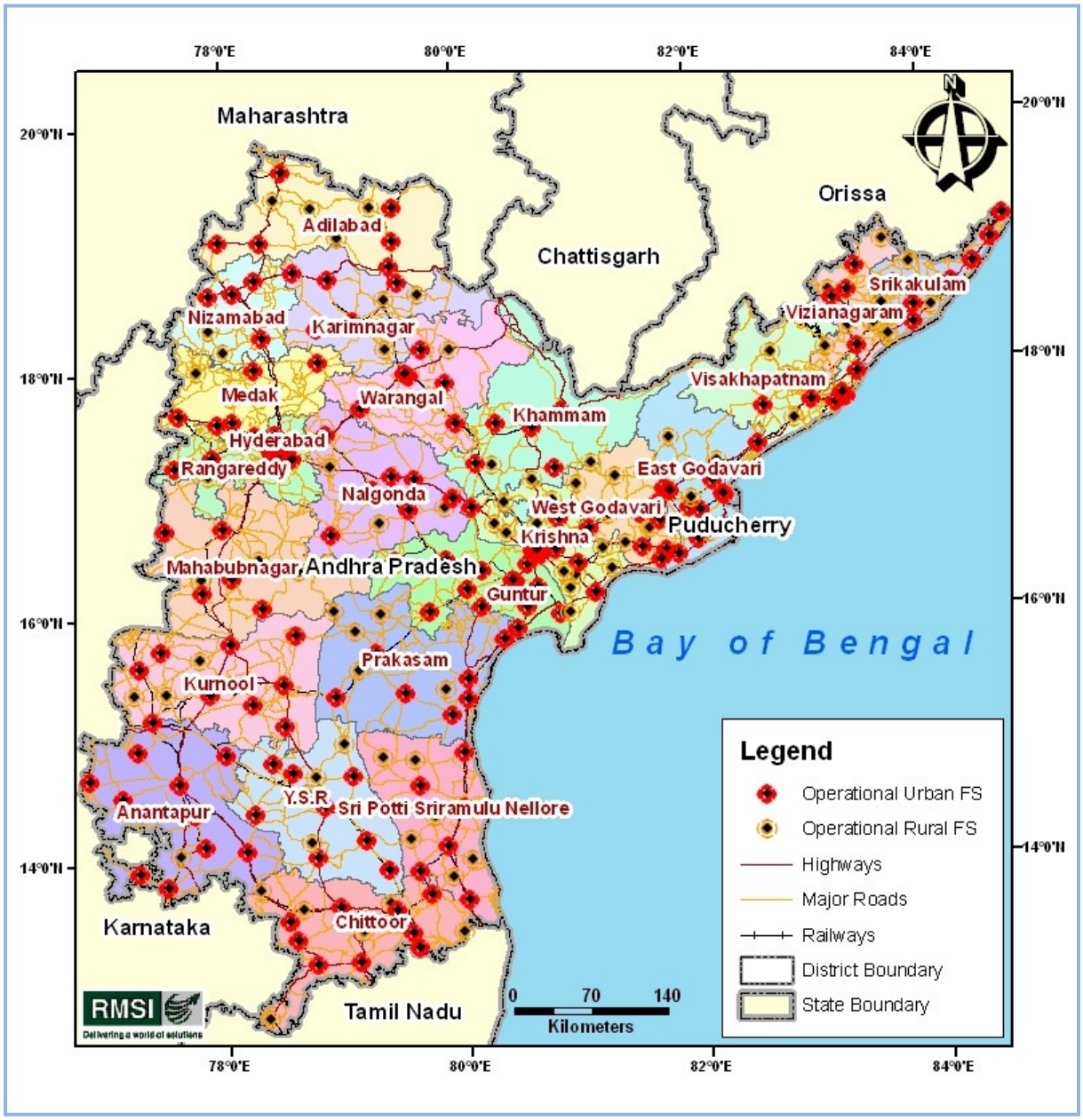

Figure 25-2: Location of operational Fire Stations in Andhra Pradesh

Table 25-2:Summary of district level operational Fire Stations in Andhra Pradesh

District	Area (sq km)	Population (Census 2011)	Population Density	No of Fire station operational	Average Population per Fire station
Adilabad	16,128	2,737,738	170	10	273,774
Anantapur	19,130	4,083,315	213	12	340,276
Chittoor	15,152	4,170,468	275	15	278,031
East Godavari	10,807	5,151,549	477	14	367,968
Guntur	11,391	4,889,230	429	13	376,095
Hyderabad	203	4,010,238	19,755	10	401,024
Karimnagar	11,823	3,811,738	322	8	476,467
Khammam	16,029	2,798,214	175	8	349,777
Krishna	8,727	4,529,009	519	21	215,667
Kurnool	17,700	4,046,601	229	12	337,217
Mahbubnagar	18,432	4,042,191	219	8	505,274
Medak	9,700	3,031,877	313	8	378,985
Nalgonda	1,422,324	3,483,648	2	10	348,365
Nizamabad	7,956	2,552,073	321	6	425,346
Prakasam	17,626	3,392,764	192	11	308,433
Rangareddi	7,564	5,296,396	700	9	588,488
Shri Potti Sriramulu Nellore	13,076	2,966,082	227	12	247,174
Srikakulam	5,837	2,699,471	462	12	224,956
Visakhapatnam	11,161	4,288,113	384	11	389,828
Vizianagaram	6,539	2,342,868	358	9	260,319
Warangal	12,847	3,522,644	274	7	503,235
West Godavari	7,742	3,934,782	508	13	302,676
Y. S. R	15,379	2,884,524	188	12	240,377
Total	**1,683,273**	**84,665,533**	**26,713**	**251**	**337,313**

25.2 Field Surveys of Fire Stations for Data Collection

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

1. Fire station general information
2. Fire station infrastructure details
3. Communication systems
4. Water supply details for firefighting purpose
5. Human resources
6. Fire risk covered in the area under jurisdiction
7. Status of firefighting vehicles

8. Specialized equipment provided (Specify whether kept in vehicle or in stores)
9. Other accessories
10. Fire calls and other fire incidence statistics (last 3-5 years)

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

25.3 Infrastructure Gap Analysis

25.3.1 Fire Station Location Gap Analysis

As discussed in section 6.2.5, response time of 5-7 minutes in urban area and 20 minutes in rural area has been considered. With network analysis, ideal jurisdiction areas have been delineated for all operating Fire Stations. In delineation of ideal jurisdiction areas, built-up areas such as various types of residential areas and industrial areas with estimated population has also been considered. After delineation of ideal jurisdiction area, un-served gaps in urban agglomeration have been identified. These un-served gaps are shown to be filled by new proposed urban Fire Stations. Table 25-3 shows district level summary of number of operational and new proposed Fire Stations with population covered within their ideal jurisdiction area.

Rural areas of Andhra Pradesh State are similarly covered with new rural Fire Stations Locations of rural Fire Stations are demarcated to the nearest relatively bigger village having population of more than 5,000 -10,000 or major roads intersection. District level numbers of new rural Fire Stations are given in Table 25-3. Figures 25-2 to 25-57 depict representative detailed maps showing delineated ideal jurisdiction areas for operational and new proposed urban Fire Stations and location of new rural Fire Station in the State.

Detailed list of delineated operational, new urban and rural Fire Stations/Fire Post in Andhra Pradesh State are given in Tables 25-38 and 25-39.

Table 25-3: District level number of operational and new Fire Stations in the Andhra Pradesh State

District	Num of operational Fire Stations	Ideally Served Population under operational Fire Stations	Num of new urban Fire Stations	Ideally Served Population under new urban Fire Stations	Num of new rural Fire Stations	Total Fire Stations
Adilabad	10	897,902	3	123,447	15	28
Anantapur	12	1,208,805	3	126,632	14	29
Chittoor	15	1,794,184	3	203,983	13	31
East Godavari	14	2,033,630	15	1,337,790	10	39
Guntur	13	1,201,249	9	600,761	15	37
Hyderabad	10	1,706,358	11	1,976,617	0	21
Karimnagar	8	1,183,575	5	275,532	13	26
Khammam	8	939,405	3	175,795	9	20
Krishna	21	3,700,334	7	850,964	2	30
Kurnool	12	1,275,320	4	414,901	16	32
Mahabubnagar	8	1,156,722	4	187,130	18	30
Medak	8	783,052	1	50,893	8	17
Nalgonda	10	1,253,708	2	47,775	11	23
Nizamabad	6	798,069	1	31,609	8	15
Prakasam	11	1,041,892	5	244,798	13	29
Rangareddy	9	769,399	22	2,874,369	10	41
Sri Potti Sriramulu Nellore	12	1,623,680	2	315,768	5	19
Srikakulam	12	1,696,236	2	90,791	5	19
Visakhapatnam	11	1,714,473	16	1,617,278	6	33
Vizianagaram	9	1,510,966	1	75,272	5	15
Warangal	7	873,624	4	485,578	14	25
West Godavari	13	2,494,472	5	372,171	8	26
Y.S.R	12	1,586,384	2	167,463	10	24
Total	**251**	**33,243,439**	**130**	**12,647,317**	**228**	**609**

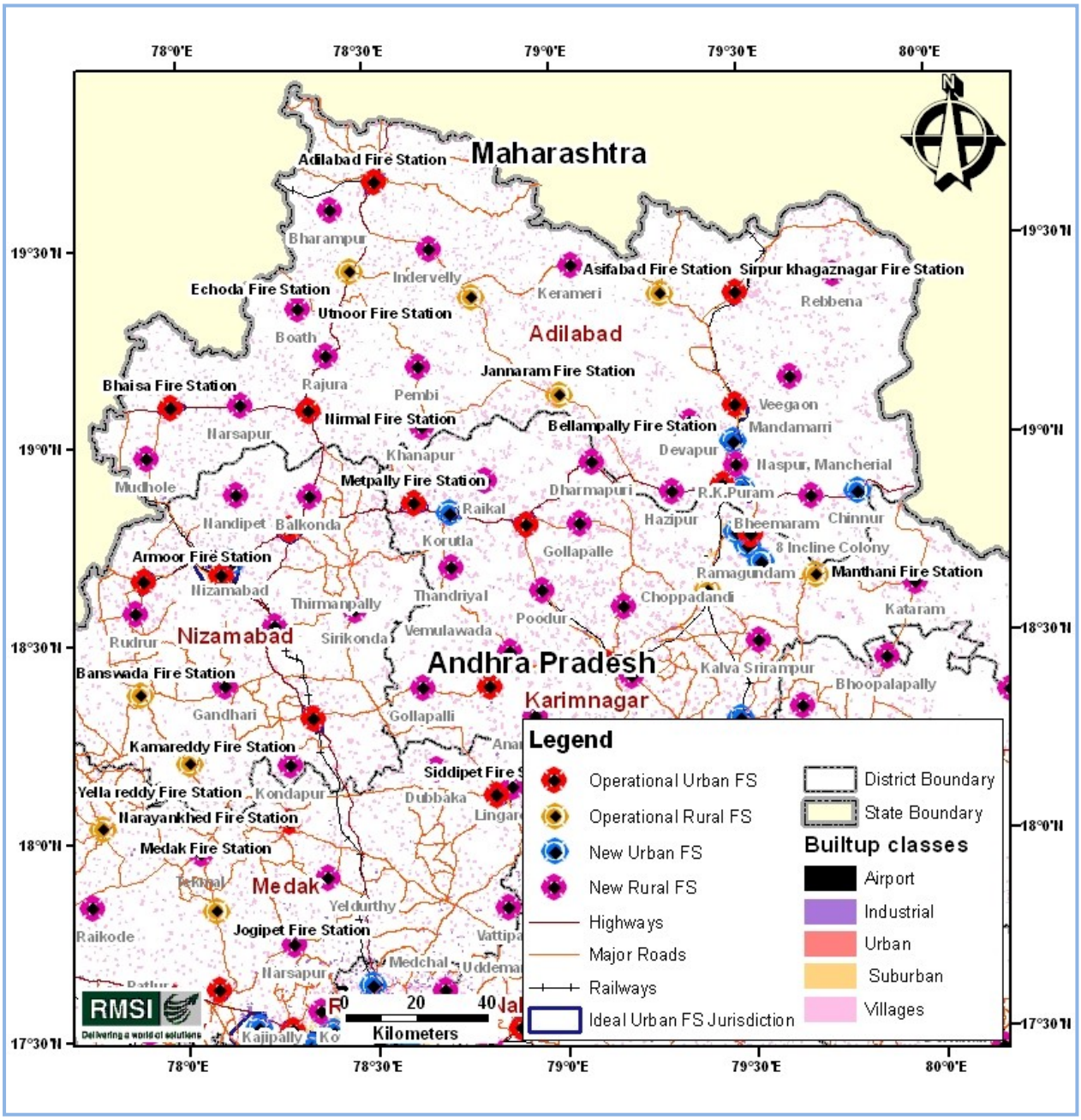

Figure 25-3: Fire stations gap analysis for Adilabad rural area

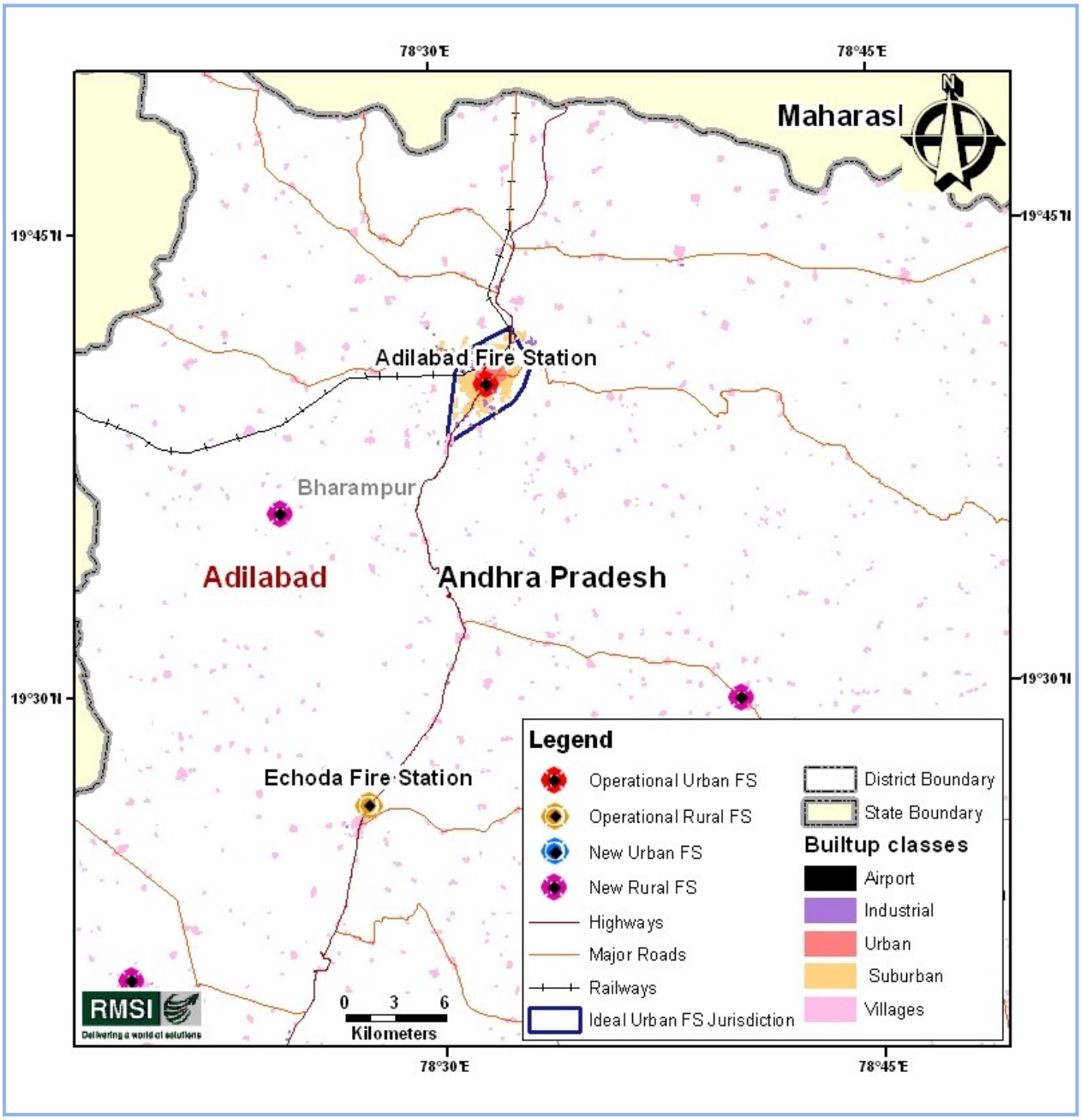

Figure 25-4: Fire stations gap analysis for Adilabad urban areas

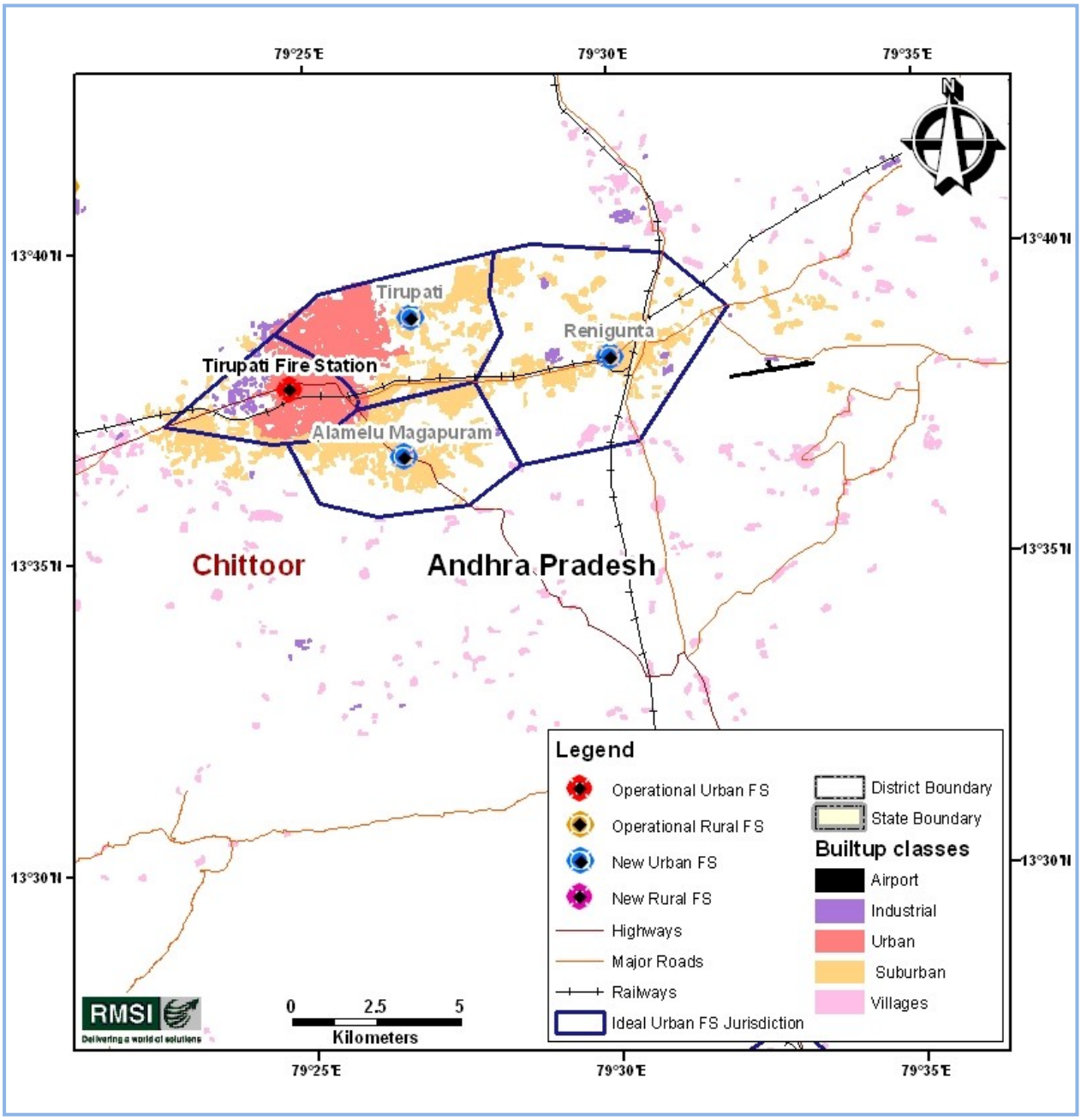

Figure 25-5: Fire stations gap analysis for Chittoor urban area

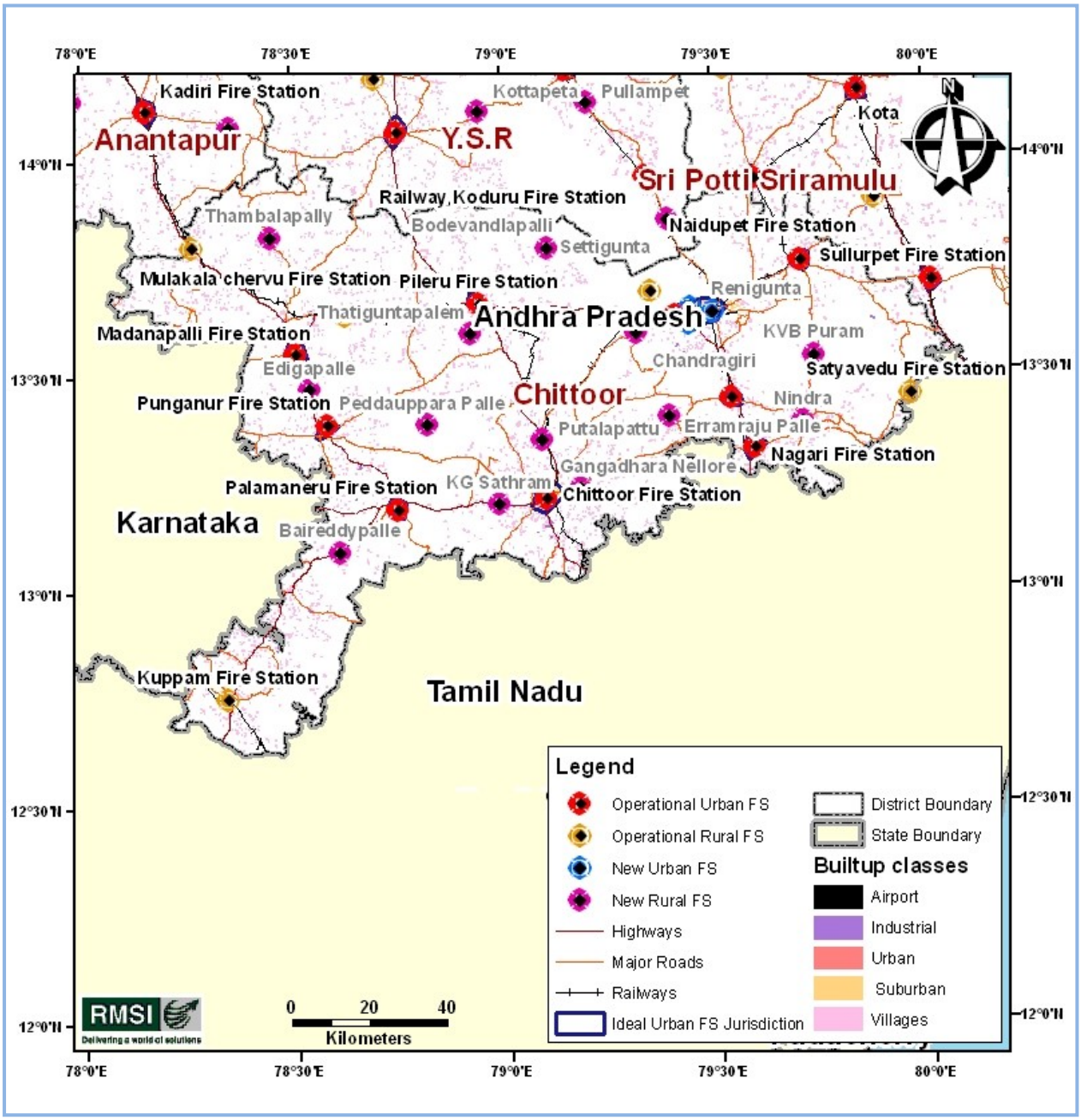

Figure 25-6: Fire stations gap analysis for Chittoor rural areas

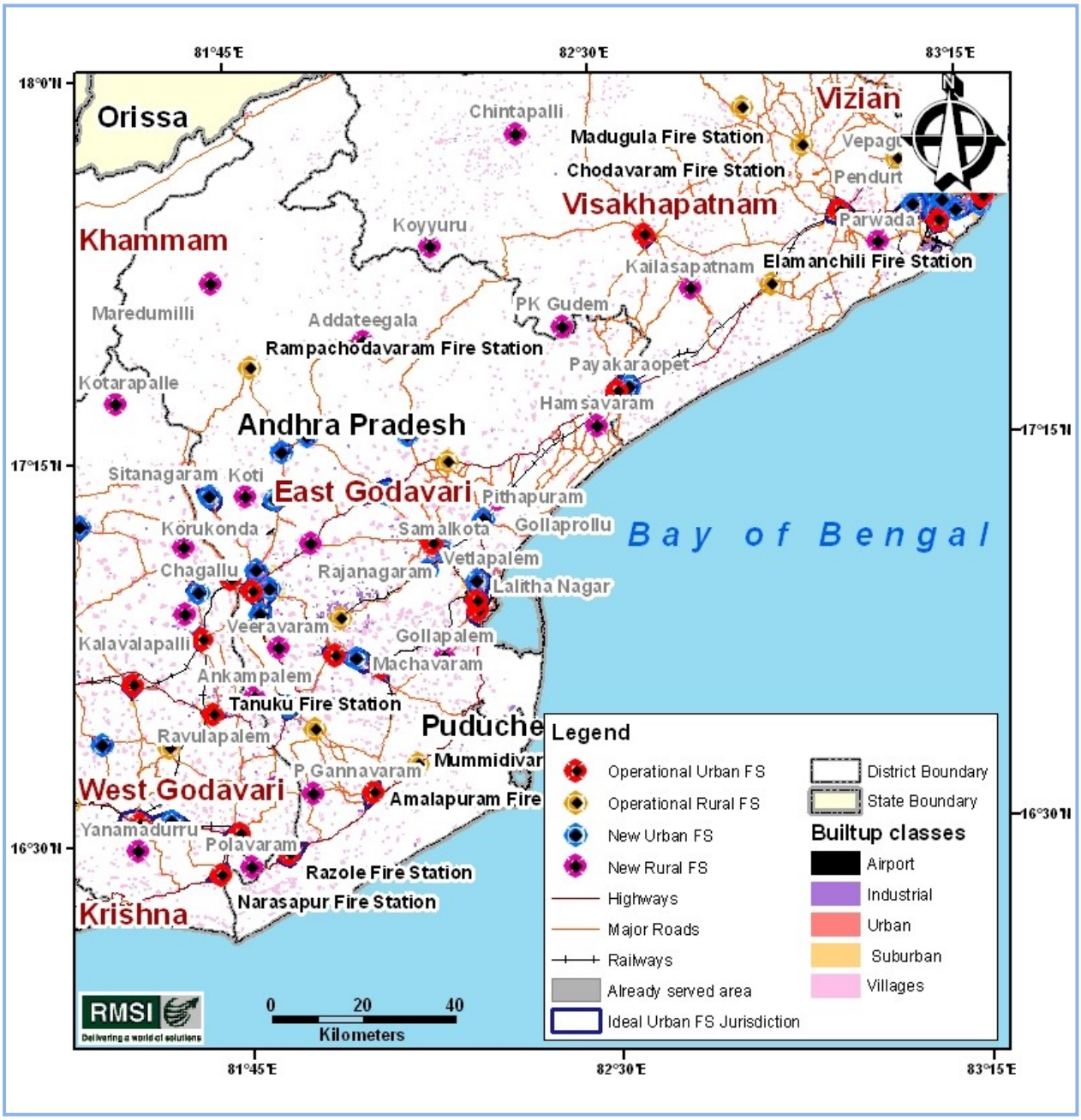

Figure 25-7: Fire stations gap analysis for East Godavari rural area

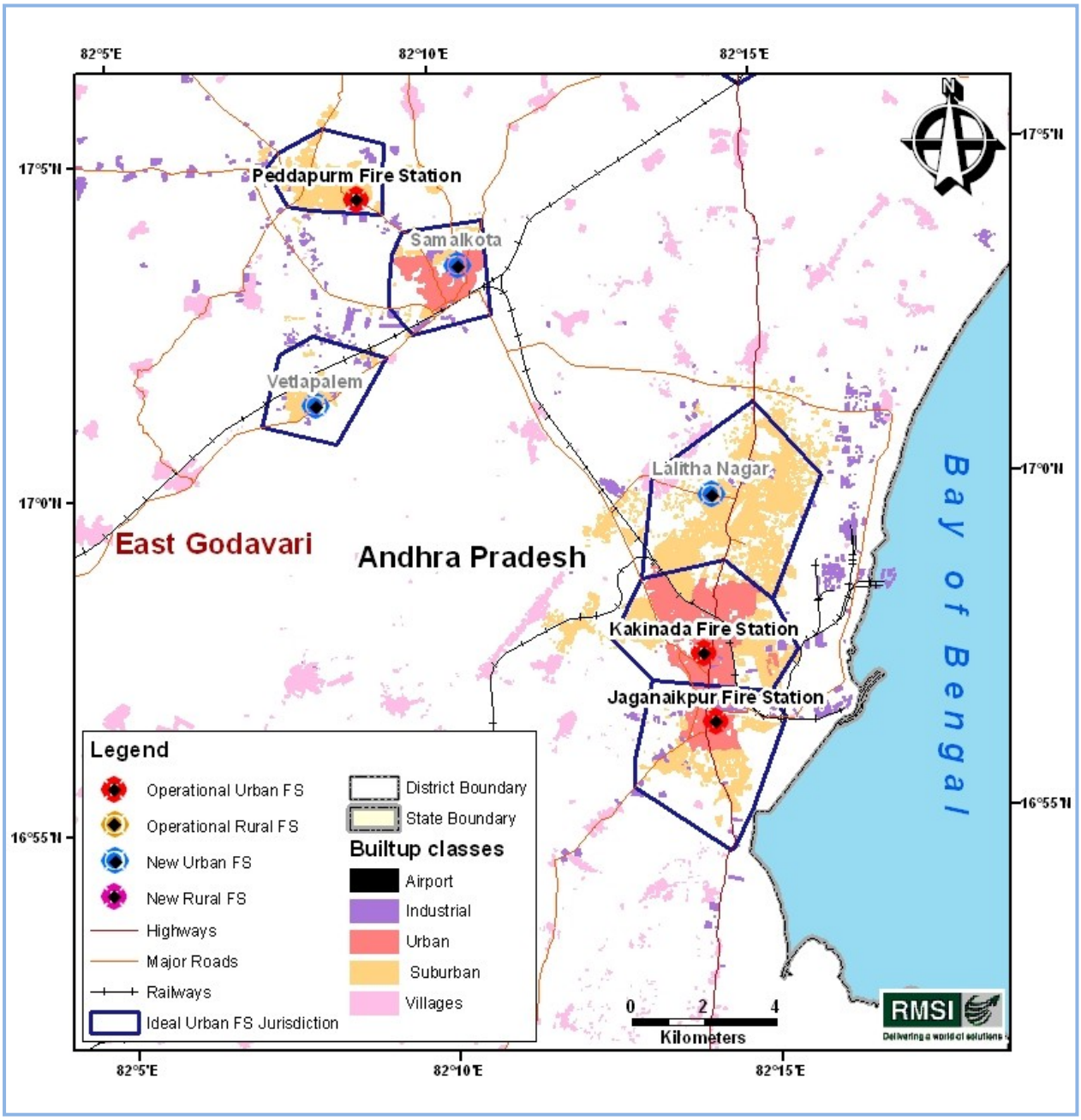

Figure 25-8: Fire stations gap analysis for East Godavari urban areas

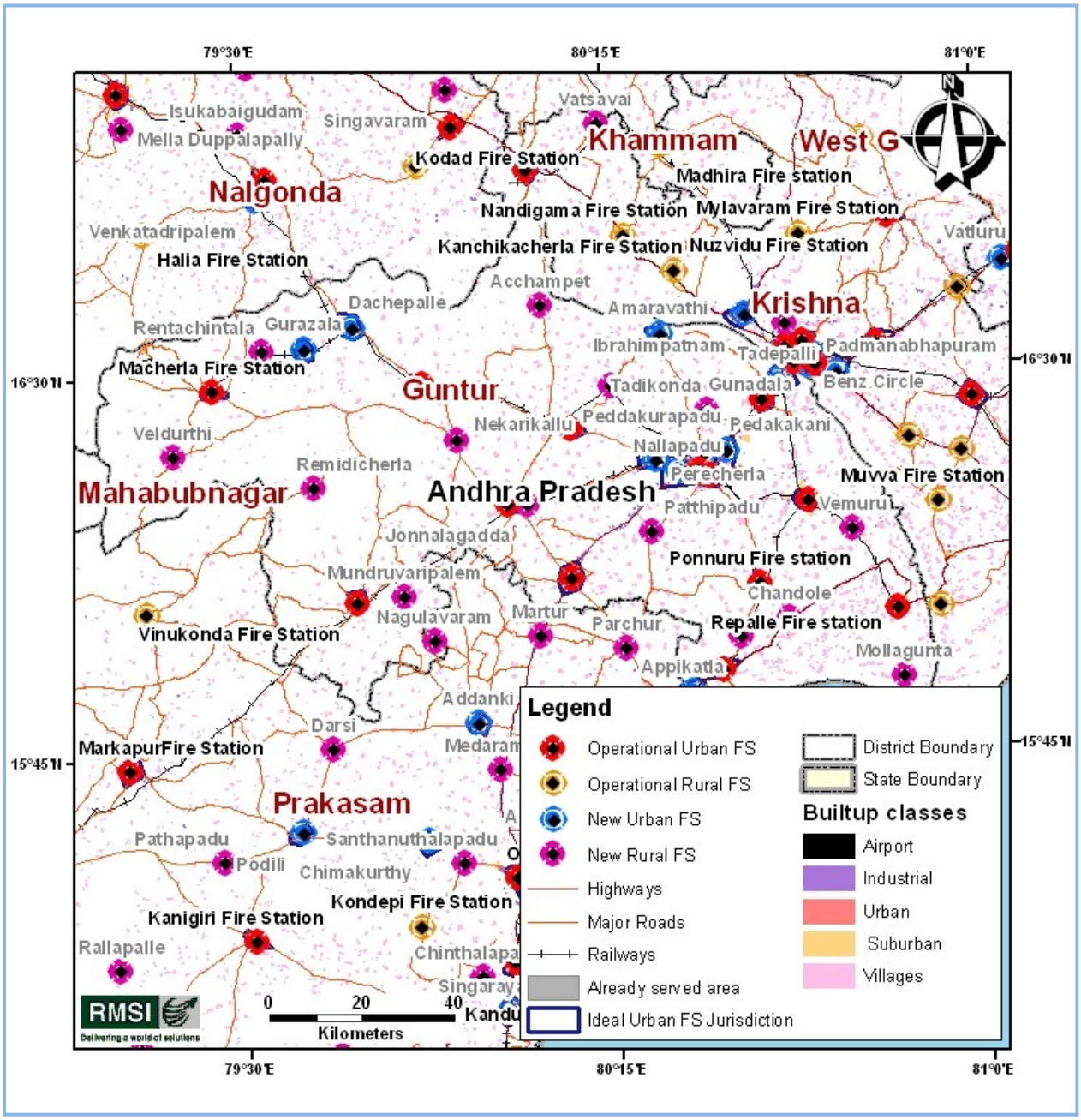

Figure 25-9: Fire stations gap analysis for Guntur rural areas

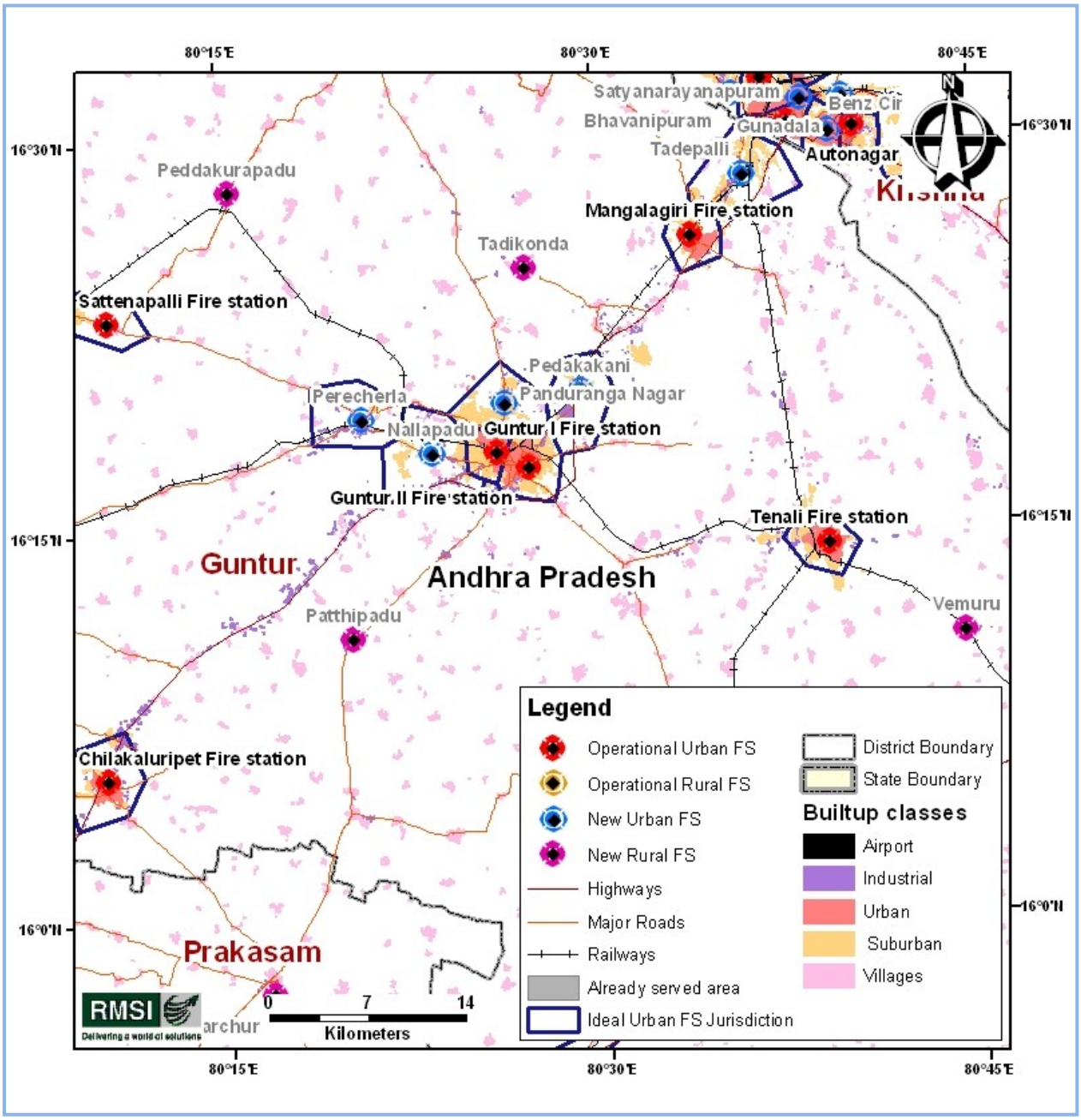

Figure 25-10: Fire stations gap analysis for Guntur urban areas

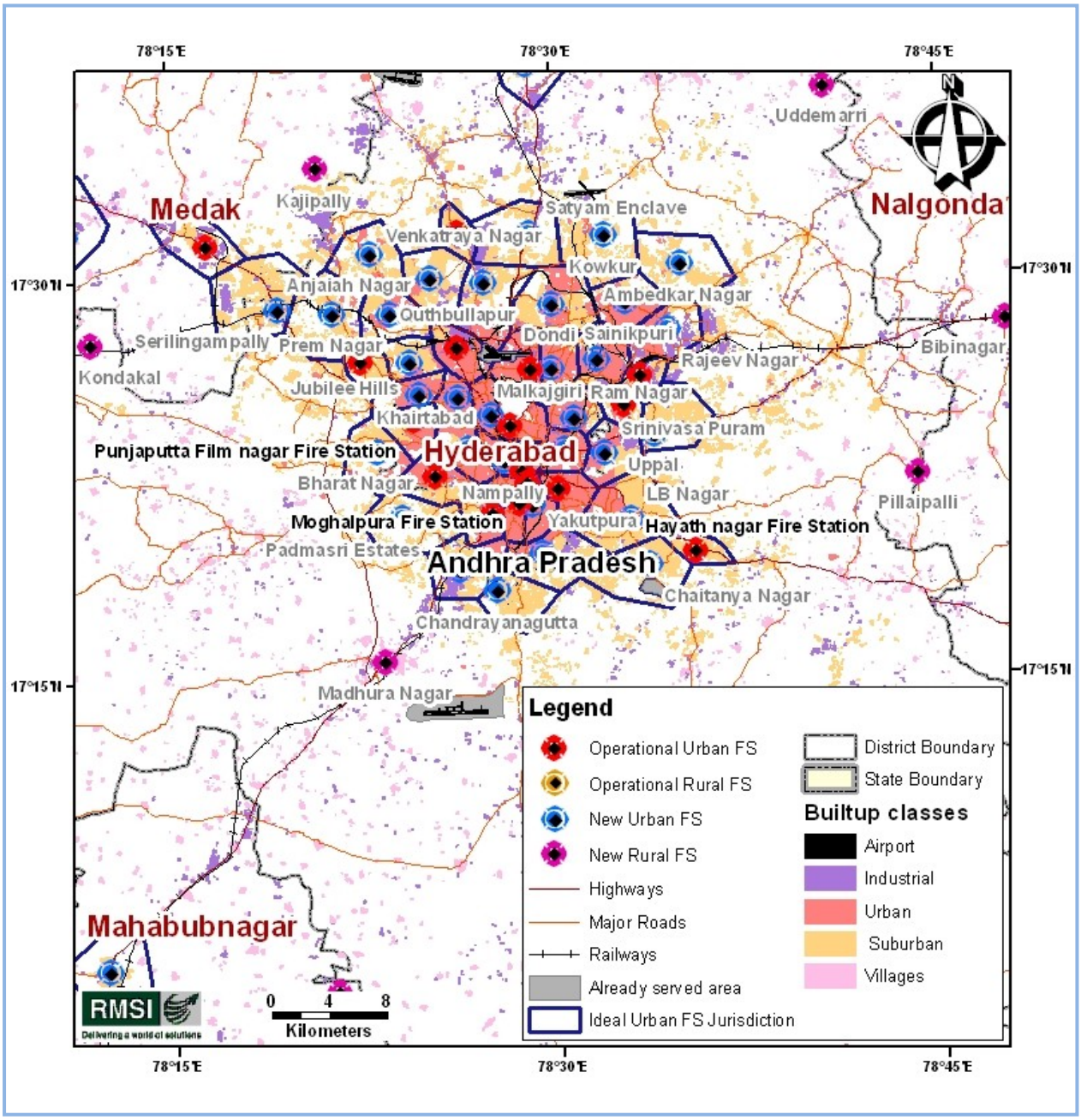

Figure 25-11: Fire stations gap analysis for Hyderabad rural areas

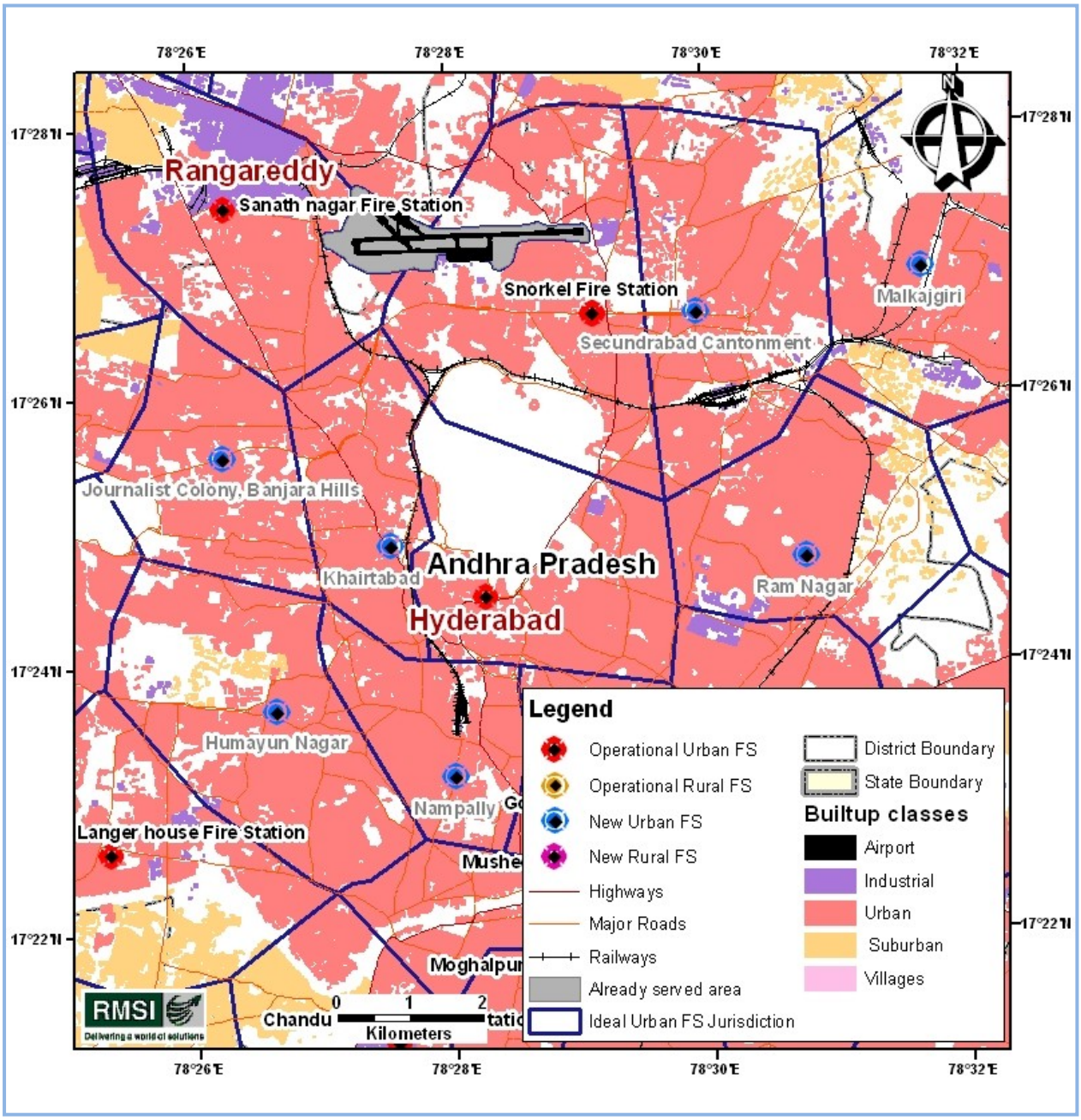

Figure 25-12: Fire stations gap analysis for Hyderabad Central areas

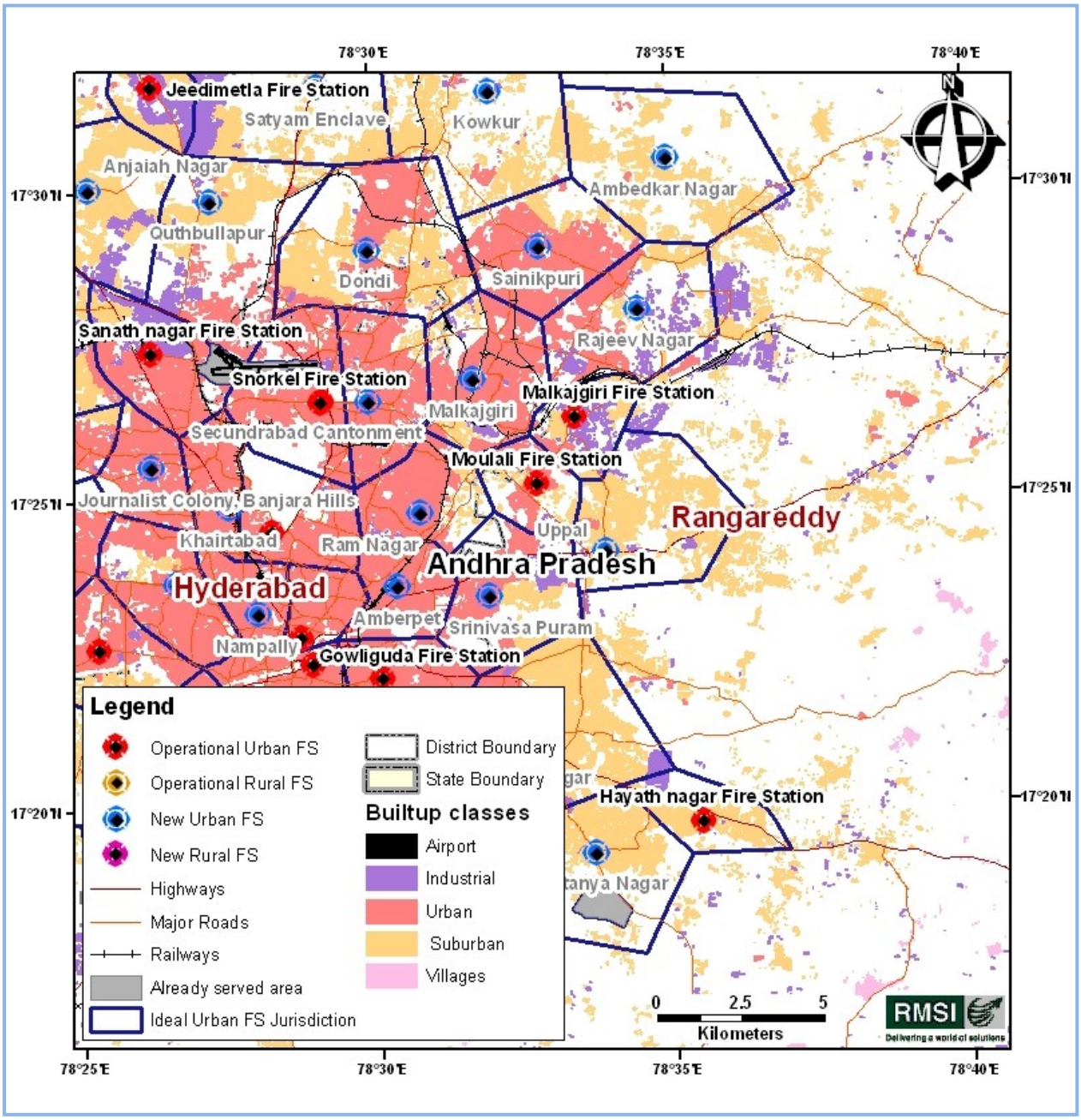

Figure 25-13: Fire stations gap analysis for Hyderabad East areas

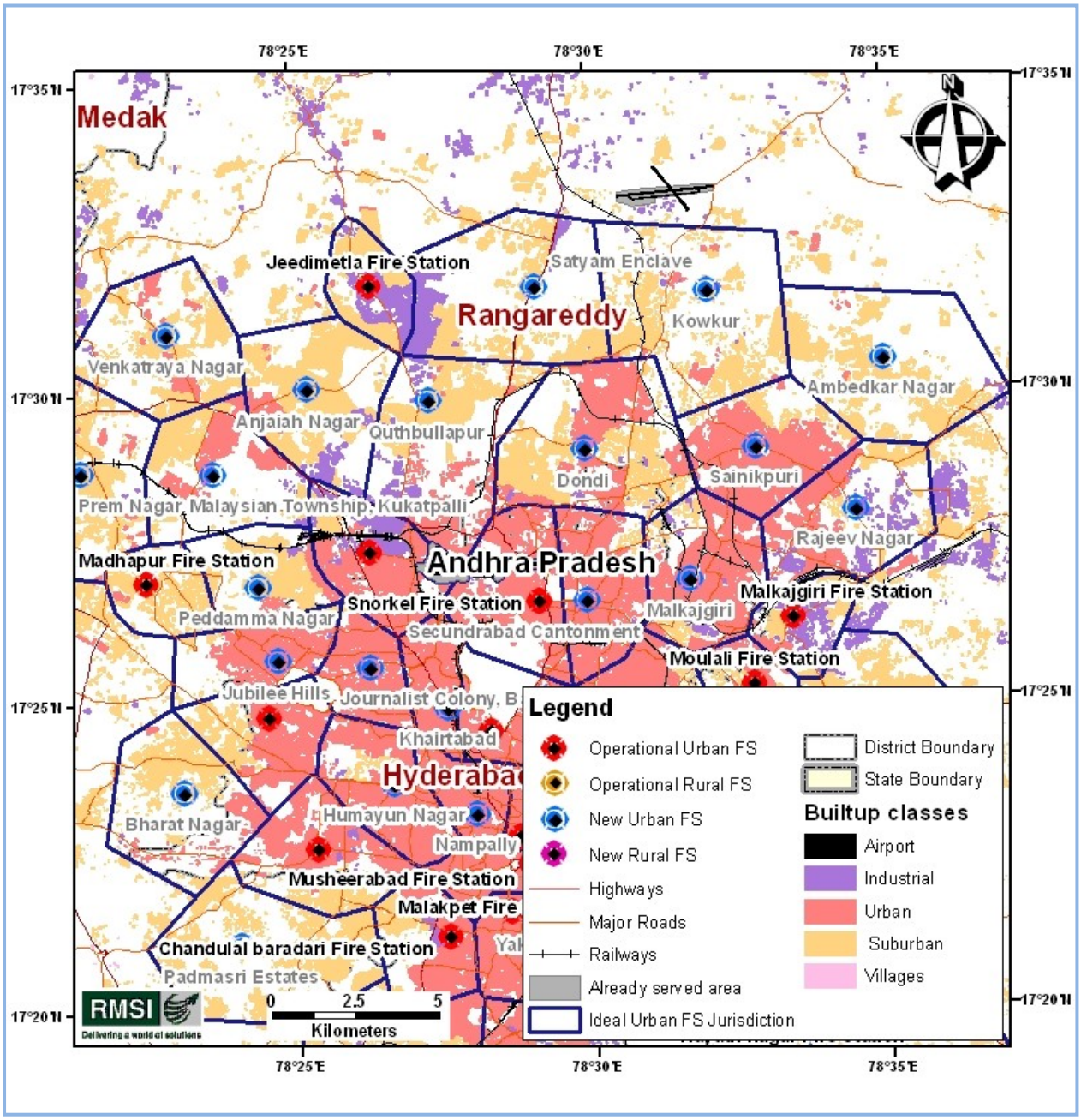

Figure 25-14: Fire stations gap analysis for Hyderabad North areas

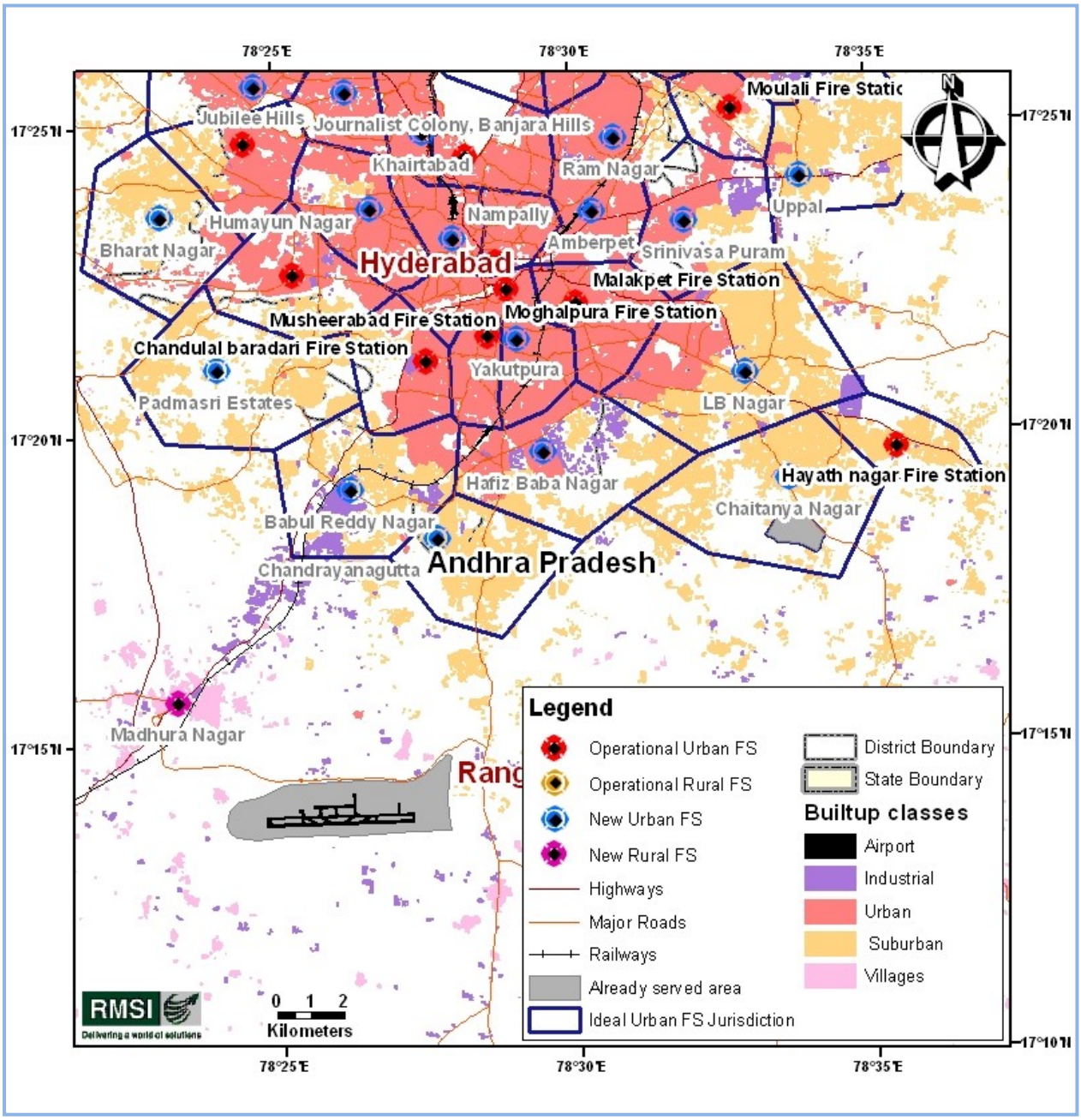

Figure 25-15: Fire stations gap analysis for Hyderabad South areas

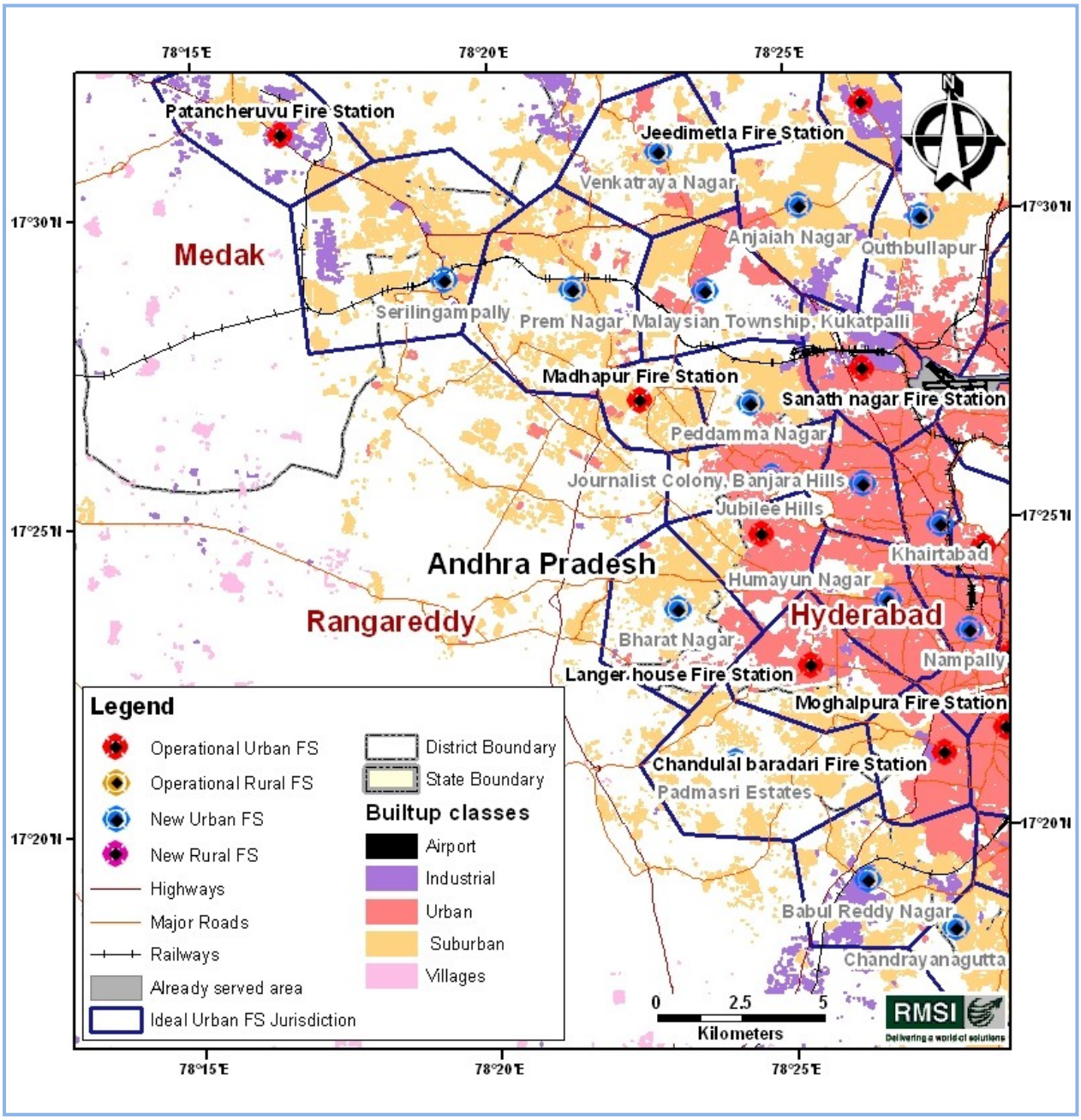

Figure 25-16: Fire stations gap analysis for Hyderabad West areas

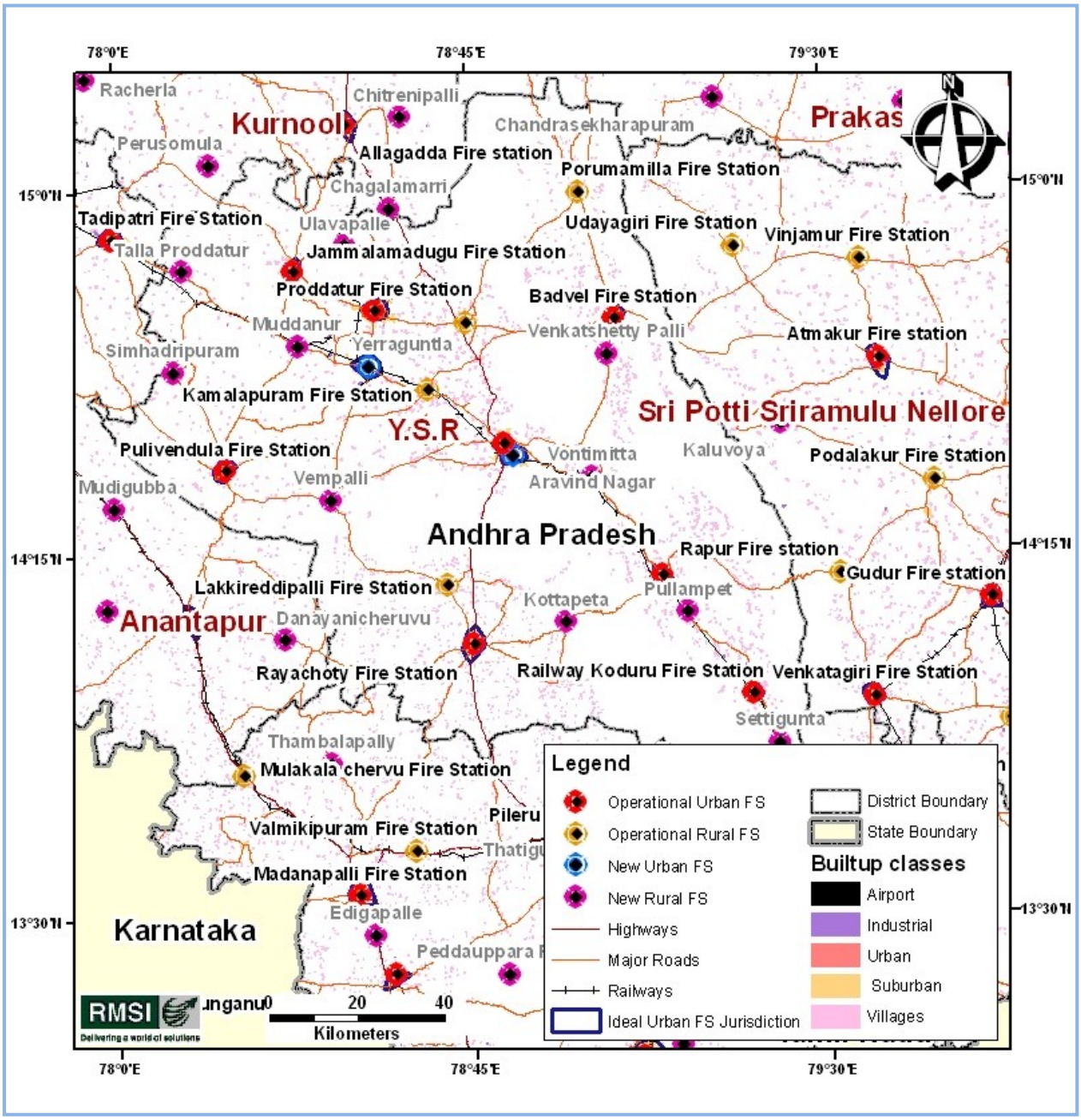

Figure 25-17: Fire stations gap analysis for Y.S.R. rural areas

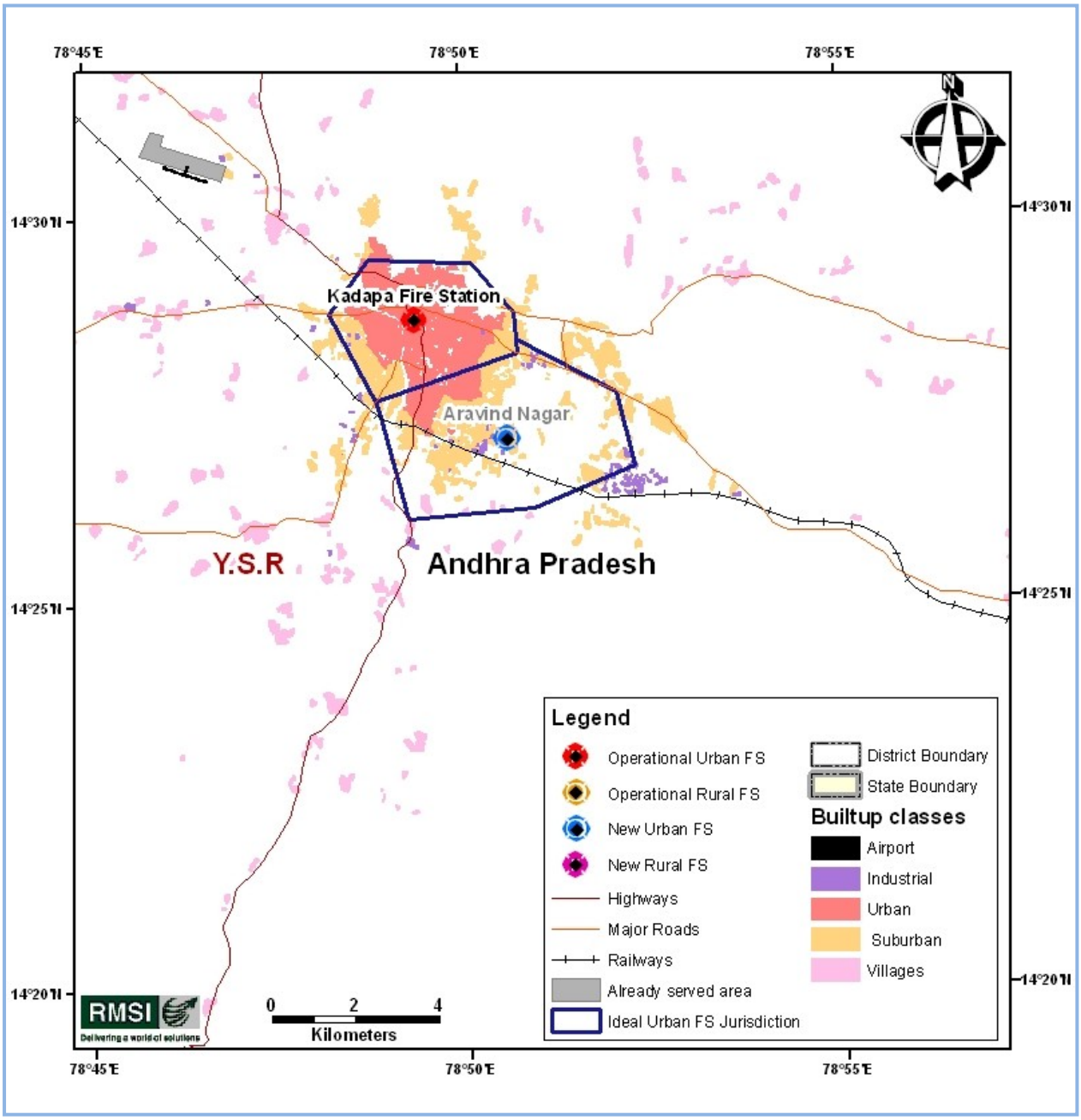

Figure 25-18: Fire stations gap analysis for Y.S.R.urban area

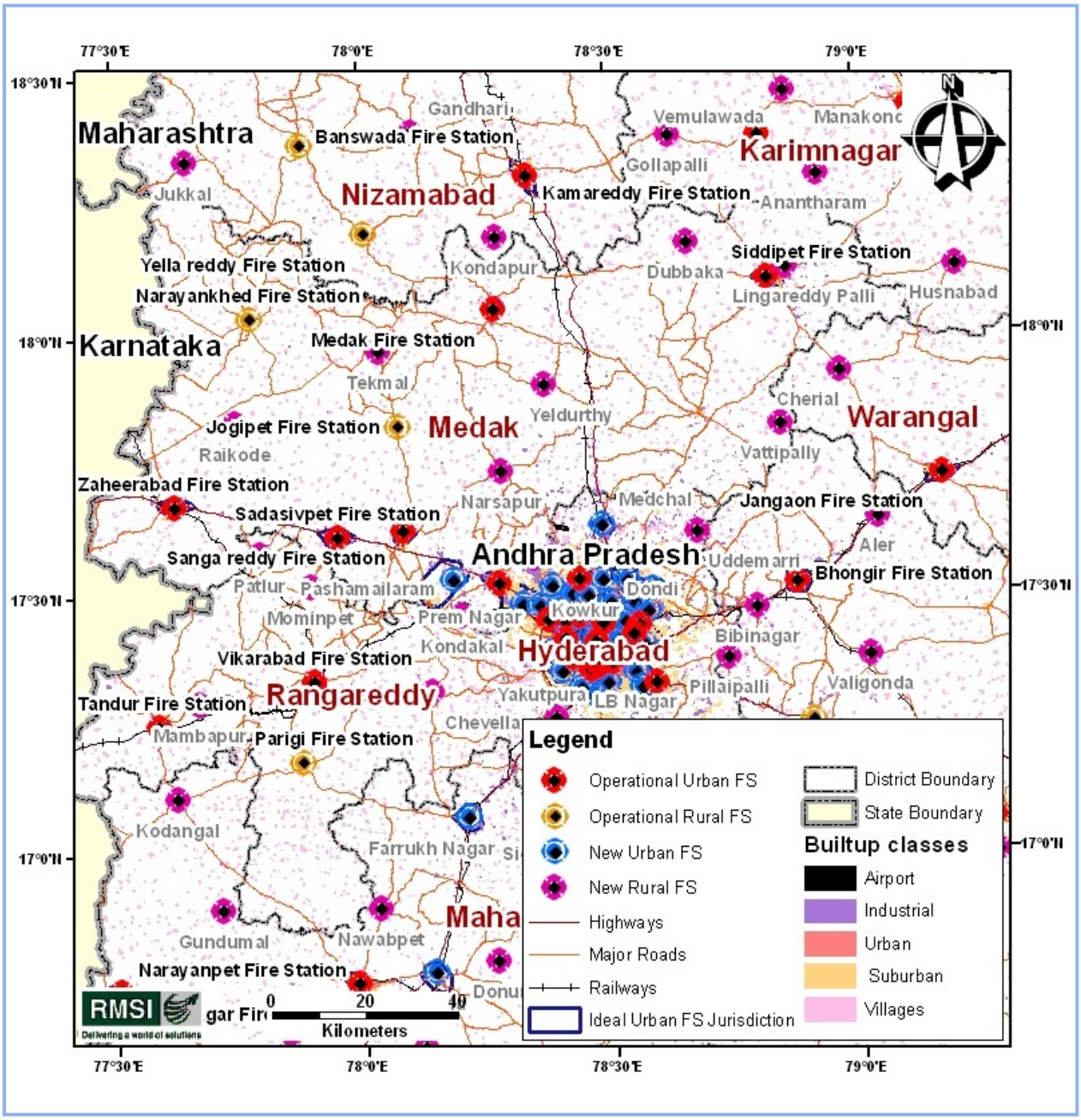

Figure 25-19: Fire stations gap analysis for Medak rural areas

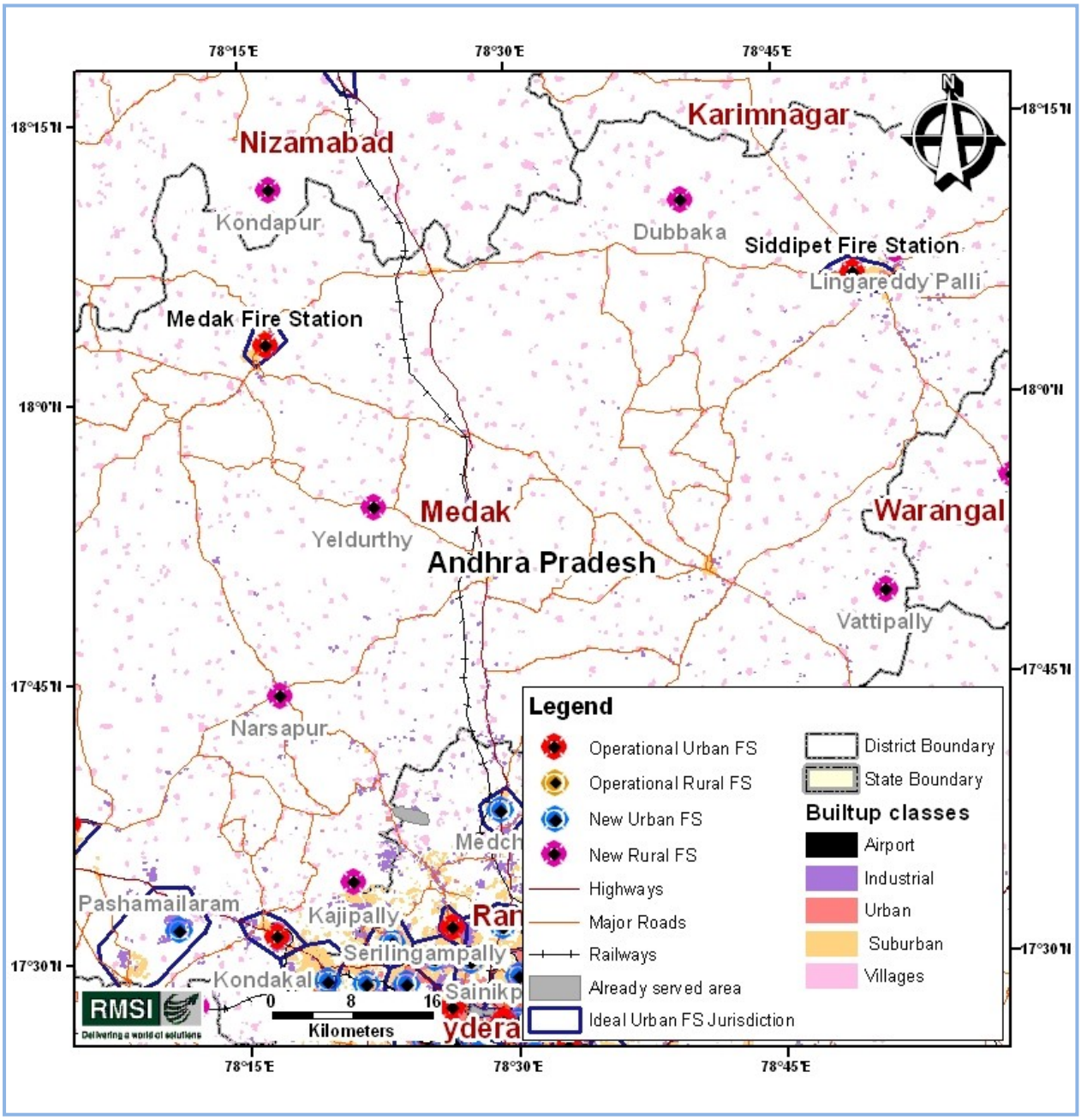

Figure 25-20: Fire stations gap analysis for Medak urban area

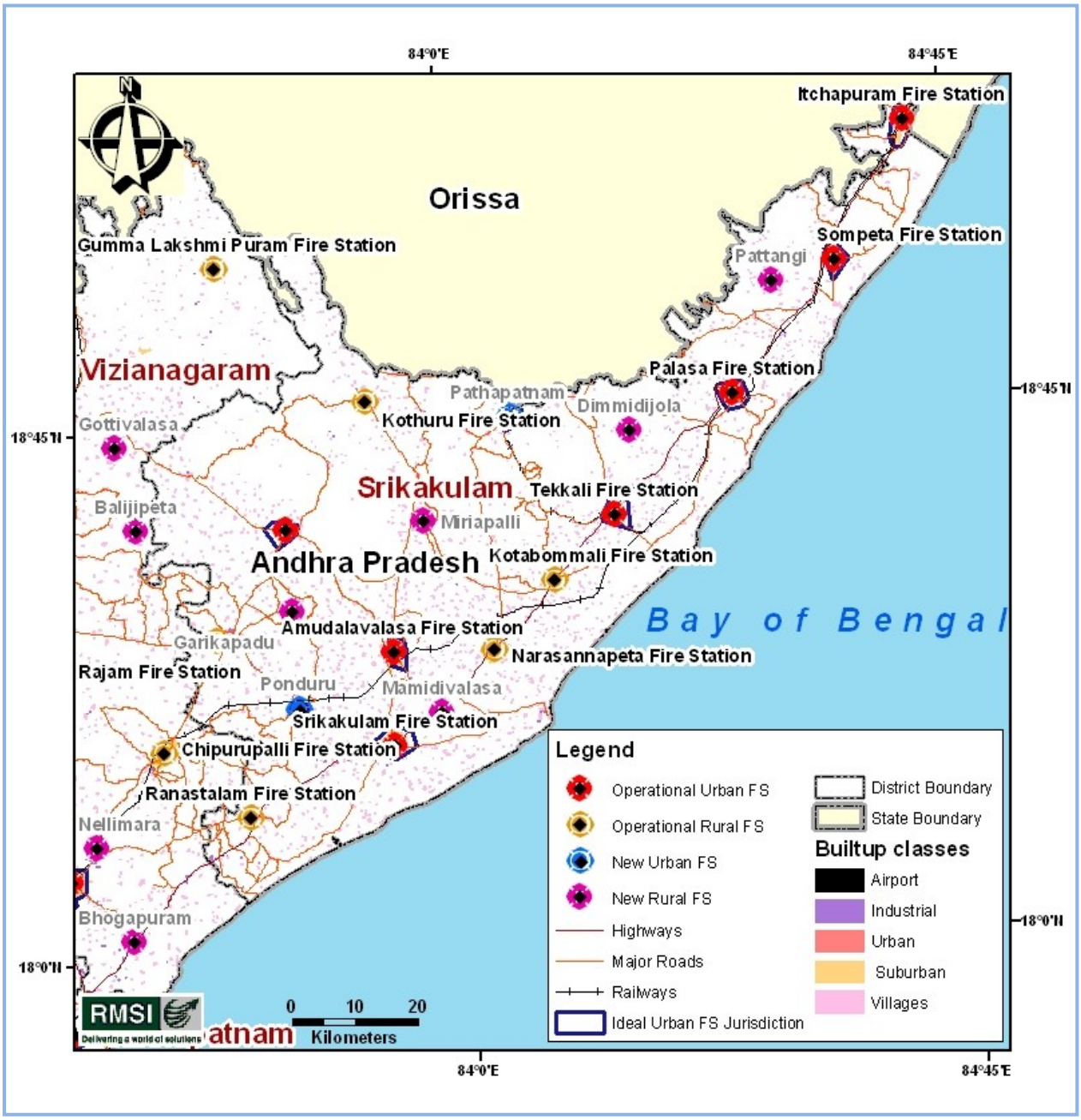

Figure 25-21: Fire stations gap analysis for Srikakulam rural areas

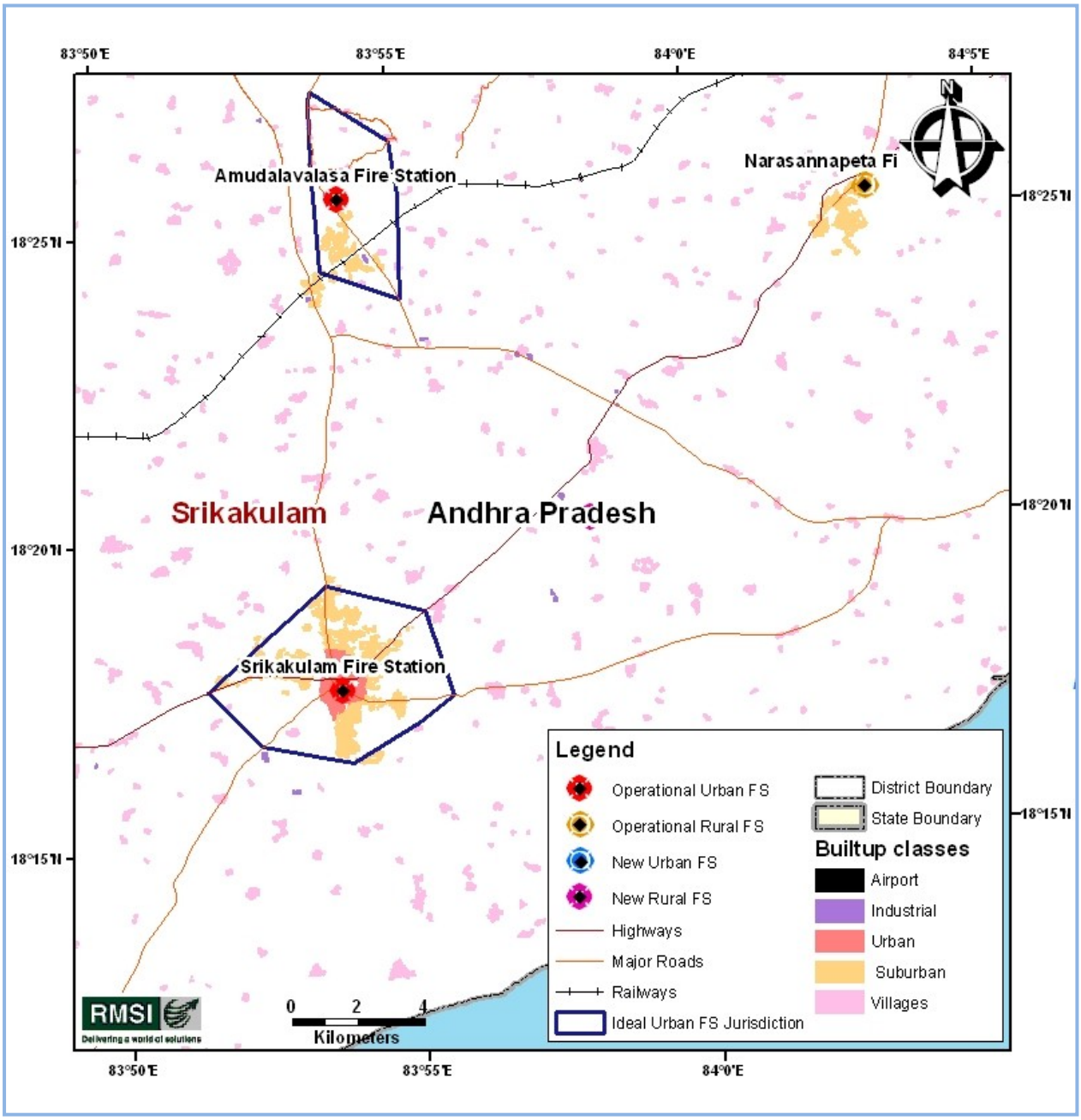

Figure 25-22: Fire stations gap analysis for Srikakulam urban area

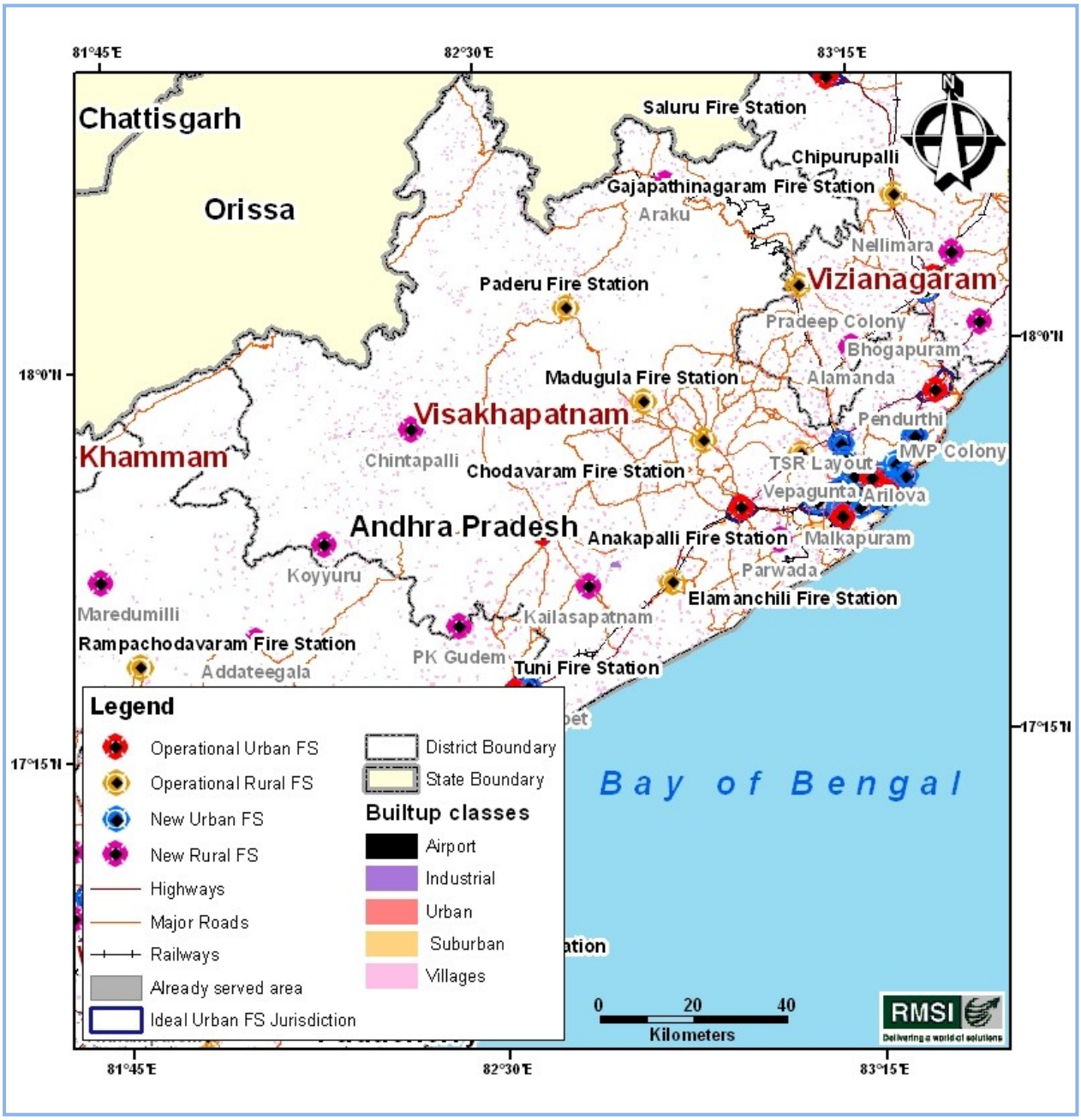

Figure 25-23: Fire stations gap analysis for Visakhapatnam rural area

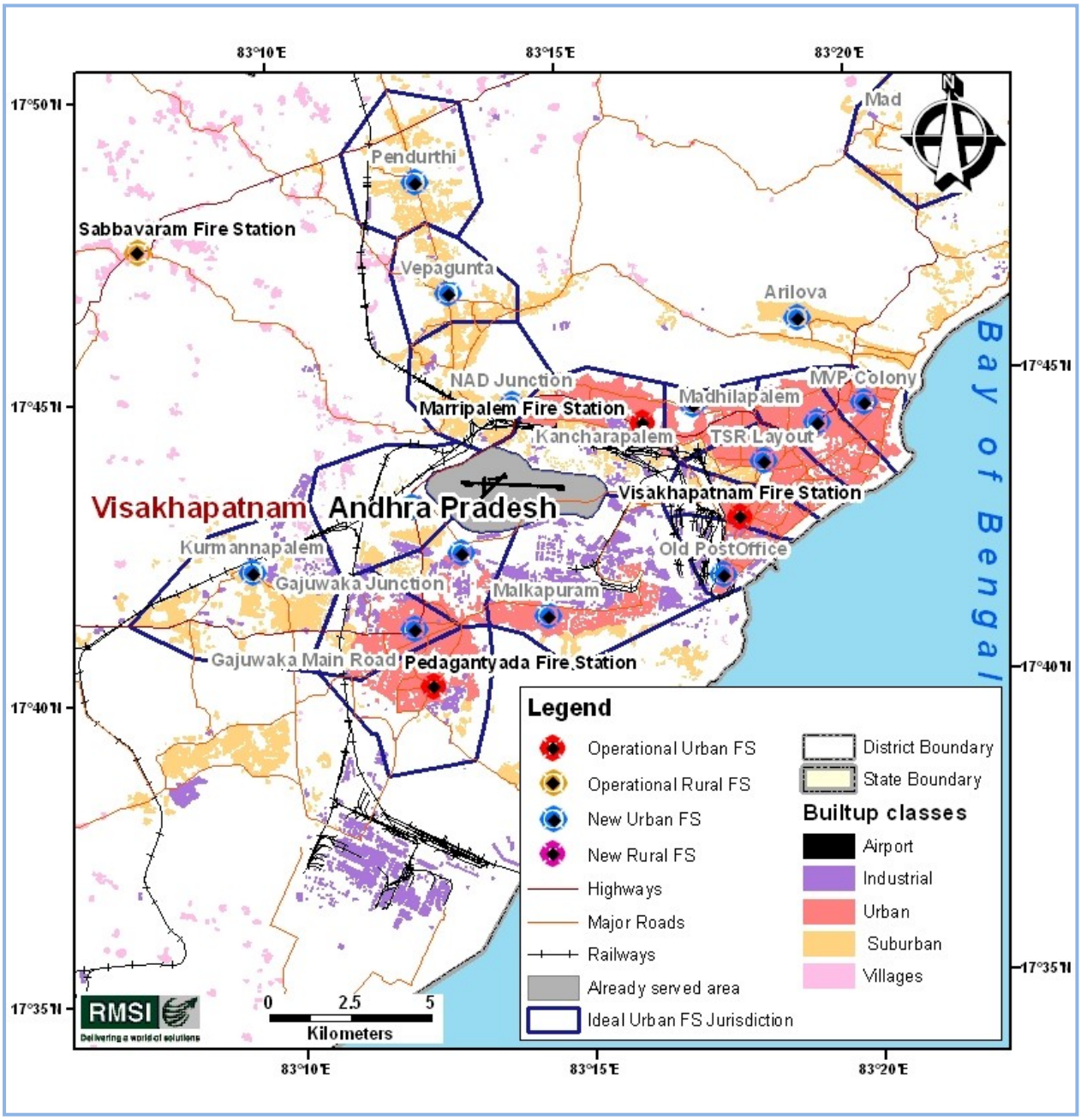

Figure 25-24: Fire stations gap analysis for Visakhapatnam urban area

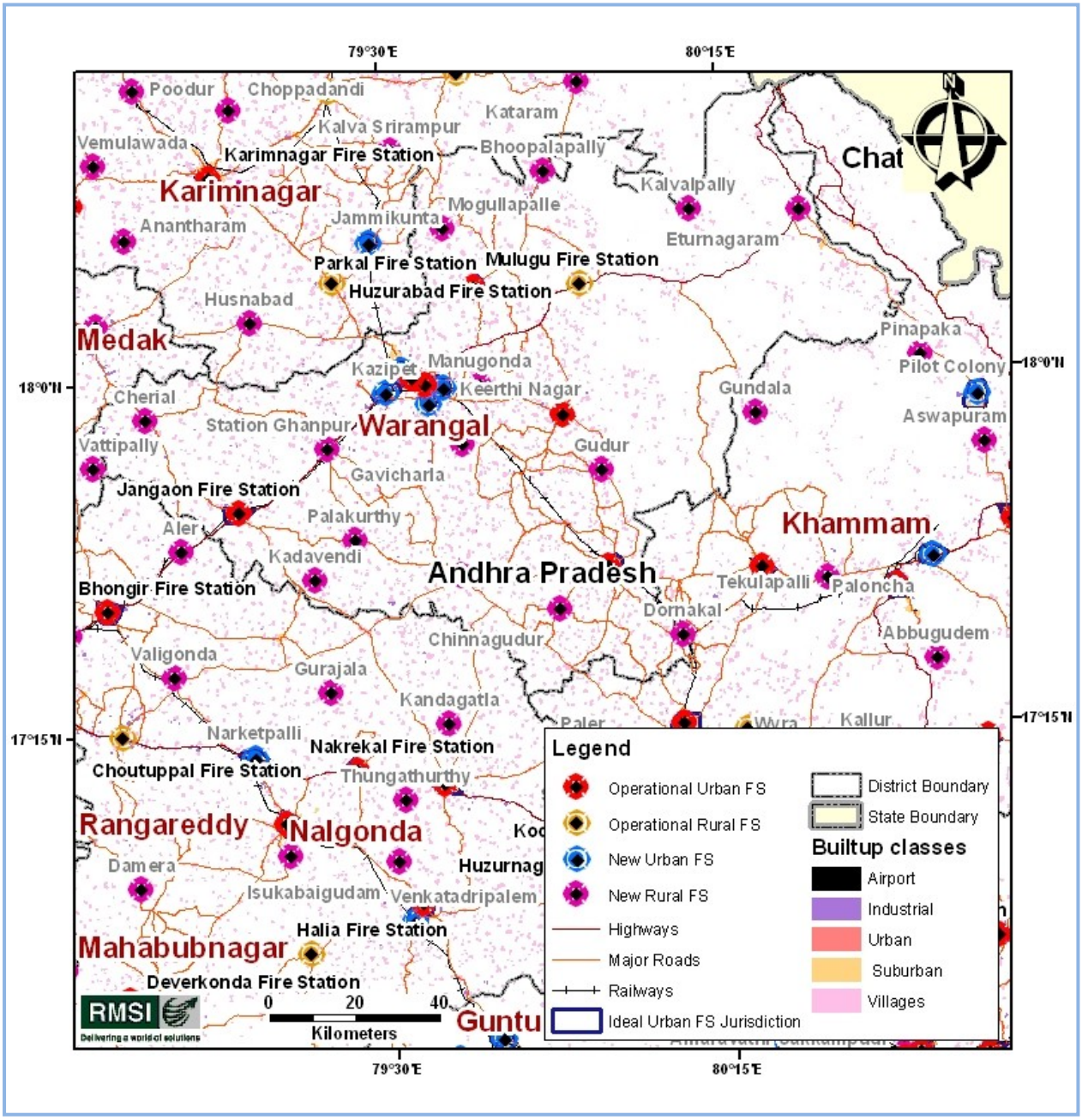

Figure 25-25: Fire stations gap analysis for Warangal rural areas

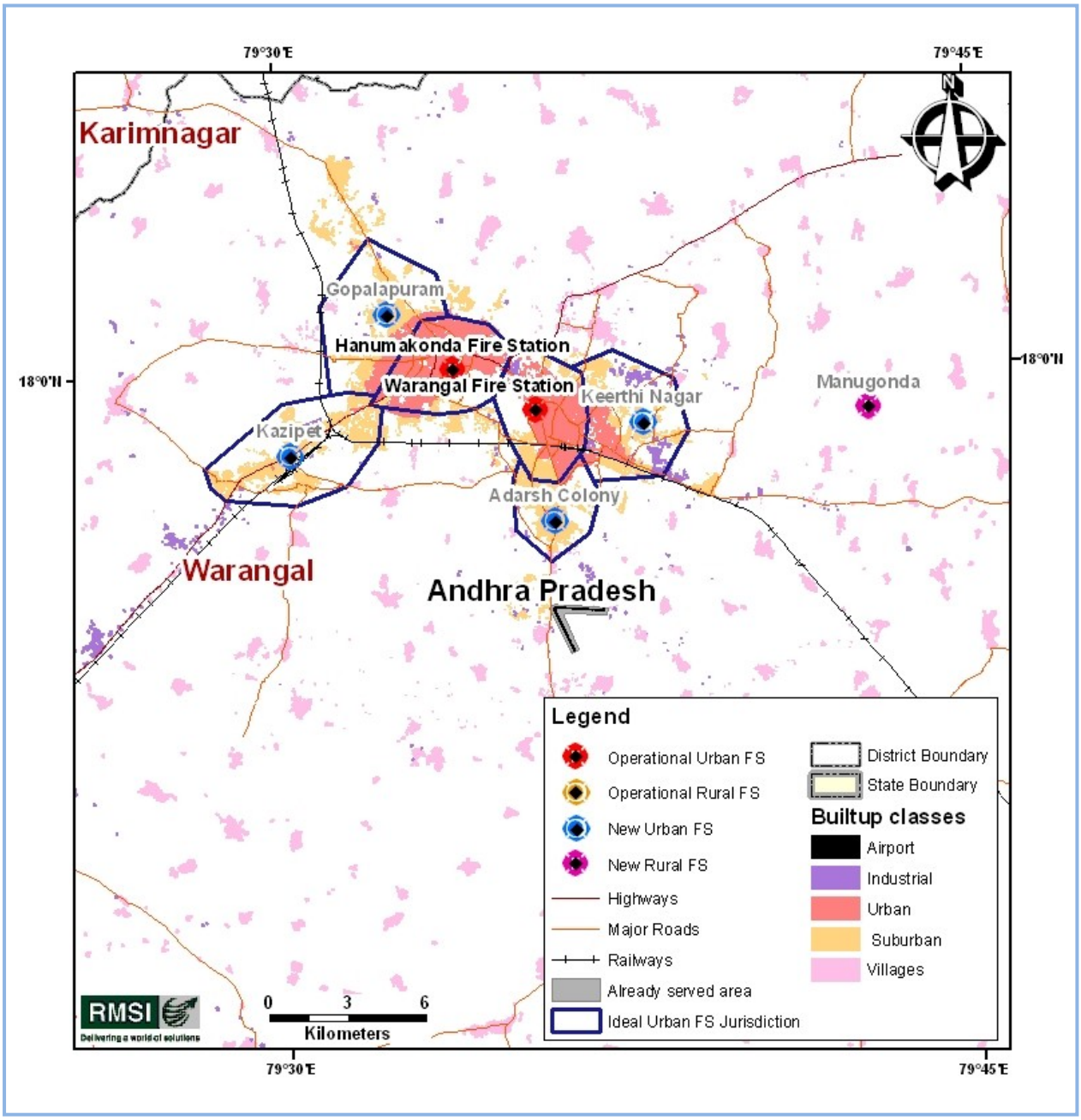

Figure 25-26: Fire stations gap analysis for Warangal urban areas

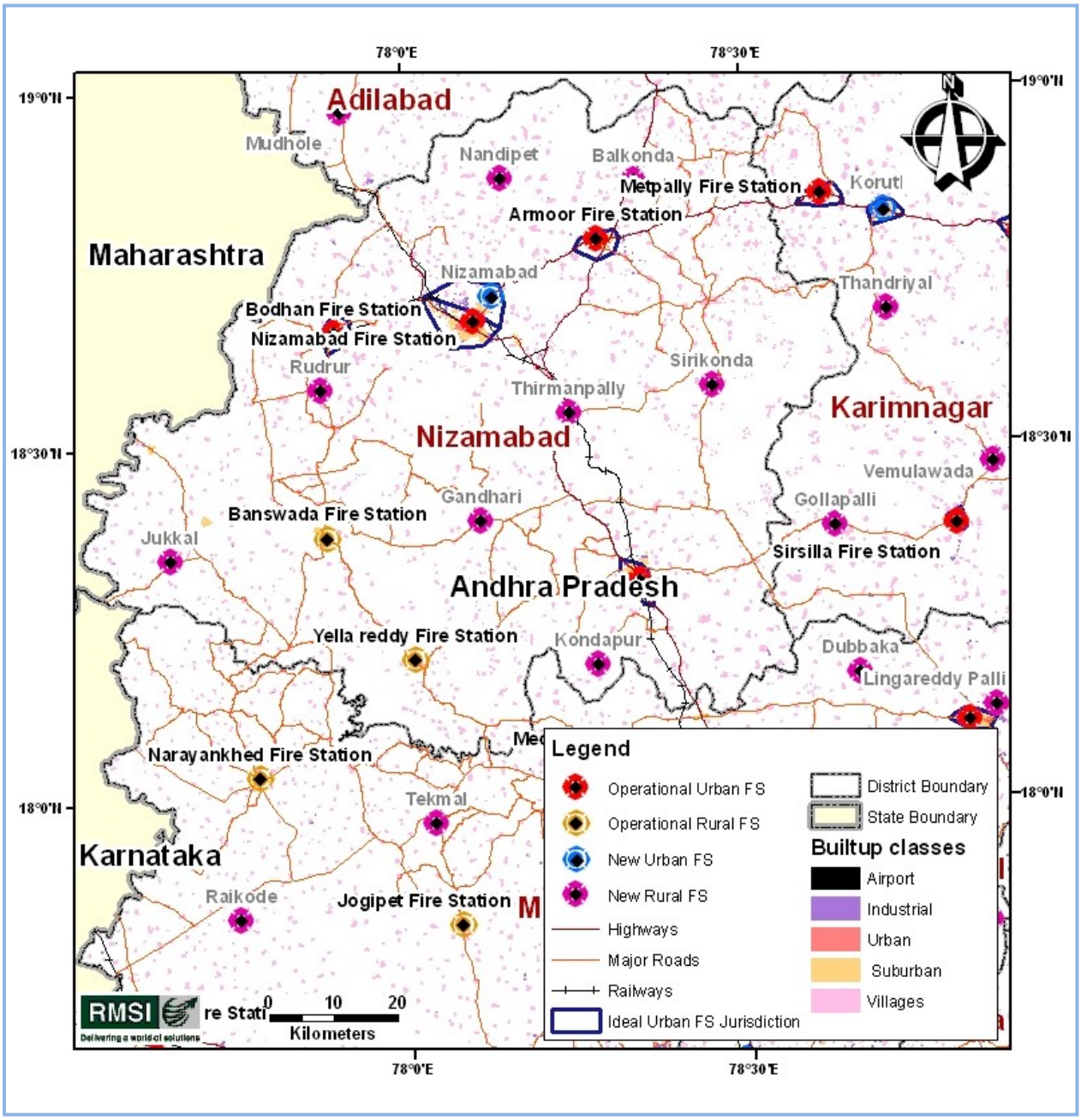

Figure 25-27: Fire stations gap analysis for Nizamabad rural areas

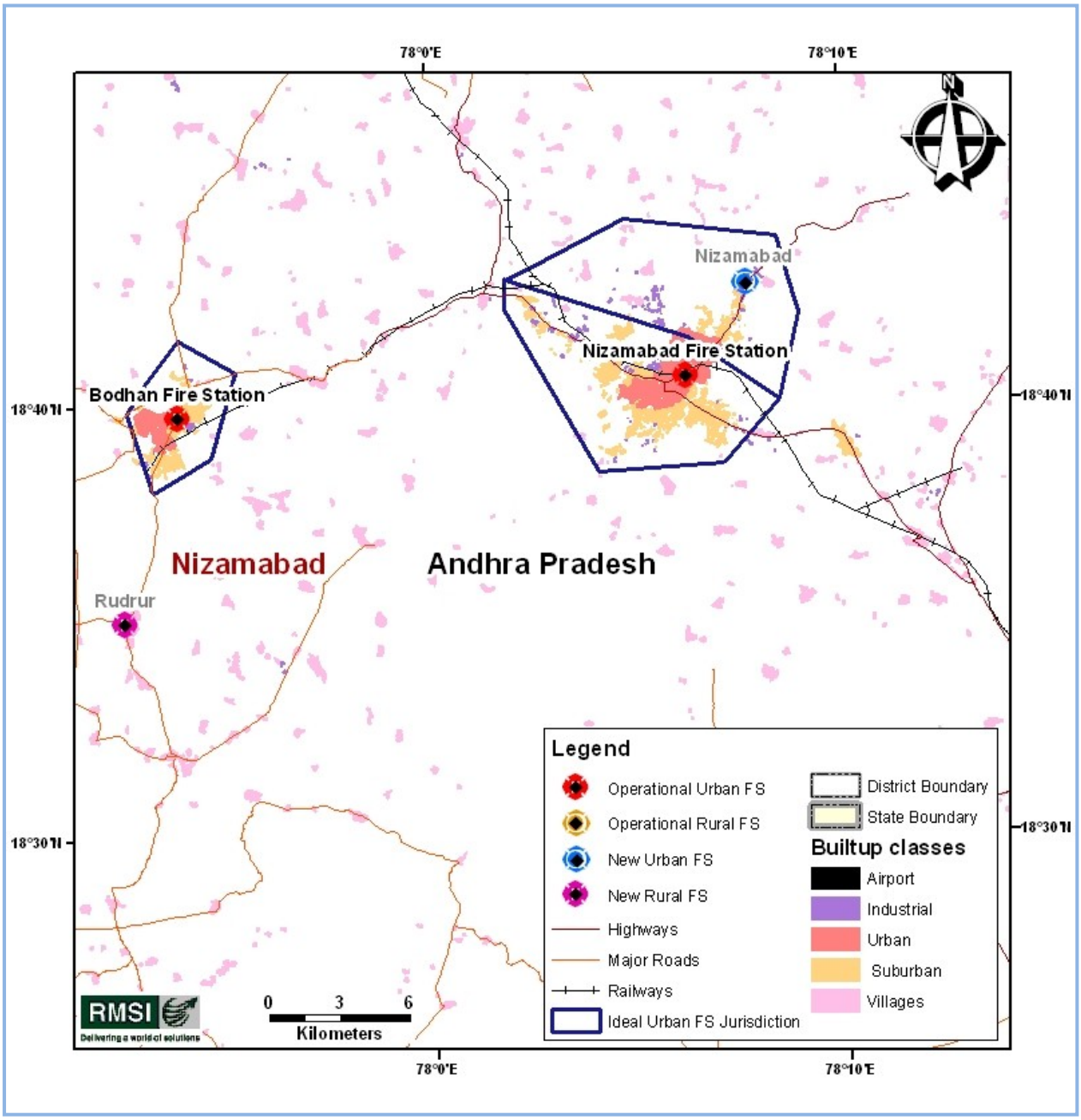

Figure 25-28: Fire stations gap analysis for Nizamabad urban areas

25.3.2 FIREFIGHTING AND RESCUE VEHICLES AND EQUIPMENT GAP

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

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

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

2. **Foam Tender:** For those Fire Stations, in whose jurisdiction small industrial area also lie, one Water Tender should be replaced with Foam Tender.
3. **DCP Tender:** Minimum one per district or one for 8-10 Fire Stations. Fire stations, having a large industrial plot area (in their ideal jurisdiction) of above 1.0 - 3.0 sq km, should have additionally one DCP tender. For industrial areas more than 3.0 - 6.0 sq km, there should be 2 DCP Tenders and so on.
4. **Advanced Rescue Tender:** One per district (minimum) up to 10 Lakhs population, and one additional unit for every 10 Lakhs urban population.
5. **Hydraulic Platform/ALP/TTL:** One per district depending upon the presence of high-rise buildings (height more than 15 m). Additional unit is to be provided for districts having a large number of such building blocks, i.e., Central Business Districts. It may be noted that Hydraulic Platform/ALP/TTL is not a replacement for in-built systems in high-rise buildings. Moreover, equipment is heavy and maneuvering on roads becomes difficult, where there are overhead electrical lines.
6. **HAZMAT Van:** Hazmat van is used rarely and is a very costly equipment requiring highly trained manpower. Hence, to optimize on resources and manpower, HAZMAT van is not recommended for future procurement in the State. However, for that purpose, an Advanced Rescue Responder is proposed (at Sr. No 4), which will have equipment to handle hazardous material release.
7. **Crash Fire Tender:** Crash Fire Tender is not recommended for the State Fire and Emergency Service. Instead, for Fire Stations in the funnel area on either side of the airport, one WT should be replaced with Foam Tender depending upon the State policy.

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

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

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

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

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

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

Specialized Equipment:

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

1. **Hydraulic Rescue Tool:** One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction including Hydraulic Cutter, Hydraulic Spreader, Hydraulic Pump, Power Wedge, and Hydraulic Rescue Ram depending upon the seismic Zone IV and V.
2. **Combi-Tool:** One Combi-Tool set shall be provided with each fire-fighting vehicle.
3. **B.A. Set with BA Compressor:** Four B. A. Sets per firefighting vehicle with minimum one compressor per Fire Station
4. **First Aid Box:** One for each firefighting vehicle (minimum two at each Fire Station) with regular replacement of expired medicines
5. **Thermal Imaging Camera:** One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction
6. **Personal Protection Equipment (PPE):** One Set for each pumping unit or a minimum of two for each Fire Station
7. **Hydraulic Chain Saw/Cutter for Wood:** One for each Fire Station
8. **Electric/Petrol Chain Saw/Cutter for Wood:** One for each Fire Station
9. **Electric/Petrol Chain Saw/Cutter for Concrete:** One for each Fire Station
10. **Hand Held Gas Detector:** One piece per Vehicle
11. **Victim Location Device (Acoustic**): One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction
12. **Portable Pump:** One for each firefighting unit
13. **Floating Pump**: One for each Fire Boat
14. **Smoke Exhauster/PPV:** One per Fire Stations located in urban areas (minimum one per district)
15. **Pneumatic Lifting Bags:** One for each Fire Station depending upon the seismic Zone IV and V, or Fire Station having urban population more than 1.5 Lakhs in its ideal jurisdiction
16. **Diving Suit (Dry Type):** Two for each Fire Boat depending upon the Fire Stations located in extreme climatic condition where wet type of diving suit cannot be used
17. **Diving Suit (Wet Type):** Two for each Fire Boat for Fire Stations located in normal climatic condition
18. **Inflatable Lighting Tower:** One per Fire Station
19. **High Capacity LED Torch Light:** One piece per vehicle

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

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

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

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

Communication Equipment:

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

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

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

Detailed district level list of currently operational firefighting vehicles available with Fire Service (As on June 2012), vehicle gap in operational Fire Stations for ideal Jurisdiction area, additional vehicle required for new urban and rural Fire Stations and total vehicle gap for existing and new Urban Fire stations are shown in Table 25-4 to 29-7. Similarly, gap analysis for specialized fire equipment is shown in Tables 25-8 to 25-15.

Table 25-4: List of operational firefighting vehicles available with Andhra Pradesh SDR & FS (As on June, 2012)

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Adilabad	10	897,902	12	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Anantapur	12	1,208,805	13	1	0	0	0	0	0	0	0	0	0	0	0	0	14
Chittoor	15	1,794,184	16	0	0	0	0	0	0	0	0	0	0	0	1	0	17
East Godavari	14	2,033,630	17	0	0	0	0	0	0	0	0	0	0	0	0	0	17
Guntur	13	1,201,249	15	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Hyderabad	10	1,706,358	11	1	0	3	1	0	0	0	1	1	4	0	1	1	24
Karimnagar	8	1,183,575	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Khammam	8	939,405	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Krishna	21	3,700,334	19	0	0	0	0	1	0	0	0	0	0	0	0	0	20
Kurnool	12	1,275,320	13	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Mahabubnagar	8	1,156,722	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Medak	8	783,052	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Nalgonda	10	1,253,708	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Nizamabad	6	798,069	7	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Prakasam	11	1,041,892	9	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Rangareddy	9	769,399	9	0	1	0	0	1	0	0	0	0	0	0	0	0	11
Sri Potti Sriramulu Nellore	12	1,623,680	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Srikakulam	12	1,696,236	11	0	0	0	0	0	0	0	0	0	0	0	0	0	11
Visakhapatnam	11	1,714,473	10	0	0	0	1	1	0	0	0	0	0	0	0	0	12
Vizianagaram	9	1,510,966	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Warangal	7	873,624	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8
West Godavari	13	2,494,472	13	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Y.S.R	12	1,586,384	10	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Total	**251**	**33,243,439**	**258**	**2**	**1**	**3**	**2**	**3**	**0**	**0**	**1**	**1**	**4**	**0**	**2**	**1**	**278**

Table 25-5: Vehicle gap in operational Fire Stations for their ideal jurisdiction area

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Adilabad	10	897,902	0	3	2	1	0	2	2	1	0	4	4	0	0	1	20
Anantapur	12	1,208,805	6	8	1	1	0	1	2	1	0	1	1	0	0	2	24
Chittoor	15	1,794,184	10	11	3	1	1	2	2	1	0	7	7	0	0	1	46
East Godavari	14	2,033,630	10	11	6	2	1	1	2	1	0	6	6	0	0	2	48
Guntur	13	1,201,249	5	6	3	2	1	1	3	1	0	1	1	0	0	2	26
Hyderabad	10	1,706,358	26	16	2	-1	1	1	1	1	0	8	5	0	0	1	61
Karimnagar	8	1,183,575	8	8	3	1	0	1	1	1	0	3	3	0	0	2	31
Khammam	8	939,405	5	6	2	1	0	1	1	1	0	3	3	0	0	1	24
Krishna	21	3,700,334	33	28	13	2	2	4	3	1	0	15	15	0	0	2	118
Kurnool	12	1,275,320	6	6	2	1	1	2	2	1	0	4	4	0	0	2	31
Mahabubnagar	8	1,156,722	7	6	2	1	0	1	2	1	0	3	3	0	0	2	28
Medak	8	783,052	2	6	0	1	0	1	2	1	0	2	2	0	0	1	18
Nalgonda	10	1,253,708	5	7	4	1	0	3	2	1	0	3	3	0	0	2	31
Nizamabad	6	798,069	1	6	2	1	0	2	2	1	0	2	2	0	0	1	20
Prakasam	11	1,041,892	7	6	1	1	0	1	3	1	0	4	4	0	0	2	30
Rangareddy	9	769,399	3	3	1	2	0	3	2	1	0	1	1	0	0	1	18
Sri Potti Sriramulu Nellore	12	1,623,680	14	9	0	1	1	1	2	1	0	7	7	0	0	1	44
Srikakulam	12	1,696,236	13	10	2	1	0	2	1	1	0	5	5	0	0	1	41
Visakhapatnam	11	1,714,473	20	16	4	1	0	0	2	1	0	7	7	0	0	1	59
Vizianagaram	9	1,510,966	11	11	1	1	0	1	1	1	0	5	5	0	0	1	38
Warangal	7	873,624	4	6	2	1	1	1	2	1	0	2	2	0	0	1	23
West Godavari	13	2,494,472	22	16	6	1	0	3	2	1	0	9	9	0	0	2	71
Y.S.R	12	1,586,384	16	8	1	1	0	2	2	1	0	5	5	0	0	1	42
Total	**251**	**33,243,439**	**234**	**213**	**63**	**25**	**9**	**37**	**44**	**23**	**0**	**107**	**104**	**0**	**0**	**33**	**892**

Table 25-6: Total vehicle gap in operational and new urban Fire Stations under their ideal jurisdiction areas

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Adilabad	13	1,021,349	3	3	2	1	0	2	3	1	0	4	4	0	0	1	24
Anantapur	15	1,335,437	9	8	1	1	0	1	2	1	0	1	1	0	0	2	27
Chittoor	18	1,998,167	15	12	3	1	1	3	3	1	0	7	7	0	0	2	55
East Godavari	29	3,371,420	36	17	7	2	1	1	4	1	0	6	6	0	0	2	83
Guntur	22	1,802,010	18	7	4	2	1	1	3	1	0	1	1	0	0	2	41
Hyderabad	21	3,682,975	57	33	7	-1	1	2	2	1	0	11	8	0	0	1	122
Karimnagar	13	1,459,107	15	9	3	1	0	1	2	1	0	3	3	0	0	2	40
Khammam	11	1,115,200	9	6	3	1	0	1	2	1	0	3	3	0	0	1	30
Krishna	28	4,551,298	44	33	18	2	2	4	3	1	0	15	15	0	0	2	139
Kurnool	16	1,690,221	13	8	3	1	1	2	3	1	0	4	4	0	0	2	42
Mahabubnagar	12	1,343,852	12	6	2	1	0	1	3	1	0	3	3	0	0	2	34
Medak	9	833,945	3	6	0	1	0	1	2	1	0	2	2	0	0	1	19
Nalgonda	12	1,301,483	7	7	4	1	0	3	2	1	0	3	3	0	0	2	33
Nizamabad	7	829,678	2	6	2	1	0	2	2	1	0	2	2	0	0	1	21
Prakasam	16	1,286,690	13	6	1	1	0	1	3	1	0	4	4	0	0	2	36
Rangareddy	31	3,643,768	46	23	10	3	0	6	4	1	0	2	2	0	0	3	100
Sri Potti Sriramulu Nellore	14	1,939,448	18	11	1	1	1	1	2	1	0	7	7	0	0	1	51
Srikakulam	14	1,787,027	15	10	2	1	0	2	2	1	0	5	5	0	0	1	44
Visakhapatnam	27	3,331,751	48	23	11	2	1	2	3	1	0	7	7	0	0	2	107
Vizianagaram	10	1,586,238	13	11	1	1	0	1	2	1	0	5	5	0	0	1	41
Warangal	11	1,359,202	12	9	3	1	1	1	2	1	0	3	3	0	0	1	37
West Godavari	18	2,866,643	30	17	6	1	0	3	3	1	0	9	9	0	0	2	81
Y.S.R	14	1,753,847	19	9	1	1	0	2	3	1	0	5	5	0	0	1	47
Total	**381**	**45,890,756**	**457**	**280**	**95**	**27**	**10**	**44**	**60**	**23**	**0**	**112**	**109**	**0**	**0**	**37**	**1,254**

Table 25-7: Additional vehicle required for new rural Fire Stations under their ideal jurisdiction areas

District	Fire Stations	Ideally Served Population Estimates	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	Hazmat Vans	QRT	Motor Cycle Mists	Fire Boats	Ambulances	Education Vans	Total Vehicle
Adilabad	15	1,766,619	18	11	2	0	0	0	0	0	0	15	15	0	0	0	61
Anantapur	14	2,642,793	28	17	5	0	0	2	1	0	0	14	14	0	0	0	81
Chittoor	13	2,137,071	22	16	3	0	0	0	0	0	0	13	13	0	0	0	67
East Godavari	10	1,700,903	17	9	7	0	0	4	0	0	0	10	10	0	0	0	57
Guntur	15	3,161,095	34	20	6	0	0	2	1	0	0	15	15	0	0	0	93
Hyderabad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karimnagar	13	2,342,944	23	17	3	0	0	1	1	0	0	13	13	0	0	0	71
Khammam	9	1,461,091	16	8	4	0	0	2	0	0	0	9	9	0	0	0	48
Krishna	2	189,258	3	1	0	0	0	0	0	0	0	2	2	0	0	0	8
Kurnool	16	2,305,025	24	12	4	0	0	0	0	0	0	16	16	0	0	0	72
Mahabubnagar	18	3,041,643	31	19	5	0	0	2	0	0	0	18	18	0	0	0	93
Medak	8	1,825,710	20	10	6	0	0	4	0	0	0	8	8	0	0	0	56
Nalgonda	11	2,022,813	19	11	7	0	0	3	0	0	0	11	11	0	0	0	62
Nizamabad	8	1,779,355	20	12	3	0	0	0	0	0	0	8	8	0	0	0	51
Prakasam	13	2,011,308	23	12	5	0	0	2	0	0	0	13	13	0	0	0	68
Rangareddy	10	1,939,950	18	10	9	0	0	8	0	0	0	10	10	0	0	0	65
Sri Potti Sriramulu Nellore	5	1,044,999	11	6	3	0	0	1	0	0	0	5	5	0	0	0	31
Srikakulam	5	874,285	9	7	0	0	0	0	0	0	0	5	5	0	0	0	26
Visakhapatnam	6	818,572	8	4	2	0	0	3	0	0	0	6	6	0	0	0	29
Vizianagaram	5	924,694	11	5	3	0	0	1	0	0	0	5	5	0	0	0	30
Warangal	14	2,416,684	28	16	6	0	0	1	1	0	0	14	14	0	0	0	80
West Godavari	8	1,172,896	9	6	4	0	0	1	0	0	0	8	8	0	0	0	36
Y.S.R	10	1,195,069	11	7	2	0	0	0	0	0	0	10	10	0	0	0	40
Total	**228**	**38,774,777**	**403**	**236**	**89**	**0**	**0**	**37**	**4**	**0**	**0**	**228**	**228**	**0**	**0**	**0**	**1,225**

Table 25-8: List of specialized equipment available with Andhra Pradesh SDR & FS Services (As on June, 2012)

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws/ Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Adilabad	10	897,902	0	0	6	0	1	0	0	0	0	0	0	0	11	0
Anantapur	12	1,208,805	0	0	10	0	6	0	0	0	0	8	0	0	13	0
Chittoor	15	1,794,184	0	0	8	0	4	0	0	1	0	7	0	0	17	0
East Godavari	14	2,033,630	0	0	9	1	0	0	0	1	0	0	0	0	17	0
Guntur	13	1,201,249	0	0	11	0	3	0	0	0	0	9	0	0	16	0
Hyderabad	10	1,706,358	0	0	15	1	9	0	2	1	2	17	1	0	10	1
Karimnagar	8	1,183,575	0	0	3	0	4	0	0	0	0	0	0	0	8	0
Khammam	8	939,405	0	0	8	0	0	0	0	0	0	0	0	0	8	0
Krishna	21	3,700,334	0	0	15	0	0	0	0	0	0	5	0	0	21	0
Kurnool	12	1,275,320	0	0	10	0	5	0	0	0	0	4	0	0	14	0
Mahabubnagar	8	1,156,722	0	0	2	0	0	0	0	0	0	0	0	0	9	0
Medak	8	783,052	0	0	9	0	2	0	0	0	0	0	0	0	8	0
Nalgonda	10	1,253,708	0	0	4	0	0	0	0	0	0	0	0	0	10	0
Nizamabad	6	798,069	0	0	4	0	0	0	0	0	0	0	0	0	9	0
Prakasam	11	1,041,892	0	0	4	0	6	0	0	0	0	3	0	0	13	0
Rangareddy	9	769,399	0	0	9	0	2	0	0	0	0	4	0	0	12	0
Sri Potti Sriramulu Nellore	12	1,623,680	0	0	8	0	4	0	0	1	0	3	0	0	14	0
Srikakulam	12	1,696,236	0	0	6	0	0	0	1	0	1	1	0	0	13	0
Visakhapatnam	11	1,714,473	0	0	9	0	0	0	0	0	3	0	0	0	13	0
Vizianagaram	9	1,510,966	0	0	6	0	0	0	0	0	0	1	0	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
Warangal	7	873,624	0	0	4	0	3	0	0	0	0	1	0	0	6	0
West Godavari	13	2,494,472	0	0	12	1	0	0	0	0	0	0	0	0	14	0
Y.S.R	12	1,586,384	0	0	7	0	8	0	0	0	0	2	0	0	13	0
Total	**251**	**33,243,439**	**0**	**0**	**179**	**3**	**57**	**0**	**3**	**4**	**6**	**65**	**1**	**0**	**280**	**1**

Table 25-9: List of specialized equipment available with Andhra Pradesh DR & FS (As on June, 2012) (continued..)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Adilabad	10	897,902	0	0	0	0	0	21	0	18	20	0	0	77
Anantapur	12	1,208,805	0	0	0	0	0	7	0	23	23	70	0	160
Chittoor	15	1,794,184	0	0	1	0	0	16	0	28	30	87	0	199
East Godavari	14	2,033,630	0	0	2	0	0	16	0	26	26	81	0	179
Guntur	13	1,201,249	0	0	0	0	0	16	0	26	28	72	0	181
Hyderabad	10	1,706,358	0	0	2	1	0	21	0	20	21	68	0	192
Karimnagar	8	1,183,575	0	0	0	0	1	13	0	16	16	23	0	84
Khammam	8	939,405	0	0	0	0	0	14	0	16	16	37	0	99
Krishna	21	3,700,334	0	0	1	0	0	26	0	42	42	112	0	264

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
Kurnool	12	1,275,320	0	0	0	0	0	17	0	24	25	68	0	167
Mahabubnagar	8	1,156,722	0	0	0	0	0	10	0	16	16	40	0	93
Medak	8	783,052	0	0	0	0	0	14	0	10	10	22	0	75
Nalgonda	10	1,253,708	0	0	0	0	0	18	0	20	20	50	0	122
Nizamabad	6	798,069	0	0	0	0	0	11	0	14	14	35	0	87
Prakasam	11	1,041,892	0	0	0	0	0	14	0	22	22	66	0	150
Rangareddy	9	769,399	0	0	1	0	0	16	0	20	20	39	0	123
Sri Potti Sriramulu Nellore	12	1,623,680	0	0	1	0	0	11	0	24	24	63	0	153
Srikakulam	12	1,696,236	1	0	0	0	0	14	0	24	24	59	0	144
Visakhapatnam	11	1,714,473	0	0	0	0	0	13	0	22	22	35	0	117
Vizianagaram	9	1,510,966	0	0	0	0	0	13	0	18	18	41	0	108
Warangal	7	873,624	0	0	0	0	0	11	0	11	11	25	0	72
West Godavari	13	2,494,472	0	0	1	0	0	12	0	26	26	91	0	183
Y.S.R	12	1,586,384	0	0	0	0	0	12	0	24	25	74	0	165
Total	**251**	**33,243,439**	**1**	**0**	**9**	**1**	**1**	**336**	**0**	**490**	**499**	**1,258**	**0**	**3,194**

Table 25-10: Specialized equipment gap in operational Fire Stations for ideal jurisdiction area

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws/ Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Adilabad	10	897,902	1	13	85	12	27	1	7	12	12	28	16	1	10	0
Anantapur	12	1,208,805	2	31	132	14	33	2	13	14	14	31	32	2	17	0
Chittoor	15	1,794,184	4	24	201	18	57	4	11	17	18	54	25	4	30	0
East Godavari	14	2,033,630	4	29	217	16	61	4	11	16	17	61	30	4	33	0
Guntur	13	1,201,249	2	36	131	16	39	2	16	16	16	33	37	2	14	0
Hyderabad	10	1,706,358	11	78	275	11	70	11	10	11	10	62	78	11	54	0
Karimnagar	8	1,183,575	1	17	134	10	34	1	6	10	10	38	18	1	22	0
Khammam	8	939,405	1	14	100	10	30	1	6	10	10	30	16	1	16	0
Krishna	21	3,700,334	5	52	467	25	130	5	11	25	25	125	54	5	87	0
Kurnool	12	1,275,320	4	20	129	14	35	4	10	14	14	36	23	4	17	0
Mahabubnagar	8	1,156,722	2	14	120	10	34	2	6	10	10	34	16	2	18	0
Medak	8	783,052	1	12	77	10	23	1	7	10	10	25	13	1	11	0
Nalgonda	10	1,253,708	1	16	128	12	37	1	8	12	12	37	17	1	19	0
Nizamabad	6	798,069	1	14	78	7	23	1	5	7	7	23	16	1	9	0
Prakasam	11	1,041,892	1	13	116	13	31	1	8	13	13	34	14	1	14	0
Rangareddy	9	769,399	1	14	75	11	24	1	10	11	11	22	19	1	6	0
Sri Potti Sriramulu Nellore	12	1,623,680	1	17	172	14	47	1	7	13	14	48	18	1	27	0
Srikakulam	12	1,696,236	1	20	179	14	50	1	7	14	13	49	22	1	28	0
Visakhapatnam	11	1,714,473	4	36	248	13	69	4	7	13	10	69	37	4	44	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
Vizianagaram	9	1,510,966	1	14	164	11	46	1	5	11	11	45	16	1	27	0
Warangal	7	873,624	1	20	97	8	26	1	7	8	8	28	22	1	16	0
West Godavari	13	2,494,472	7	41	283	15	80	7	10	16	16	80	42	7	52	0
Y.S.R	12	1,586,384	5	30	173	14	42	5	10	14	14	48	32	5	27	0
Total	**251**	**33,243,439**	**62**	**575**	**3781**	**298**	**1048**	**62**	**198**	**297**	**295**	**1040**	**613**	**62**	**598**	**0**

Table 25-11: Specialized equipment gap in operational Fire Stations for ideal jurisdiction area (continued..)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Adilabad	10	897,902	0	0	12	7	1	7	0	-6	14	35	12	307
Anantapur	12	1,208,805	0	0	14	13	2	30	0	-9	21	-22	14	400
Chittoor	15	1,794,184	0	0	17	11	4	43	0	-10	36	-17	18	569
East Godavari	14	2,033,630	0	0	15	11	4	45	0	-9	45	-9	17	622
Guntur	13	1,201,249	0	0	16	16	2	21	0	-10	20	-18	16	423
Hyderabad	10	1,706,358	0	0	10	11	11	58	0	-8	68	21	12	875
Karimnagar	8	1,183,575	0	0	10	6	0	24	0	-6	27	22	10	395

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
Khammam	8	939,405	0	0	10	6	1	16	0	-6	19	-1	10	300
Krishna	21	3,700,334	0	0	24	11	5	110	0	-17	106	36	25	1,316
Kurnool	12	1,275,320	0	0	14	10	4	23	0	-10	23	-17	14	385
Mahabubnagar	8	1,156,722	0	0	10	6	2	24	0	-6	25	2	10	351
Medak	8	783,052	0	0	10	7	1	10	0	0	20	9	10	268
Nalgonda	10	1,253,708	0	0	12	8	1	20	0	-8	26	-3	12	369
Nizamabad	6	798,069	0	0	7	5	1	13	0	-7	16	-3	7	231
Prakasam	11	1,041,892	0	0	13	8	1	20	0	-9	20	-21	13	317
Rangareddy	9	769,399	0	0	10	10	1	10	0	-9	14	-3	11	250
Sri Potti Sriramulu Nellore	12	1,623,680	0	0	13	7	1	39	0	-10	34	-4	14	474
Srikakulam	12	1,696,236	0	0	14	8	1	38	0	-10	32	-2	14	494
Visakhapatnam	11	1,714,473	0	0	13	7	4	57	0	-9	55	43	13	741
Vizianagaram	9	1,510,966	0	0	11	5	1	34	0	-7	34	11	11	453
Warangal	7	873,624	0	0	8	7	1	17	0	-3	24	11	8	316
West Godavari	13	2,494,472	0	0	15	10	7	71	0	-10	64	0	16	829
Y.S.R	12	1,586,384	0	0	14	10	5	38	0	-10	31	-16	14	505
Total	**251**	**33,243,439**	**0**	**0**	**292**	**200**	**61**	**768**	**0**	**-189**	**774**	**54**	**301**	**11,190**

Table 25-12: Total gap in specialized equipment for operational and new urban Fire Stations

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws/ Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Adilabad	13	1,021,349	1	17	99	16	33	1	11	16	16	34	20	1	13	0
Anantapur	15	1,335,437	2	35	146	18	39	2	17	18	18	37	36	2	20	0
Chittoor	18	1,998,167	4	31	230	22	65	4	15	21	22	62	33	4	36	0
East Godavari	29	3,371,420	6	69	375	34	105	6	29	34	35	105	70	6	66	0
Guntur	22	1,802,010	3	54	203	27	62	3	27	27	27	56	55	3	29	0
Hyderabad	21	3,682,975	16	145	537	24	137	16	23	24	23	129	146	16	110	0
Karimnagar	13	1,459,107	1	27	172	16	46	1	12	16	16	50	28	1	30	0
Khammam	11	1,115,200	1	20	124	14	37	1	10	14	14	37	22	1	21	0
Krishna	28	4,551,298	5	77	568	33	157	5	19	33	33	152	79	5	108	0
Kurnool	16	1,690,221	6	32	177	19	49	6	15	19	19	50	35	6	27	0
Mahabubnagar	12	1,343,852	2	20	144	15	42	2	11	15	15	42	22	2	23	0
Medak	9	833,945	1	13	82	11	25	1	8	11	11	27	14	1	12	0
Nalgonda	12	1,301,483	1	18	138	14	41	1	10	14	14	41	19	1	21	0
Nizamabad	7	829,678	1	15	83	8	25	1	6	8	8	25	17	1	10	0
Prakasam	16	1,286,690	1	20	145	19	41	1	14	19	19	44	21	1	20	0
Rangareddy	31	3,643,768	8	102	423	37	112	8	36	37	37	110	110	8	79	0
Sri Potti Sriramulu Nellore	14	1,939,448	2	25	206	16	56	2	9	15	16	57	26	2	34	0
Srikakulam	14	1,787,027	1	22	189	16	54	1	9	16	15	53	24	1	30	0
Visakhapatnam	27	3,331,751	6	86	450	32	123	6	26	32	29	123	90	6	86	0
Vizianagaram	10	1,586,238	1	16	174	12	48	1	6	12	12	47	18	1	29	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
Warangal	11	1,359,202	2	36	157	13	42	2	12	13	13	44	38	2	29	0
West Godavari	18	2,866,643	7	52	326	21	92	7	16	22	22	92	53	7	61	0
Y.S.R	14	1,753,847	5	35	192	16	48	5	12	16	16	54	37	5	31	0
Total	**381**	**45,890,756**	**83**	**967**	**5340**	**453**	**1479**	**83**	**353**	**452**	**450**	**1471**	**1013**	**83**	**925**	**0**

Table 25-13: Total gap in specialized equipment for operational and new urban Fire Stations (Continued….)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Adilabad	13	1,021,349	0	0	16	11	1	11	0	-2	19	41	16	391
Anantapur	15	1,335,437	0	0	18	17	2	34	0	-5	25	-16	18	483
Chittoor	18	1,998,167	0	0	21	15	4	51	0	-6	47	-5	22	698
East Godavari	29	3,371,420	0	0	33	29	6	85	0	9	87	36	35	1,260
Guntur	22	1,802,010	0	0	27	27	3	39	0	1	38	5	27	743
Hyderabad	21	3,682,975	0	0	23	24	16	126	0	5	138	91	25	1,794
Karimnagar	13	1,459,107	0	0	16	12	0	34	0	0	38	35	16	567
Khammam	11	1,115,200	0	0	14	10	1	22	0	-2	26	7	14	408
Krishna	28	4,551,298	0	0	32	19	5	135	0	-9	131	63	33	1,683

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
Kurnool	16	1,690,221	0	0	19	15	6	35	0	-5	36	-2	19	583
Mahabubnagar	12	1,343,852	0	0	15	11	2	30	0	-1	32	12	15	471
Medak	9	833,945	0	0	11	8	1	11	0	1	21	11	11	292
Nalgonda	12	1,301,483	0	0	14	10	1	22	0	-6	28	1	14	417
Nizamabad	7	829,678	0	0	8	6	1	14	0	-6	17	-1	8	255
Prakasam	16	1,286,690	0	0	19	14	1	27	0	-3	27	-11	19	458
Rangareddy	31	3,643,768	0	0	36	36	8	101	0	17	111	95	37	1,548
Sri Potti Sriramulu Nellore	14	1,939,448	0	0	15	9	2	47	0	-8	42	5	16	594
Srikakulam	14	1,787,027	0	0	16	10	1	40	0	-8	36	2	16	544
Visakhapatnam	27	3,331,751	0	0	32	26	6	110	0	10	113	104	32	1,528
Vizianagaram	10	1,586,238	0	0	12	6	1	36	0	-6	38	15	12	491
Warangal	11	1,359,202	0	0	13	12	2	33	0	2	40	27	13	545
West Godavari	18	2,866,643	0	0	21	16	7	82	0	-4	76	13	22	1,011
Y.S.R	14	1,753,847	0	0	16	12	5	43	0	-8	37	-10	16	583
Total	**381**	**45,890,756**	**0**	**0**	**447**	**355**	**82**	**1168**	**0**	**-34**	**1203**	**518**	**456**	**17,347**

Table 25-14: Additional specialized equipment required for new rural Fire Stations

District	Fire Stations	Ideally Served Population Estimates	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws/ Cutters / Hammers for Concrete	Electric Chain Saws / Cutters/ Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Adilabad	15	1,766,619	0	0	185	18	55	0	0	18	18	55	0	0	46	0
Anantapur	14	2,642,793	0	0	274	17	77	0	0	17	17	77	0	0	64	0
Chittoor	13	2,137,071	0	0	228	16	65	0	0	16	16	65	0	0	54	0
East Godavari	10	1,700,903	0	0	182	12	52	0	0	12	12	52	0	0	43	0
Guntur	15	3,161,095	0	0	324	18	90	0	0	18	18	90	0	0	75	0
Hyderabad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karimnagar	13	2,342,944	0	0	238	16	67	0	0	16	16	67	0	0	56	0
Khammam	9	1,461,091	0	0	156	11	44	0	0	11	11	44	0	0	37	0
Krishna	2	189,258	0	0	24	2	7	0	0	2	2	7	0	0	6	0
Kurnool	16	2,305,025	0	0	230	19	67	0	0	19	19	67	0	0	56	0
Mahabubnagar	18	3,041,643	0	0	307	22	88	0	0	22	22	88	0	0	73	0
Medak	8	1,825,710	0	0	192	10	53	0	0	10	10	53	0	0	44	0
Nalgonda	11	2,022,813	0	0	204	13	58	0	0	13	13	58	0	0	48	0
Nizamabad	8	1,779,355	0	0	187	10	52	0	0	10	10	52	0	0	43	0
Prakasam	13	2,011,308	0	0	223	16	64	0	0	16	16	64	0	0	53	0
Rangareddy	10	1,939,950	0	0	202	12	56	0	0	12	12	56	0	0	47	0
Sri Potti Sriramulu Nellore	5	1,044,999	0	0	108	6	30	0	0	6	6	30	0	0	25	0
Srikakulam	5	874,285	0	0	89	6	25	0	0	6	6	25	0	0	21	0
Visakhapatnam	6	818,572	0	0	82	7	24	0	0	7	7	24	0	0	20	0
Vizianagaram	5	924,694	0	0	103	6	29	0	0	6	6	29	0	0	24	0
Warangal	14	2,416,684	0	0	274	17	77	0	0	17	17	77	0	0	64	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
West Godavari	8	1,172,896	0	0	110	10	32	0	0	10	10	32	0	0	27	0
Y.S.R	10	1,195,069	0	0	120	12	36	0	0	12	12	36	0	0	30	0
Total	**228**	**38,774,777**	**0**	**0**	**4042**	**276**	**1148**	**0**	**0**	**276**	**276**	**1148**	**0**	**0**	**956**	**0**

Table 25-15: Additional specialized equipment required for new rural Fire Stations (continued…)

District	Fire Stations	Ideally Served Population Estimates	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Adilabad	15	1,766,619	0	0	18	0	0	55	0	18	55	55	18	614
Anantapur	14	2,642,793	0	0	17	0	0	79	0	17	80	80	17	833
Chittoor	13	2,137,071	0	0	16	0	0	65	0	16	65	65	16	703
East Godavari	10	1,700,903	0	0	12	0	0	56	0	12	56	56	12	569
Guntur	15	3,161,095	0	0	18	0	0	92	0	18	94	94	18	967
Hyderabad	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Karimnagar	13	2,342,944	0	0	16	0	0	68	0	16	70	70	16	732
Khammam	9	1,461,091	0	0	11	0	0	47	0	11	47	47	11	488
Krishna	2	189,258	0	0	2	0	0	7	0	2	7	7	2	77
Kurnool	16	2,305,025	0	0	19	0	0	67	0	19	67	67	19	735

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
Mahabubnagar	18	3,041,643	0	0	22	0	0	90	0	22	90	90	22	958
Medak	8	1,825,710	0	0	10	0	0	58	0	10	58	58	10	576
Nalgonda	11	2,022,813	0	0	13	0	0	61	0	13	61	61	13	629
Nizamabad	8	1,779,355	0	0	10	0	0	52	0	10	52	52	10	550
Prakasam	13	2,011,308	0	0	16	0	0	66	0	16	66	66	16	698
Rangareddy	10	1,939,950	0	0	12	0	0	66	0	12	66	66	12	631
Sri Potti Sriramulu Nellore	5	1,044,999	0	0	6	0	0	31	0	6	31	31	6	322
Srikakulam	5	874,285	0	0	6	0	0	25	0	6	25	25	6	271
Visakhapatnam	6	818,572	0	0	7	0	0	28	0	7	28	28	7	276
Vizianagaram	5	924,694	0	0	6	0	0	30	0	6	30	30	6	311
Warangal	14	2,416,684	0	0	17	0	0	78	0	17	79	79	17	830
West Godavari	8	1,172,896	0	0	10	0	0	34	0	10	34	34	10	363
Y.S.R	10	1,195,069	0	0	12	0	0	36	0	12	36	36	12	402
Total	**228**	**38,774,777**	**0**	**0**	**276**	**0**	**0**	**1,191**	**0**	**276**	**1,197**	**1,197**	**276**	**12,535**

25.3.3 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, while the current duty pattern for them is practically 24 hours (Table 25.16).

Table 25-16: Manpower requirement for Station officer and lower staff for Andhra Pradesh 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 (Table 25-17). From Tables 25-16 and 25-17, it is quite clear that The Administrative Reform Department (ARD, Delhi), has already optimized the fire manpower requirement in comparison of what has been suggested in SFAC norms. It may be noted that total number of staff is coming in decimal places, as calculations are on pumping units including reserve staff, which has been rounded of in the fire manpower gap analysis at district and State levels (Table 25-17).

Table 25-17: Manpower requirement for Station officer and lower staffs as per ARD, Delhi (2-shifts)

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

Thus for optimization on resources, following manpower criteria have been suggested for manpower gap analysis. Accordingly, total firefighting manpower gap in operational, urban and rural Fire Stations in Andhra Pradesh State has been estimated, which comes to 38,706 (Table 25-19 to 25-21) against the present firefighting manpower of 3,676 (Table 25-18).

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

- Director (Technical) : 1
- Additional Director (Technical) : 1
- Dy Director : 3 (one for each division)
- CFO : 6
- Dy. CFO : 12 (Two per CFO)
- DO : 73(one per 8 Fire Stations)
- ADO : 145 (one per 4 Fire Stations)

It may be noted that we recommend hiring of Cleaners/Sweepers 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 Andhra Pradesh State have been carried out and are shown Tables 25-19 to 25-21.

Table 25-18: List of manpower available for operational Fire Stations in Andhra Pradesh SDR & FS (As on June, 2012)

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Adilabad	10	0	0	0	0	1	1	0	10	19	111	0	142
Anantapur	12	0	0	0	0	1	1	0	12	42	145	6	207
Chittoor	15	0	0	0	0	1	1	0	15	34	176	0	227
East Godavari	14	0	0	0	0	1	1	0	13	36	166	3	220
Guntur	13	0	0	0	0	1	1	0	12	27	153	0	194
Hyderabad	10	2	0	0	0	2	2	0	12	28	131	0	177
Karimnagar	8	0	0	0	0	1	1	0	8	15	83	0	108
Khammam	8	0	0	0	0	1	1	0	8	15	73	0	98
Krishna	21	0	0	0	0	1	1	0	21	50	238	0	311
Kurnool	12	0	0	0	0	1	1	0	10	30	133	0	175
Mahabubnagar	8	0	0	0	0	1	1	0	8	16	78	0	104
Medak	8	0	0	0	0	1	2	0	7	16	77	0	103
Nalgonda	10	0	0	0	0	1	1	0	10	18	90	0	120
Nizamabad	6	0	0	0	0	1	1	0	6	11	70	0	89
Prakasam	11	0	0	0	0	1	1	0	10	26	135	0	173
Rangareddy	9	0	0	0	0	1	2	0	10	20	72	0	105
Sri Potti Sriramulu Nellore	12	0	0	0	0	1	1	0	11	25	142	0	180
Srikakulam	12	0	0	0	0	1	2	0	12	22	112	0	149
Visakhapatnam	11	0	0	0	0	1	1	0	11	29	152	0	194
Vizianagaram	9	0	0	0	0	1	1	0	9	19	91	1	122
Warangal	7	0	0	0	0	1	1	0	7	15	72	0	96
West Godavari	13	0	0	0	0	1	1	1	12	33	148	1	197
Y.S.R	12	0	0	0	0	1	1	0	10	27	146	0	185
Total	**251**	**2**	**0**	**0**	**0**	**24**	**27**	**1**	**244**	**573**	**2,794**	**11**	**3,676**

***Level 10**: Director General/Director/ Joint Director/Additional Director; **Level 9**: CFO/CO; **Level 8**: Deputy CFO; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/EO/Fire Supervisor; **Level 5**: ADO/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 25-19: Manpower gap in operational Fire Stations for ideal jurisdiction area

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Adilabad	10	0	0	0	0	2	6	11	23	38	310	10	400
Anantapur	12	0	0	1	0	3	5	19	35	41	469	6	579
Chittoor	15	0	1	1	0	4	7	24	47	81	607	15	787
East Godavari	14	0	1	1	0	4	9	29	50	92	744	11	941
Guntur	13	0	0	1	0	4	8	19	41	69	503	13	658
Hyderabad	10	1	1	1	0	0	1	40	59	139	1,000	10	1,252
Karimnagar	8	0	0	0	0	2	5	16	32	69	477	8	609
Khammam	8	0	0	0	0	1	3	14	24	47	387	8	484
Krishna	21	0	1	1	0	1	4	60	101	214	1,559	21	1,962
Kurnool	12	0	0	1	0	2	4	19	38	56	460	12	592
Mahabubnagar	8	0	0	0	0	2	5	16	29	58	437	8	555
Medak	8	0	0	0	0	1	4	12	22	31	273	8	351
Nalgonda	10	0	0	0	0	2	4	19	33	66	490	10	624
Nizamabad	6	0	0	0	0	1	3	12	22	48	346	6	438
Prakasam	11	0	0	0	0	2	5	16	32	50	395	11	511
Rangareddy	9	0	0	0	0	2	3	14	25	43	392	9	488
Sri Potti Sriramulu Nellore	12	1	1	1	0	1	2	21	40	74	543	12	696
Srikakulam	12	0	0	1	0	1	2	22	38	77	576	12	729
Visakhapatnam	11	1	1	1	0	1	2	32	54	110	777	11	990
Vizianagaram	9	0	0	0	0	1	3	21	35	72	537	8	677
Warangal	7	0	0	0	0	1	4	16	26	49	417	7	520
West Godavari	13	0	0	1	0	2	4	35	63	120	883	12	1,120
Y.S.R	12	0	0	1	0	2	3	21	42	77	548	12	706
Total	**251**	**3**	**6**	**12**	**0**	**42**	**96**	**508**	**911**	**1,721**	**13,130**	**240**	**16,669**

***Level 10**: Director General/Director/ Joint Director/Additional Director; **Level 9**: CFO/CO; **Level 8**: Deputy CFO; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/EO/Fire Supervisor; **Level 5**: ADO/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 25-20: 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
Adilabad	13	0	0	0	0	2	6	12	30	45	372	13	480
Anantapur	15	0	0	1	0	3	5	19	42	48	516	9	643
Chittoor	18	0	1	1	0	4	7	28	59	102	743	18	963
East Godavari	29	0	1	1	0	4	9	46	98	165	1,283	26	1,633
Guntur	22	0	0	1	0	4	8	24	67	100	732	22	958
Hyderabad	21	1	1	1	0	0	2	71	121	268	1,864	21	2,350
Karimnagar	13	0	0	0	0	2	6	20	47	88	615	13	791
Khammam	11	0	0	0	0	2	4	16	33	59	481	11	606
Krishna	28	0	1	1	0	2	6	70	128	264	1,878	28	2,378
Kurnool	16	0	0	1	0	3	6	24	53	82	624	16	809
Mahabubnagar	12	0	0	0	0	2	7	17	40	73	531	12	682
Medak	9	0	0	0	0	1	4	12	24	33	289	9	372
Nalgonda	12	0	0	0	0	2	5	19	38	71	521	12	668
Nizamabad	7	0	0	0	0	1	3	12	24	50	362	7	459
Prakasam	16	0	0	0	0	3	6	17	44	62	489	16	637
Rangareddy	31	0	0	0	0	4	7	55	120	232	1,660	31	2,109
Sri Potti Sriramulu Nellore	14	1	1	1	0	1	2	25	49	90	646	14	830
Srikakulam	14	0	0	1	0	1	3	23	43	82	623	14	790
Visakhapatnam	27	1	1	1	0	1	5	57	115	218	1,560	27	1,986
Vizianagaram	10	0	0	0	0	1	3	22	39	79	584	9	737
Warangal	11	0	0	0	0	2	5	22	41	75	598	11	754
West Godavari	18	0	0	1	0	2	5	40	77	137	1,039	17	1,318
Y.S.R	14	0	0	1	0	2	4	23	48	87	626	14	805
Total	**381**	**3**	**6**	**12**	**0**	**49**	**118**	**674**	**1,380**	**2,510**	**18,636**	**370**	**23,758**

***Level 10**: Director General/Director/ Joint Director/Additional Director; **Level 9**: CFO/CO; **Level 8**: Deputy CFO; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/EO/Fire Supervisor; **Level 5**: ADO/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 25-21: Additional staff required for new rural Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Adilabad	15	0	0	0	0	0	0	16	43	56	479	15	609
Anantapur	14	0	0	0	0	0	0	29	62	115	791	14	1,011
Chittoor	13	0	0	0	0	0	0	22	49	89	626	13	799
East Godavari	10	0	0	0	0	0	0	20	45	79	548	10	702
Guntur	15	0	0	0	0	0	0	35	73	144	990	15	1,257
Hyderabad	0	0	0	0	0	0	0	0	0	0	0	0	0
Karimnagar	13	0	0	0	0	0	0	25	53	96	679	13	866
Khammam	9	0	0	0	0	0	0	16	37	67	450	9	579
Krishna	2	0	0	0	0	0	0	1	6	10	62	2	81
Kurnool	16	0	0	0	0	0	0	19	54	91	617	16	797
Mahabubnagar	18	0	0	0	0	0	0	32	70	119	861	18	1,100
Medak	8	0	0	0	0	0	0	24	45	95	644	8	816
Nalgonda	11	0	0	0	0	0	0	20	48	91	601	11	771
Nizamabad	8	0	0	0	0	0	0	19	41	79	517	8	664
Prakasam	13	0	0	0	0	0	0	21	52	94	636	13	816
Rangareddy	10	0	0	0	0	0	0	25	51	100	668	10	854
Sri Potti Sriramulu Nellore	5	0	0	0	0	0	0	11	24	46	312	5	398
Srikakulam	5	0	0	0	0	0	0	9	19	36	245	5	314
Visakhapatnam	6	0	0	0	0	0	0	7	23	41	258	6	335
Vizianagaram	5	0	0	0	0	0	0	10	23	47	300	5	385
Warangal	14	0	0	0	0	0	0	26	62	119	781	14	1,002
West Godavari	8	0	0	0	0	0	0	11	26	39	307	8	391
Y.S.R	10	0	0	0	0	0	0	9	30	42	310	10	401
Total	**228**	**0**	**0**	**0**	**0**	**0**	**0**	**407**	**936**	**1,695**	**11,682**	**228**	**14,948**

***Level 10**: Director General/Director/ Joint Director/Additional Director; **Level 9**: CFO/CO; **Level 8**: Deputy CFO; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/EO/Fire Supervisor; **Level 5**: ADO/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.*

25.3.4 Fire Station Building Infrastructure Gap

Depending upon the number of pumping units, no of bays in a Fire Station has been estimated. However, in order to consider future growth in population, a minimum two bay Fire Station has been proposed, even at a Fire Station having requirement of one pumping unit. Accordingly, gaps in operational Fire Stations, new urban and rural Fire Stations have been given in Table 25-22.

Table 25-22: Fire station building required for gap in operational, new urban and new rural Fire Stations (no. of bays)

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay More Than 7
Adilabad	28	8	9	3	2	0	0	0	0
Anantapur	29	1	5	4	3	3	2	1	0
Chittoor	31	0	4	7	7	4	0	0	0
East Godavari	39	4	3	9	5	2	4	0	0
Guntur	37	7	3	5	3	3	6	0	0
Hyderabad	21	-1	-4	0	4	4	5	2	3
Karimnagar	26	1	4	6	4	3	2	0	0
Khammam	20	5	0	3	4	0	2	0	0
Krishna	30	-5	-7	9	4	3	4	1	2
Kurnool	32	3	3	7	7	1	0	0	0
Mahabubnagar	30	5	4	4	7	3	1	0	0
Medak	17	-1	0	3	3	1	3	0	0
Nalgonda	23	1	-1	7	4	2	1	0	0
Nizamabad	15	3	-1	3	0	2	3	1	0
Prakasam	29	6	1	6	3	4	0	0	0
Rangareddy	41	1	7	15	6	3	2	0	1
Sri Potti Sriramulu Nellore	19	-4	2	2	3	2	3	0	0
Srikakulam	19	-3	0	7	3	2	0	0	0
Visakhapatnam	33	3	2	7	4	2	3	1	1
Vizianagaram	15	-5	2	4	4	1	2	0	0
Warangal	25	1	4	5	3	5	1	0	1
West Godavari	26	0	3	3	5	4	3	0	0
Y.S.R	24	3	1	4	3	3	0	0	0
Total	**609**	**33**	**44**	**123**	**91**	**57**	**47**	**6**	**8**

25.4 Investment and Financial Analysis

25.4.1 Capital Cost

Building Infrastructure Cost:

Table 25-23 provides details of the Fire Station building infrastructure cost analysis in Andhra Pradesh State. The ideal requirement of land for a Fire Station is 2 ½ acres, however, a 2 bay Fire Station may be constructed in 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. To start with, rural-Fire Stations/ Fire Posts may be stationed in government buildings like schools/ hospitals or a Panchayat-Ghar.

Thus, total estimated capital cost for the Fire Stations building development for gap in operational and all the proposed and new urban and rural Fire Stations is **Rs. 2,178 Crores** (Table 25-23).

Firefighting and Rescue Vehicles and Specialized Equipment Cost:

The costs of different firefighting vehicles and specialized equipment including communication sets (static and mobile VHF sets) have been taken as approximate rates quoted by fire equipment suppliers. Accordingly, capital cost for firefighting vehicles and equipment for all the districts in Andhra Pradesh has been estimated (Tables 25-24 to 25-29).

Table 25-23: Cost (in Lakhs Rupees) of Fire Station building (no. of bays) required for gap in operational, new urban and new rural Fire Stations

District	Fire Stations	Bay1	Bay2	Bay3	Bay4	Bay5	Bay6	Bay7	Bay More Than 7
Adilabad	28	1,200.00	2,700.00	1,350.00	1,150.00	0.00	0.00	0.00	0.00
Anantapur	29	150.00	1,500.00	1,800.00	1,725.00	2,100.00	1,650.00	950.00	0.00
Chittoor	31	0.00	1,200.00	3,150.00	4,025.00	2,800.00	0.00	0.00	0.00
East Godavari	39	600.00	900.00	4,050.00	2,875.00	1,400.00	3,300.00	0.00	0.00
Guntur	37	1,050.00	900.00	2,250.00	1,725.00	2,100.00	4,950.00	0.00	0.00
Hyderabad	21	(150.00)	(1,200.00)	0.00	2,300.00	2,800.00	4,125.00	1,900.00	2,850.00
Karimnagar	26	150.00	1,200.00	2,700.00	2,300.00	2,100.00	1,650.00	0.00	0.00
Khammam	20	750.00	0.00	1,350.00	2,300.00	0.00	1,650.00	0.00	0.00
Krishna	30	(750.00)	(2,100.00)	4,050.00	2,300.00	2,100.00	3,300.00	950.00	1,900.00
Kurnool	32	450.00	900.00	3,150.00	4,025.00	700.00	0.00	0.00	0.00
Mahabubnagar	30	750.00	1,200.00	1,800.00	4,025.00	2,100.00	825.00	0.00	0.00
Medak	17	(150.00)	0.00	1,350.00	1,725.00	700.00	2,475.00	0.00	0.00
Nalgonda	23	150.00	(300.00)	3,150.00	2,300.00	1,400.00	825.00	0.00	0.00
Nizamabad	15	450.00	(300.00)	1,350.00	0.00	1,400.00	2,475.00	950.00	0.00
Prakasam	29	900.00	300.00	2,700.00	1,725.00	2,800.00	0.00	0.00	0.00
Rangareddy	41	150.00	2,100.00	6,750.00	3,450.00	2,100.00	1,650.00	0.00	950.00
Sri Potti Sriramulu Nellore	19	(600.00)	600.00	900.00	1,725.00	1,400.00	2,475.00	0.00	0.00
Srikakulam	19	(450.00)	0.00	3,150.00	1,725.00	1,400.00	0.00	0.00	0.00
Visakhapatnam	33	450.00	600.00	3,150.00	2,300.00	1,400.00	2,475.00	950.00	950.00
Vizianagaram	15	(750.00)	600.00	1,800.00	2,300.00	700.00	1,650.00	0.00	0.00
Warangal	25	150.00	1,200.00	2,250.00	1,725.00	3,500.00	825.00	0.00	950.00
West Godavari	26	0.00	900.00	1,350.00	2,875.00	2,800.00	2,475.00	0.00	0.00
Y.S.R	24	450.00	300.00	1,800.00	1,725.00	2,100.00	0.00	0.00	0.00
Total	**609**	**4,950.00**	**13,200.00**	**55,350.00**	**52,325.00**	**39,900.00**	**38,775.00**	**5,700.00**	**7,600.00**

Table 25-24: Cost estimates (in Lakhs Rupees) for gap in firefighting vehicles for operational and new urban Fire Stations

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Advanced Rescue Responders	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	QRT	Motor Cycle Mists	Education Vans	Total Vehicle Cost
Adilabad	13	105.0	90.0	80.0	500.0	0.0	70.0	90.0	30.0	36.0	27.0	20.0	1048.0
Anantapur	15	315.0	240.0	40.0	500.0	0.0	35.0	60.0	30.0	9.0	6.8	40.0	1275.8
Chittoor	18	525.0	360.0	120.0	500.0	500.0	105.0	90.0	30.0	63.0	47.3	40.0	2380.3
East Godavari	29	1260.0	510.0	280.0	1000.0	500.0	35.0	120.0	30.0	54.0	40.5	40.0	3869.5
Guntur	22	630.0	210.0	160.0	1000.0	500.0	35.0	90.0	30.0	9.0	6.8	40.0	2710.8
Hyderabad	21	1995.0	990.0	280.0	-500.0	500.0	70.0	60.0	30.0	99.0	54.0	20.0	3598.0
Karimnagar	13	525.0	270.0	120.0	500.0	0.0	35.0	60.0	30.0	27.0	20.3	40.0	1627.3
Khammam	11	315.0	180.0	120.0	500.0	0.0	35.0	60.0	30.0	27.0	20.3	20.0	1307.3
Krishna	28	1540.0	990.0	720.0	1000.0	1000.0	140.0	90.0	30.0	135.0	101.3	40.0	5786.3
Kurnool	16	455.0	240.0	120.0	500.0	500.0	70.0	90.0	30.0	36.0	27.0	40.0	2108.0
Mahabubnagar	12	420.0	180.0	80.0	500.0	0.0	35.0	90.0	30.0	27.0	20.3	40.0	1422.3
Medak	9	105.0	180.0	0.0	500.0	0.0	35.0	60.0	30.0	18.0	13.5	20.0	961.5
Nalgonda	12	245.0	210.0	160.0	500.0	0.0	105.0	60.0	30.0	27.0	20.3	40.0	1397.3
Nizamabad	7	70.0	180.0	80.0	500.0	0.0	70.0	60.0	30.0	18.0	13.5	20.0	1041.5
Prakasam	16	455.0	180.0	40.0	500.0	0.0	35.0	90.0	30.0	36.0	27.0	40.0	1433.0
Rangareddy	31	1610.0	690.0	400.0	1500.0	0.0	210.0	120.0	30.0	18.0	13.5	60.0	4651.5
Sri Potti Sriramulu Nellore	14	630.0	330.0	40.0	500.0	500.0	35.0	60.0	30.0	63.0	47.3	20.0	2255.3
Srikakulam	14	525.0	300.0	80.0	500.0	0.0	70.0	60.0	30.0	45.0	33.8	20.0	1663.8
Visakhapatnam	27	1680.0	690.0	440.0	1000.0	500.0	70.0	90.0	30.0	63.0	47.3	40.0	4650.3
Vizianagaram	10	455.0	330.0	40.0	500.0	0.0	35.0	60.0	30.0	45.0	33.8	20.0	1548.8
Warangal	11	420.0	270.0	120.0	500.0	500.0	35.0	60.0	30.0	27.0	20.3	20.0	2002.3
West Godavari	18	1050.0	510.0	240.0	500.0	0.0	105.0	90.0	30.0	81.0	60.8	40.0	2706.8
Y.S.R	14	665.0	270.0	40.0	500.0	0.0	70.0	90.0	30.0	45.0	33.8	20.0	1763.8
Total	**381**	**15,995.0**	**8,400.0**	**3,800.0**	**13500.0**	**5,000.0**	**1,540.0**	**1,800.0**	**690.0**	**1,008.0**	**735.8**	**740.0**	**53208.8**

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

District	Fire Stations	Water Tenders	Water Bowsers	Foam Tenders	Rescue Responder	Sky Lifts / TTL	DCP Tenders	Hose Tenders	BA Vans	QRT	Motor Cycle Mists	Education Vans	Total Vehicle Cost
Adilabad	15	630.0	330.0	80.0	0.0	0.0	0.0	0.0	0.0	135.0	101.3	0.0	1,276.3
Anantapur	14	980.0	510.0	200.0	0.0	0.0	70.0	30.0	0.0	126.0	94.5	0.0	2,010.5
Chittoor	13	770.0	480.0	120.0	0.0	0.0	0.0	0.0	0.0	117.0	87.8	0.0	1,574.8
East Godavari	10	595.0	270.0	280.0	0.0	0.0	140.0	0.0	0.0	90.0	67.5	0.0	1,442.5
Guntur	15	1190.0	600.0	240.0	0.0	0.0	70.0	30.0	0.0	135.0	101.3	0.0	2,366.3
Hyderabad	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Karimnagar	13	805.0	510.0	120.0	0.0	0.0	35.0	30.0	0.0	117.0	87.8	0.0	1,704.8
Khammam	9	560.0	240.0	160.0	0.0	0.0	70.0	0.0	0.0	81.0	60.8	0.0	1,171.8
Krishna	2	105.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	13.5	0.0	166.5
Kurnool	16	840.0	360.0	160.0	0.0	0.0	0.0	0.0	0.0	144.0	108.0	0.0	1,612.0
Mahabubnagar	18	1085.0	570.0	200.0	0.0	0.0	70.0	0.0	0.0	162.0	121.5	0.0	2,208.5
Medak	8	700.0	300.0	240.0	0.0	0.0	140.0	0.0	0.0	72.0	54.0	0.0	1,506.0
Nalgonda	11	665.0	330.0	280.0	0.0	0.0	105.0	0.0	0.0	99.0	74.3	0.0	1,553.3
Nizamabad	8	700.0	360.0	120.0	0.0	0.0	0.0	0.0	0.0	72.0	54.0	0.0	1,306.0
Prakasam	13	805.0	360.0	200.0	0.0	0.0	70.0	0.0	0.0	117.0	87.8	0.0	1,639.8
Rangareddy	10	630.0	300.0	360.0	0.0	0.0	280.0	0.0	0.0	90.0	67.5	0.0	1,727.5
Sri Potti Sriramulu Nellore	5	385.0	180.0	120.0	0.0	0.0	35.0	0.0	0.0	45.0	33.8	0.0	798.8
Srikakulam	5	315.0	210.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	33.8	0.0	603.8
Visakhapatnam	6	280.0	120.0	80.0	0.0	0.0	105.0	0.0	0.0	54.0	40.5	0.0	679.5
Vizianagaram	5	385.0	150.0	120.0	0.0	0.0	35.0	0.0	0.0	45.0	33.8	0.0	768.8
Warangal	14	980.0	480.0	240.0	0.0	0.0	35.0	30.0	0.0	126.0	94.5	0.0	1,985.5
West Godavari	8	315.0	180.0	160.0	0.0	0.0	35.0	0.0	0.0	72.0	54.0	0.0	816.0
Y.S.R	10	385.0	210.0	80.0	0.0	0.0	0.0	0.0	0.0	90.0	67.5	0.0	832.5
Total	**228**	**14,105.0**	**7,080.0**	**3,560.0**	**0.0**	**0.0**	**1,295.0**	**120.0**	**0.0**	**2,052.0**	**1,539.0**	**0.0**	**29,751.0**

Table 25-26: Cost estimate (in Lakhs Rupees) for gap in firefighting specialized equipment for operational and new urban Fire Stations

District	Fire Stations	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters / Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Adilabad	13	15.0	42.5	39.6	24.0	3.3	10.0	8.8	8.0	4.8	85.0	6.0	6.5	26.0	0.0
Anantapur	15	30.0	87.5	58.4	27.0	3.9	20.0	13.6	9.0	5.4	92.5	10.8	13.0	40.0	0.0
Chittoor	18	60.0	77.5	92.0	33.0	6.5	40.0	12.0	10.5	6.6	155.0	9.9	26.0	72.0	0.0
East Godavari	29	90.0	172.5	150.0	51.0	10.5	60.0	23.2	17.0	10.5	262.5	21.0	39.0	132.0	0.0
Guntur	22	45.0	135.0	81.2	40.5	6.2	30.0	21.6	13.5	8.1	140.0	16.5	19.5	58.0	0.0
Hyderabad	21	240.0	362.5	214.8	36.0	13.7	160.0	18.4	12.0	6.9	322.5	43.8	104.0	220.0	0.0
Karimnagar	13	15.0	67.5	68.8	24.0	4.6	10.0	9.6	8.0	4.8	125.0	8.4	6.5	60.0	0.0
Khammam	11	15.0	50.0	49.6	21.0	3.7	10.0	8.0	7.0	4.2	92.5	6.6	6.5	42.0	0.0
Krishna	28	75.0	192.5	227.2	49.5	15.7	50.0	15.2	16.5	9.9	380.0	23.7	32.5	216.0	0.0
Kurnool	16	90.0	80.0	70.8	28.5	4.9	60.0	12.0	9.5	5.7	125.0	10.5	39.0	54.0	0.0
Mahabubnagar	12	30.0	50.0	57.6	22.5	4.2	20.0	8.8	7.5	4.5	105.0	6.6	13.0	46.0	0.0
Medak	9	15.0	32.5	32.8	16.5	2.5	10.0	6.4	5.5	3.3	67.5	4.2	6.5	24.0	0.0
Nalgonda	12	15.0	45.0	55.2	21.0	4.1	10.0	8.0	7.0	4.2	102.5	5.7	6.5	42.0	0.0
Nizamabad	7	15.0	37.5	33.2	12.0	2.5	10.0	4.8	4.0	2.4	62.5	5.1	6.5	20.0	0.0
Prakasam	16	15.0	50.0	58.0	28.5	4.1	10.0	11.2	9.5	5.7	110.0	6.3	6.5	40.0	0.0
Rangareddy	31	120.0	255.0	169.2	55.5	11.2	80.0	28.8	18.5	11.1	275.0	33.0	52.0	158.0	0.0
Sri Potti Sriramulu Nellore	14	30.0	62.5	82.4	24.0	5.6	20.0	7.2	7.5	4.8	142.5	7.8	13.0	68.0	0.0
Srikakulam	14	15.0	55.0	75.6	24.0	5.4	10.0	7.2	8.0	4.5	132.5	7.2	6.5	60.0	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
Visakhapatnam	27	90.0	215.0	180.0	48.0	12.3	60.0	20.8	16.0	8.7	307.5	27.0	39.0	172.0	0.0
Vizianagaram	10	15.0	40.0	69.6	18.0	4.8	10.0	4.8	6.0	3.6	117.5	5.4	6.5	58.0	0.0
Warangal	11	30.0	90.0	62.8	19.5	4.2	20.0	9.6	6.5	3.9	110.0	11.4	13.0	58.0	0.0
West Godavari	18	105.0	130.0	130.4	31.5	9.2	70.0	12.8	11.0	6.6	230.0	15.9	45.5	122.0	0.0
Y.S.R	14	75.0	87.5	76.8	24.0	4.8	50.0	9.6	8.0	4.8	135.0	11.1	32.5	62.0	0.0
Total	**381**	**1,245.0**	**2,417.5**	**2,136.0**	**679.5**	**147.9**	**830.0**	**282.4**	**226.0**	**135.0**	**3,677.5**	**303.9**	**539.5**	**1,850.0**	**0.0**

Table 25-27: Cost estimate (in Lakhs Rupees) for gap in firefighting specialized equipment for operational and new urban Fire Stations (contd…)

District	Fire Stations	Diving Suits (Dry Type)	Diving Suits (Wet Type)	Inflatable Lighting Towers	Smoke Exhausters / PPV	Pneumatic lifting Bags	High Capacity LED Torches	Rescue Boats	Static Wireless Sets	Mobile Wireless Sets	Walky Talky	Mega Phones	Total
Adilabad	13	0.0	0.0	33.6	11.0	5.0	4.4	0.0	-0.5	3.2	4.9	4.8	345.9
Anantapur	15	0.0	0.0	37.8	17.0	10.0	13.6	0.0	-1.4	4.3	-1.9	5.4	495.9
Chittoor	18	0.0	0.0	44.1	15.0	20.0	20.4	0.0	-1.6	8.0	-0.6	6.6	712.9
East Godavari	29	0.0	0.0	69.3	29.0	30.0	34.0	0.0	2.4	14.8	4.3	10.5	1,233.5
Guntur	22	0.0	0.0	56.7	27.0	15.0	15.6	0.0	0.3	6.5	0.6	8.1	744.8

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
Hyderabad	21	0.0	0.0	48.3	24.0	80.0	50.4	0.0	1.4	23.5	10.9	7.5	2,000.5
Karimnagar	13	0.0	0.0	33.6	12.0	0.0	13.6	0.0	0.0	6.5	4.2	4.8	486.9
Khammam	11	0.0	0.0	29.4	10.0	5.0	8.8	0.0	-0.5	4.4	0.8	4.2	378.2
Krishna	28	0.0	0.0	67.2	19.0	25.0	54.0	0.0	-2.4	22.3	7.6	9.9	1,506.2
Kurnool	16	0.0	0.0	39.9	15.0	30.0	14.0	0.0	-1.4	6.1	-0.2	5.7	699.0
Mahabubnagar	12	0.0	0.0	31.5	11.0	10.0	12.0	0.0	-0.3	5.4	1.4	4.5	451.3
Medak	9	0.0	0.0	23.1	8.0	5.0	4.4	0.0	0.3	3.6	1.3	3.3	275.7
Nalgonda	12	0.0	0.0	29.4	10.0	5.0	8.8	0.0	-1.6	4.8	0.1	4.2	386.9
Nizamabad	7	0.0	0.0	16.8	6.0	5.0	5.6	0.0	-1.6	2.9	-0.1	2.4	252.5
Prakasam	16	0.0	0.0	39.9	14.0	5.0	10.8	0.0	-0.8	4.6	-1.3	5.7	432.7
Rangareddy	31	0.0	0.0	75.6	36.0	40.0	40.4	0.0	4.6	18.9	11.4	11.1	1,505.3
Sri Potti Sriramulu Nellore	14	0.0	0.0	31.5	9.0	10.0	18.8	0.0	-2.2	7.1	0.6	4.8	555.0
Srikakulam	14	0.0	0.0	33.6	10.0	5.0	16.0	0.0	-2.2	6.1	0.2	4.8	484.5
Visakhapatnam	27	0.0	0.0	67.2	26.0	30.0	44.0	0.0	2.7	19.2	12.5	9.6	1,407.5
Vizianagaram	10	0.0	0.0	25.2	6.0	5.0	14.4	0.0	-1.6	6.5	1.8	3.6	420.0
Warangal	11	0.0	0.0	27.3	12.0	10.0	13.2	0.0	0.5	6.8	3.2	3.9	515.9
West Godavari	18	0.0	0.0	44.1	16.0	35.0	32.8	0.0	-1.1	12.9	1.6	6.6	1,067.8
Y.S.R	14	0.0	0.0	33.6	12.0	25.0	17.2	0.0	-2.2	6.3	-1.2	4.8	676.6
Total	**381**	**0.0**	**0.0**	**938.7**	**355.0**	**410.0**	**467.2**	**0.0**	**-9.2**	**204.5**	**62.2**	**136.8**	**17,035.4**

Table 25-28: Cost estimate (Lakhs Rupees) for gap in specialized fire equipment for new rural Fire Stations

District	Fire Stations	Hydraulic Rescue Tools	Combi Tools	B.A. Sets	BA Compressors	First-Aid Boxes	Thermal Imaging Cameras	Electric Chain Saws / Cutters / Hammers for Concrete	Electric Chain Saws / Cutters / Hammers for Wood	Hydraulic / Manual Chain Saws / Cutters for Wood	Personal Protection Equipment	Hand Held Gas Detector Kits	Life Locator Equipment	Portable Pumps	Floating Pumps
Adilabad	15	0.0	0.0	74.0	27.0	5.5	0.0	0.0	9.0	5.4	137.5	0.0	0.0	92.0	0.0
Anantapur	14	0.0	0.0	109.6	25.5	7.7	0.0	0.0	8.5	5.1	192.5	0.0	0.0	128.0	0.0
Chittoor	13	0.0	0.0	91.2	24.0	6.5	0.0	0.0	8.0	4.8	162.5	0.0	0.0	108.0	0.0
East Godavari	10	0.0	0.0	72.8	18.0	5.2	0.0	0.0	6.0	3.6	130.0	0.0	0.0	86.0	0.0
Guntur	15	0.0	0.0	129.6	27.0	9.0	0.0	0.0	9.0	5.4	225.0	0.0	0.0	150.0	0.0
Hyderabad	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Karimnagar	13	0.0	0.0	95.2	24.0	6.7	0.0	0.0	8.0	4.8	167.5	0.0	0.0	112.0	0.0
Khammam	9	0.0	0.0	62.4	16.5	4.4	0.0	0.0	5.5	3.3	110.0	0.0	0.0	74.0	0.0
Krishna	2	0.0	0.0	9.6	3.0	0.7	0.0	0.0	1.0	0.6	17.5	0.0	0.0	12.0	0.0
Kurnool	16	0.0	0.0	92.0	28.5	6.7	0.0	0.0	9.5	5.7	167.5	0.0	0.0	112.0	0.0
Mahabubnagar	18	0.0	0.0	122.8	33.0	8.8	0.0	0.0	11.0	6.6	220.0	0.0	0.0	146.0	0.0
Medak	8	0.0	0.0	76.8	15.0	5.3	0.0	0.0	5.0	3.0	132.5	0.0	0.0	88.0	0.0
Nalgonda	11	0.0	0.0	81.6	19.5	5.8	0.0	0.0	6.5	3.9	145.0	0.0	0.0	96.0	0.0
Nizamabad	8	0.0	0.0	74.8	15.0	5.2	0.0	0.0	5.0	3.0	130.0	0.0	0.0	86.0	0.0
Prakasam	13	0.0	0.0	89.2	24.0	6.4	0.0	0.0	8.0	4.8	160.0	0.0	0.0	106.0	0.0
Rangareddy	10	0.0	0.0	80.8	18.0	5.6	0.0	0.0	6.0	3.6	140.0	0.0	0.0	94.0	0.0
Sri Potti Sriramulu Nellore	5	0.0	0.0	43.2	9.0	3.0	0.0	0.0	3.0	1.8	75.0	0.0	0.0	50.0	0.0
Srikakulam	5	0.0	0.0	35.6	9.0	2.5	0.0	0.0	3.0	1.8	62.5	0.0	0.0	42.0	0.0
Visakhapatnam	6	0.0	0.0	32.8	10.5	2.4	0.0	0.0	3.5	2.1	60.0	0.0	0.0	40.0	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
Vizianagaram	5	0.0	0.0	41.2	9.0	2.9	0.0	0.0	3.0	1.8	72.5	0.0	0.0	48.0	0.0
Warangal	14	0.0	0.0	109.6	25.5	7.7	0.0	0.0	8.5	5.1	192.5	0.0	0.0	128.0	0.0
West Godavari	8	0.0	0.0	44.0	15.0	3.2	0.0	0.0	5.0	3.0	80.0	0.0	0.0	54.0	0.0
Y.S.R	10	0.0	0.0	48.0	18.0	3.6	0.0	0.0	6.0	3.6	90.0	0.0	0.0	60.0	0.0
Total	**228**	**0.0**	**0.0**	**1,616.8**	**414.0**	**114.8**	**0.0**	**0.0**	**138.0**	**82.8**	**2,870.0**	**0.0**	**0.0**	**1,912.0**	**0.0**

Table 25-29: Cost estimate (Lakhs Rupees) for gap in specialized fire equipment for new rural Fire Stations (cont.)

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
Adilabad	15	0.0	0.0	37.8	0.0	0.0	22.0	0.0	4.9	9.4	6.6	5.4	436.4
Anantapur	14	0.0	0.0	35.7	0.0	0.0	31.6	0.0	4.6	13.6	9.6	5.1	577.1
Chittoor	13	0.0	0.0	33.6	0.0	0.0	26.0	0.0	4.3	11.1	7.8	4.8	492.6
East Godavari	10	0.0	0.0	25.2	0.0	0.0	22.4	0.0	3.2	9.5	6.7	3.6	392.3
Guntur	15	0.0	0.0	37.8	0.0	0.0	36.8	0.0	4.9	16.0	11.3	5.4	667.1
Hyderabad	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Karimnagar	13	0.0	0.0	33.6	0.0	0.0	27.2	0.0	4.3	11.9	8.4	4.8	508.4

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
Khammam	9	0.0	0.0	23.1	0.0	0.0	18.8	0.0	3.0	8.0	5.6	3.3	337.9
Krishna	2	0.0	0.0	4.2	0.0	0.0	2.8	0.0	0.5	1.2	0.8	0.6	54.6
Kurnool	16	0.0	0.0	39.9	0.0	0.0	26.8	0.0	5.1	11.4	8.0	5.7	518.9
Mahabubnagar	18	0.0	0.0	46.2	0.0	0.0	36.0	0.0	5.9	15.3	10.8	6.6	669.0
Medak	8	0.0	0.0	21.0	0.0	0.0	23.2	0.0	2.7	9.9	7.0	3.0	392.3
Nalgonda	11	0.0	0.0	27.3	0.0	0.0	24.4	0.0	3.5	10.4	7.3	3.9	435.1
Nizamabad	8	0.0	0.0	21.0	0.0	0.0	20.8	0.0	2.7	8.8	6.2	3.0	381.6
Prakasam	13	0.0	0.0	33.6	0.0	0.0	26.4	0.0	4.3	11.2	7.9	4.8	486.7
Rangareddy	10	0.0	0.0	25.2	0.0	0.0	26.4	0.0	3.2	11.2	7.9	3.6	425.6
Sri Potti Sriramulu Nellore	5	0.0	0.0	12.6	0.0	0.0	12.4	0.0	1.6	5.3	3.7	1.8	222.4
Srikakulam	5	0.0	0.0	12.6	0.0	0.0	10.0	0.0	1.6	4.3	3.0	1.8	189.7
Visakhapatnam	6	0.0	0.0	14.7	0.0	0.0	11.2	0.0	1.9	4.8	3.4	2.1	189.3
Vizianagaram	5	0.0	0.0	12.6	0.0	0.0	12.0	0.0	1.6	5.1	3.6	1.8	215.1
Warangal	14	0.0	0.0	35.7	0.0	0.0	31.2	0.0	4.6	13.4	9.5	5.1	576.4
West Godavari	8	0.0	0.0	21.0	0.0	0.0	13.6	0.0	2.7	5.8	4.1	3.0	254.4
Y.S.R	10	0.0	0.0	25.2	0.0	0.0	14.4	0.0	3.2	6.1	4.3	3.6	286.1
Total	**228**	**0.0**	**0.0**	**579.6**	**0.0**	**0.0**	**476.4**	**0.0**	**74.5**	**203.5**	**143.6**	**82.8**	**8,708.9**

25.4.2 Recurring Cost

Manpower Cost

The manpower cost estimation per year has been carried out by considering pay-scale structure for different level of employees. Accordingly, cost estimates for manpower requirement at various levels by district is shown in Table 25-30 and Table 25-31. The total estimated annual manpower cost for existing and proposed staff will be about **Rs. 795.6 Crores** after filling gap in operational and new urban Fire Stations and about **Rs. 497.3 Crores** for new rural Fire Stations (Table 25-30 and Table 25-31).

Table 25-30: Annual cost estimates (in Lakhs Rupees) for manpower for Andhra Pradesh after filling up the gap in operational and new urban Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Adilabad	13	0.0	0.0	0.0	0.0	12.8	34.3	60.6	129.0	149.0	1,205.3	10.9	1,601.9
Anantapur	15	0.0	0.0	8.6	0.0	19.2	28.6	96.0	180.6	158.9	1,671.8	7.6	2,171.2
Chittoor	18	0.0	13.8	8.6	0.0	25.6	40.0	141.4	253.7	337.6	2,407.3	15.1	3,243.2
East Godavari	29	0.0	13.8	8.6	0.0	25.6	51.5	232.3	421.4	546.2	4,156.9	21.8	5,478.1
Guntur	22	0.0	0.0	8.6	0.0	25.6	45.8	121.2	288.1	331.0	2,371.7	18.5	3,210.4
Hyderabad	21	14.8	13.8	8.6	0.0	0.0	11.4	358.6	520.3	887.1	6,039.4	17.6	7,871.5
Karimnagar	13	0.0	0.0	0.0	0.0	12.8	34.3	101.0	202.1	291.3	1,992.6	10.9	2,645.0
Khammam	11	0.0	0.0	0.0	0.0	12.8	22.9	80.8	141.9	195.3	1,558.4	9.2	2,021.4
Krishna	28	0.0	13.8	8.6	0.0	12.8	34.3	353.5	550.4	873.8	6,084.7	23.5	7,955.5
Kurnool	16	0.0	0.0	8.6	0.0	19.2	34.3	121.2	227.9	271.4	2,021.8	13.4	2,717.9
Mahabubnagar	12	0.0	0.0	0.0	0.0	12.8	40.0	85.9	172.0	241.6	1,720.4	10.1	2,282.8
Medak	9	0.0	0.0	0.0	0.0	6.4	22.9	60.6	103.2	109.2	936.4	7.6	1,246.2
Nalgonda	12	0.0	0.0	0.0	0.0	12.8	28.6	96.0	163.4	235.0	1,688.0	10.1	2,233.9
Nizamabad	7	0.0	0.0	0.0	0.0	6.4	17.2	60.6	103.2	165.5	1,172.9	5.9	1,531.6
Prakasam	16	0.0	0.0	0.0	0.0	19.2	34.3	85.9	189.2	205.2	1,584.4	13.4	2,131.6

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
Rangareddy	31	0.0	0.0	0.0	0.0	25.6	40.0	277.8	516.0	767.9	5,378.4	26.0	7,031.8
Sri Potti Sriramulu Nellore	14	14.8	13.8	8.6	0.0	6.4	11.4	126.3	210.7	297.9	2,093.0	11.8	2,794.6
Srikakulam	14	0.0	0.0	8.6	0.0	6.4	17.2	116.2	184.9	271.4	2,018.5	11.8	2,634.9
Visakhapatnam	27	14.8	13.8	8.6	0.0	6.4	28.6	287.9	494.5	721.6	5,054.4	22.7	6,653.1
Vizianagaram	10	0.0	0.0	0.0	0.0	6.4	17.2	111.1	167.7	261.5	1,892.2	7.6	2,463.6
Warangal	11	0.0	0.0	0.0	0.0	12.8	28.6	111.1	176.3	248.3	1,937.5	9.2	2,523.8
West Godavari	18	0.0	0.0	8.6	0.0	12.8	28.6	202.0	331.1	453.5	3,366.4	14.3	4,417.2
Y.S.R	14	0.0	0.0	8.6	0.0	12.8	22.9	116.2	206.4	288.0	2,028.2	11.8	2,694.8
Total	**381**	**44.3**	**82.5**	**103.3**	**0.0**	**313.6**	**675.0**	**3,403.7**	**5,934.0**	**8,308.1**	**60,380.6**	**310.8**	**79,555.9**

***Level 10**: Director General/Director/ Joint Director/Additional Director; **Level 9**: CFO/CO; **Level 8**: Deputy CFO; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/EO/Fire Supervisor; **Level 5**: ADO/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 25-31: Cost estimate (in Lakhs Rupees) manpower in Andhra Pradesh for new rural Fire Stations

District	Fire Stations	Level 10	Level 9	Level 8	Level 7	Level 6	Level 5	Level 4	Level 3	Level 2	Level 1	Level 0	Total Staff
Adilabad	15	0.0	0.0	0.0	0.0	0.0	0.0	80.8	184.9	185.4	1,552.0	12.6	2,015.6
Anantapur	14	0.0	0.0	0.0	0.0	0.0	0.0	146.5	266.6	380.7	2,562.8	11.8	3,368.3
Chittoor	13	0.0	0.0	0.0	0.0	0.0	0.0	111.1	210.7	294.6	2,028.2	10.9	2,655.6
East Godavari	10	0.0	0.0	0.0	0.0	0.0	0.0	101.0	193.5	261.5	1,775.5	8.4	2,339.9
Guntur	15	0.0	0.0	0.0	0.0	0.0	0.0	176.8	313.9	476.6	3,207.6	12.6	4,187.5

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 Staff
Hyderabad	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Karimnagar	13	0.0	0.0	0.0	0.0	0.0	0.0	126.3	227.9	317.8	2,200.0	10.9	2,882.8
Khammam	9	0.0	0.0	0.0	0.0	0.0	0.0	80.8	159.1	221.8	1,458.0	7.6	1,927.2
Krishna	2	0.0	0.0	0.0	0.0	0.0	0.0	5.1	25.8	33.1	200.9	1.7	266.5
Kurnool	16	0.0	0.0	0.0	0.0	0.0	0.0	96.0	232.2	301.2	1,999.1	13.4	2,641.9
Mahabubnagar	18	0.0	0.0	0.0	0.0	0.0	0.0	161.6	301.0	393.9	2,789.6	15.1	3,661.3
Medak	8	0.0	0.0	0.0	0.0	0.0	0.0	121.2	193.5	314.5	2,086.6	6.7	2,722.4
Nalgonda	11	0.0	0.0	0.0	0.0	0.0	0.0	101.0	206.4	301.2	1,947.2	9.2	2,565.1
Nizamabad	8	0.0	0.0	0.0	0.0	0.0	0.0	96.0	176.3	261.5	1,675.1	6.7	2,215.5
Prakasam	13	0.0	0.0	0.0	0.0	0.0	0.0	106.1	223.6	311.1	2,060.6	10.9	2,712.4
Rangareddy	10	0.0	0.0	0.0	0.0	0.0	0.0	126.3	219.3	331.0	2,164.3	8.4	2,849.3
Sri Potti Sriramulu Nellore	5	0.0	0.0	0.0	0.0	0.0	0.0	55.6	103.2	152.3	1,010.9	4.2	1,326.1
Srikakulam	5	0.0	0.0	0.0	0.0	0.0	0.0	45.5	81.7	119.2	793.8	4.2	1,044.3
Visakhapatnam	6	0.0	0.0	0.0	0.0	0.0	0.0	35.4	98.9	135.7	835.9	5.0	1,110.9
Vizianagaram	5	0.0	0.0	0.0	0.0	0.0	0.0	50.5	98.9	155.6	972.0	4.2	1,281.2
Warangal	14	0.0	0.0	0.0	0.0	0.0	0.0	131.3	266.6	393.9	2,530.4	11.8	3,334.0
West Godavari	8	0.0	0.0	0.0	0.0	0.0	0.0	55.6	111.8	129.1	994.7	6.7	1,297.8
Y.S.R	10	0.0	0.0	0.0	0.0	0.0	0.0	45.5	129.0	139.0	1,004.4	8.4	1,326.3
Total	**228**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**2,055.4**	**4,024.8**	**5,610.5**	**37,849.7**	**191.5**	**49,731.8**

***Level 10**: Director General/Director/ Joint Director/Additional Director; **Level 9**: CFO/CO; **Level 8**: Deputy CFO; **Level 7**: Deputy Controller; **Level 6**: DFO/DO/EO/Fire Supervisor; **Level 5**: ADO/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 Vehicle Maintenance & Repairs, and PDL Cost

For Gap analysis, vehicle maintenance, repairs and Petrol, Diesel & Lubricant (PDL) costs have been estimated based on average current expenditure to total vehicles cost (Table 25-32). The total estimated cost on vehicle maintenance & repairs, and PDL will be **Rs. 27.43 Crores** per year for filling the gap in operational and urban areas in Andhra Pradesh. The annual specialized equipment, building maintenance, office expanses, and training expanses will be about **Rs. 14.70 Crores, 32.49 Crores, 57.9 Crores** and **Rs. 10.10 Crores**, respectively.

Table 25-32: Annual recurring cost estimates (in Lakhs Rupees) for petrol, diesel, and lubricants after filling the gap in operational and new urban Fire Stations

District	Num of Fire Stations	Annual Vehicle Maintenance	Annual PDL Cost	Annual Equipment Maintenance	Annual Building Maintenance	Office Expenses	Training Expenses
Adilabad	13	35.23	26.42	30.97	63.00	131.01	22.87
Anantapur	15	42.26	31.69	45.42	99.50	179.48	31.34
Chittoor	18	70.81	53.10	64.01	148.50	252.16	44.03
East Godavari	29	107.15	80.36	104.39	228.00	390.95	68.26
Guntur	22	77.66	58.24	66.47	143.50	243.13	42.45
Hyderabad	21	153.10	114.82	168.49	306.00	535.12	93.43
Karimnagar	13	45.77	34.33	41.96	104.00	189.64	33.11
Khammam	11	38.09	28.57	33.16	76.00	148.30	25.89
Krishna	28	155.67	116.75	128.89	313.00	566.65	98.94
Kurnool	16	61.51	46.13	61.38	120.00	208.10	36.34
Mahabubnagar	12	41.69	31.27	38.88	87.50	166.01	28.99
Medak	9	30.64	22.98	24.65	56.50	100.59	17.56
Nalgonda	12	41.93	31.45	34.44	88.00	166.33	29.04
Nizamabad	7	30.88	23.16	22.94	52.00	115.46	20.16
Prakasam	16	41.95	31.46	39.32	97.00	170.74	29.81
Rangareddy	31	121.00	90.75	125.20	274.50	465.70	81.31
Sri Potti Sriramulu Nellore	14	63.37	47.52	49.54	124.00	214.00	37.37
Srikakulam	14	49.17	36.88	43.50	114.50	197.82	34.54
Visakhapatnam	27	132.85	99.63	116.57	257.00	459.96	80.31
Vizianagaram	10	45.57	34.18	37.20	101.00	181.00	31.60
Warangal	11	54.77	41.08	43.56	89.00	179.48	31.34
West Godavari	18	75.88	56.91	90.51	190.50	319.76	55.83
Y.S.R	14	50.73	38.05	58.85	116.00	208.68	36.44
Total	**381**	**1,567.67**	**1,175.76**	**1,470.29**	**3,249.00**	**5,790.09**	**1,010.97**

Table 25-33: State level summary of Capital Expenditure required for filling the gap (in Crores Rupees)

Capital Expenditure				
Operational Type	**Fire Station Building Infrastructure**	**Vehicle Cost**	**Equipment Cost**	**Total Capital Cost**
Operational Fire Stations	500.25	121.11	13.43	634.79
Gap in Operational Fire Stations	658.25	397.30	114.33	1,169.88
New Urban Fire Stations	466.00	134.79	56.03	656.81
Total Gap in New Urban and Operational Fire Stations	1,124.25	532.09	170.35	1,826.69
New Rural Fire Stations	1,053.75	297.51	87.09	1,438.35
Total Gap in New Urban ,New Rural and Operational Fire Stations	2,178.00	829.60	257.44	3,265.04

Table 25-34: State level summary of Recurring Expenditure required for filling the gap (in Crores Rupees)

Recurring Expenditure								
Operational Type	**Annual Staff Salary**	**Annual Vehicle Maintenance**	**Annual Maintenance Contract (Specialized Equipment)**	**Annual Petrol diesel and Lubricant Cost**	**Annual Building maintenance**	**Annual Office Expenses**	**Annual Training Expenses**	**Total Recurring Expenditure**
Operational Fire Stations	123.50	2.91	1.07	2.18	10.01	7.78	1.36	148.81
Gap in Operational Fire Stations	559.70	9.54	9.15	7.15	13.17	35.26	6.16	640.12
New Urban Fire Stations	235.86	3.23	4.48	2.43	9.32	14.86	2.59	272.78
Total Gap in New Urban and Operational Fire Stations	795.56	12.77	13.63	9.58	22.49	50.12	8.75	912.89
New Rural Fire Stations	497.32	7.14	6.97	5.36	21.08	31.33	5.47	574.66
Total Gap in New Urban ,New Rural and Operational Fire Stations	1,292.88	19.91	20.60	14.93	43.56	81.45	14.22	1,487.55

25.5 Detailed Financial Investment Plan

All the above detailed capital and recurring expenses have been taken into consideration, while finalizing the detailed investment plan for next 10 years for Andhra Pradesh State (Table 25-35 and Table 25-36).

Table 25-35: State level 10 year investment plan for Andhra Pradesh SDR & FS for filling gap in operational and new urban Fire Stations (in Crores Rupees)

	Capital Expenditure		Recurring Expenditure					
Year	Building Infrastructure	Vehicle and Equipment	Annual Vehicle Maintenance & PDL AMC	Annual Staff Salary	Annual Office Expenses	Annual Training Office Expenses	Annual Bldg. maintenance	Total
First Year	224.85	255.81	19.08	403.35	25.41	4.44	16.59	949.53
Second Year	249.58	268.60	34.55	765.19	48.21	7.89	23.40	1,397.43
Third Year	138.52	42.07	39.68	916.18	57.72	8.86	25.54	1,228.57
Fourth Year	153.75	44.18	45.41	1,092.40	68.82	9.90	27.71	1,442.18
Fifth Year	170.67	23.19	50.43	1,260.60	79.42	10.71	28.96	1,623.98
Sixth Year	189.45	24.35	55.95	1,453.43	91.57	11.58	30.23	1,856.56
Seventh Year	210.28	25.57	62.04	1,674.40	105.49	12.50	31.52	2,121.80
Eighth Year	233.42	26.85	68.74	1,927.47	121.43	13.50	32.84	2,424.24
Ninth Year	0.00	28.19	76.12	2,217.16	139.68	14.55	34.17	2,509.88
Tenth Year	0.00	29.60	84.23	2,548.63	160.56	15.68	35.53	2,874.24
Total	**1,570.52**	**768.43**	**536.24**	**14,258.81**	**898.30**	**109.61**	**286.50**	**18,428.41**

Table 25-36: State level 10 year investment plan for Andhra Pradesh SDR & FS for filling gap in operational, new urban and new rural Fire Stations (in Crores Rupees)

	Capital Expenditure		Recurring Expenditure					
Year	Building Infrastructure	Vehicle and Equipment	Annual Vehicle Maintenance & PDL AMC	Annual Staff Salary	Annual Office Expenses	Annual Training Office Expenses	Annual Bldg. maintenance	Total
First Year	435.60	255.81	19.08	403.35	25.41	4.44	16.59	1,160.28
Second Year	483.52	268.60	34.55	765.19	48.21	7.89	23.40	1,631.36
Third Year	268.35	126.88	44.22	1,040.95	65.58	10.06	29.84	1,585.89
Forth Year	297.86	133.22	55.22	1,371.88	86.43	12.43	36.40	1,993.44
Fifth Year	330.64	69.94	63.67	1,651.87	104.07	14.04	39.93	2,274.15
Sixth Year	367.01	73.44	73.11	1,979.30	124.70	15.77	43.52	2,676.85
Seventh Year	407.37	77.11	83.66	2,361.53	148.78	17.64	47.18	3,143.26
Eighth Year	452.20	80.97	95.42	2,806.99	176.84	19.65	50.91	3,682.98
Ninth Year	0.00	85.02	108.54	3,325.36	209.50	21.83	54.71	3,804.96
Tenth Year	0.00	89.26	123.14	3,927.73	247.45	24.17	58.58	4,470.33
Total	**3,042.56**	**1,260.26**	**700.61**	**19,634.14**	**1,236.95**	**147.91**	**401.06**	**26,423.49**

25.6 Prioritization of new Fire Stations/Fire Posts

For prioritization of new Fire Stations/Fire Posts, the RMSI team has strictly followed risk categorization and estimated population density in the jurisdiction of new Fire Station/Fire Post as criteria. Accordingly, the priority for establishing new urban Fire Stations and rural Fire Stations/Posts has been given in Tables 25-38 and 25-39, respectively.

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

25.7 Avenues of Fund Generation

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

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

25.8 Capacity Building and Training Facilities

The State has framed Recruitment Rules (RR) for each level, and these are being adhered to for filling the vacant position.

Andhra Pradesh SDR&FS is running a full-fledged training centre on the outskirt of Hyderabad, which is providing training for leading fireman, fireman, other staff and also running specialized courses. A few senior level officials got training at NFSC Nagpur and other places, however, Andhra Pradesh SDR&FS need capacity building for its firefighters as there is significant gap in firefighting manpower..

The roles of firefighter cannot be performed until and unless sufficient training is being imparted to the fire service personnel. The types of training and duration depend upon the type of entry to the fire service department or change of responsibility on promotion. Broadly, there are two entry levels in fire services in India; 1) Fireman level and 2) Middle level (Sub

Officer/ Asstt. Station Officer). Immediately after joining the Fire Services, it is mandatory that every fire personnel needs to undergo professional training.

In order to further strengthen the AP SDR & FS, the gap in training has been estimated for various levels of fire personnel. The Fire Station survey and gap analysis reveal that there is some gap in training need for existing staff. The previous section (section 25.3.3.) details about huge gap in manpower for operational Fire Stations and need of additional fire personnel for new urban and new rural Fire Stations. As per the guidelines of SFAC, immediately after recruitment, fire personnel should undertake professional trainings. Moreover, there should be refresher-training courses at an interval of 3 to 5 years for every fire personnel. The following sections detail about the estimation of training need at different levels (fireman, leading fireman, station officer, sub-officer etc.).

25.8.1 BASIC TRAINING FOR FIREMAN

The basic training course should provide practical experience of firefighting to meet the challenge in firefighting operations. Fire personnel should also be trained for operation and maintenance of firefighting 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 25-37. Additional requirement of Refresher Training Course for fireman after every 3-5 years of service is also shown the Table 25-37. Some of the special training for handling specialized equipment such as Breathing Apparatus, Global-positioning System etc should also be part of the Refresher course. As a whole, Andhra Pradesh SDR & FS would require to train 31,156 fire personnel in basic and 17,953 fire personnel in refresher training in next 10 years. Therefore, State training centre should have adequate capacity and infrastructure for meeting such training requirement.

Table 25-37: Estimated training requirements for fire personnel in Andhra Pradesh Fire Services

Basic Training for Fireman		
	Number of Fire Personnel in Operational Fire Stations	13,968
	Number of Fire Personnel in New Urban Fire Stations	5,506
	Number of Fire Personnel in New Rural Fire Stations	11,682
	Total Number of Fire Personnel for Training	**31,156**
Refresher Training for Fireman		
	Total Number of Fire Personnel	**17,953**
Leading Fireman Training Course		
	Number of Fire Personnel in Operational Fire Stations	1,893
	Number of Fire Personnel in New Urban Fire Stations	789
	Number of Fire Personnel in New Rural Fire Stations	1,695
	Total Number of Fire Personnel for Training	**4,377**
Other specialized Training Course		
	Total Number of Fire Personnel for Training	**2,682**
Junior Officer Training Course		
	Number of Fire Personnel in Operational Fire Stations	1,493
	Number of Fire Personnel in New Urban Fire Stations	635
	Number of Fire Personnel in New Rural Fire Stations	1,343
	Total Number of Fire Personnel for Training	**3,471**
Divisional Officer Training Course		
	Number of Fire Personnel in Operational Fire Stations	171
	Number of Fire Personnel in New Urban Fire Stations	29
	Number of Fire Personnel in New Rural Fire Stations	0
	Total Number of Fire Personnel for Training	**200**
Fire Prevention Course		
	Total Number of Fire Personnel for Training	**236**

25.8.2 TRAINING COURSE FOR LEADING FIREMAN

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

Estimated number of fire personnel who require training for leading fireman in operational Fire Stations (after filling the gap of manpower), and additional new recruitment for new urban and new rural Fire Stations is shown in Table 25-37.

25.8.3 OTHER SPECIALIZED TRAINING COURSES

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

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

The syllabi for above courses are already provided in SFAC guidelines. Number of leading fireman need to attend specialized course is also shown in Table 25-38. In total, Andhra Pradesh SDR &FS would need to train at least 2,682 leading firemen for specialized courses in next 10 years.

25.8.4 JUNIOR OFFICER TRAINING COURSE

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

Estimated number of fire officers who need to participate in Junior Officer training course in operational Fire Stations (after filling the gap of manpower), and additional new recruitment for new urban and new rural Fire Stations is shown in Table 25.37. After filling gap in operational Fire Stations, new urban and rural Fire Stations, Andhra Pradesh SDR & FS Service would require to train 3,471 junior officers in next 10 years.

25.8.5 DIVISIONAL FIRE OFFICER TRAINING COURSE

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

Estimated number of fire officers who require Divisional Officer training course in operational and new Fire Stations (after filling the gap of manpower) is shown in Table 25-38. About 200 fire officers in Andhra Pradesh SDR & FS Service who would require this training in next 10 years.

25.8.6 FIRE PREVENTION TRAINING COURSE

In addition to firefighting staff, a few municipal corporations are running a fire prevention wing for inspection, awareness generation, and training for schools, hospitals, high-rise buildings, shopping malls govt. offices, public buildings etc. Though AP SDR&FS in the State is creating public awareness programs for schools, colleges, hospitals, cinema halls, shopping malls, Govt. offices, etc. however, it is not up to the desired level due to lack of trained manpower. For that purpose sufficient manpower at senior officer levels have been recommended to have an effective State "*Fire Prevention Wing*". The fire prevention wing should have trained officials for fire inspection, awareness and training, so that fire incidences similar to that of AMRI, Kolkata should not occur in the State. The State should have a dedicated "*Education Van*" in each district for the purpose. The van should be well equipped with short video films as produced by MHA, distribution of pamphlets on "DO"s and "DON'T"s generated by MHA, and live demonstration of how to use "portable extinguishers" and handle small fires. Accordingly, the State would require to train about 236 fire officials in fire prevention course

25.8.7 AWARENESS GENERATION PROGRAMS

Besides attending regular fire and other rescue calls, the State fire services should also work on awareness generation programs, and it should conduct regular awareness programs in schools, residential areas, NCC camps, oil and gas plants, Govt. offices etc. Currently, numbers of awareness programs conducted by Andhra Pradesh SDR & FS Service are not up to the desired levels and there is a need to have a dedicated Fire Prevention Wing throughout the State. For large scale public awareness generation, each district is being recommended with an Education Van equipped with short vide films as produced by MHA, distribution of pamphlets on "DO"s and "DON'T"s to prevent fire event generated by MHA, live- demonstrations of how to use "portable extinguishers" and how to handle small kitchen fires.

25.9 Limitations of the Study

1. In fire hazard and risk analysis, fire-load of specific industry has not been taken into consideration. However, weightage has been given to the size of industrial area in the fire hazard and risk analysis of the base unit (district level). An attempt has been made even in the present assignment to go further down at lower levels. Providing special weightage of type of industry will require building level survey including estimation of fire-load for each industry, which is out of scope of present assignment.
2. Currently, Census 2011 has published only district level demographic data (the Tehsil/ Block level data is still unavailable), which has been used for further estimation and analysis purpose.
3. Floating population in cities has not been considered for distribution over the land use (built-up area); this may be attempted in future detailed studies.
4. Non-availability of a uniform level of fire statistics of all the fire events in the past 5 years.
5. Designation, rank structure and administrative control are very heterogeneous from State to State, which in the present State creates ambiguity while brining in at National level. For example, Director Position pay scale in one State may not be equal to that of Chief Fire Officer in another State. For the purpose of present assignment, we have divided the rank/designation structure into 11 levels (level 0 to level 10). For this, a system needs to be put in place through having a uniform administrative structure at national level to State level. This may require development and implementation of National Fire Act, which MHA is trying to develop in near future.
6. The firefighting 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 is trying to get information about the fire-fighting infrastructure for these, and will include whatever information will be 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.

25.10 Recommendations for Andhra Pradesh State fire services

1. At present, the State has A.P. Fire Service Act 1999 and A.P. Fire and Emergency Operations and Levy of Fee Rules 2006. A few amendments to A.P. Fire Service Act 1999 were proposed by the State in the year 2007 to 2011. The State Fire Service Act should be updated after making changes for the propose amendments including provisions of National Building Code (NBC, 2005) and its strict implementation of fire code in building design and construction. National Building Code (NBC) should strictly adhered in high-rise buildings, schools, colleges, shopping malls, cinema halls, hospitals, industrial units, institutions and public and private buildings.
2. The Andhra Pradesh SDR & FS lacks in firefighting manpower and there are several vacancies at all levels in the State in operational Fire Stations, which need to be filled up at the earliest.
3. Instead of having firemen, driver-operator separately, the State should recruit fireman-cum-driver-cum-operator. This will help in optimizing the huge manpower requirements. Since, these may not be readily available, the State should train the new recruit in a systematic manner, and encourage all existing staff, specially, fireman and leading fireman to obtain heavy vehicle driving license. The State may offer some incentive towards this, as this will help in optimization of resources.
4. Based on prioritization of Fire Stations, State Fire Services needs to add new Fire Stations at a faster pace, as there are gaps both in urban and rural areas.
5. Online Vehicle tracking through GPS and development of a fully computerized response system is another area for improvement.
6. Though A.P. SDR & Fire Services is creating public awareness programs through fire prevention wings in some of the Municipal Corporations for schools, hospitals, Govt. offices, etc. however, it is not meeting up to the desired level due to lack of trained manpower and funds. For that purpose sufficient manpower at senior officer levels have been recommended to have an effective State "*Fire Prevention Wing*". The fire prevention wing should have trained officials for fire inspection, awareness and training, so that fire incidences similar to that of AMRI, Kolkata should not occur in the State. The State should have a dedicated "*Education Van*" in each district for the purpose. The van should be well equipped with short video films as produced by MHA, distribution of pamphlets on "DO"s and "DON'T"s generated by MHA, and live demonstration of how to use "portable extinguishers" and handle small fires.
7. Periodic fire drills and fire-inspection of schools, hospitals, shopping complexes, multi-storied buildings, and major industrial centers should be taken care by the A.P. SDR&FS.
8. 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, A.P. SDR&FS 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.

9. However, A.P. SDR&FS does have promotional avenues for their staff. 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.
10. The A.P. SDR&FS in the State should have audit by a central authority to ensure good finance mechanism for capital, and O&M expenditures.

Table 25-38: Details of operational and new proposed urban Fire Stations with their ideal jurisdiction area, estimated ideal served population under their jurisdiction, and priority ranking for new urban Fire Stations

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Urban_96	Adilabad	Chinnur	New Urban Fire Station	3,358	80
AP_New_Urban_28	Adilabad	Mandamarri	New Urban Fire Station	3,187	81
AP_New_Urban_23	Adilabad	Naspur, Mancherial	New Urban Fire Station	1,804	95
AP1458	Adilabad	Mancherial Fire Station	Operational Urban Fire Station	10,468	
AP1463	Adilabad	Bellampally Fire Station	Operational Urban Fire Station	4,195	
AP1465	Adilabad	Sirpur khagaznagar Fire Station	Operational Urban Fire Station	5,082	
AP1496	Adilabad	Adilabad Fire Station	Operational Urban Fire Station	6,738	
AP1498	Adilabad	Nirmal Fire Station	Operational Urban Fire Station	2,521	
AP1506	Adilabad	Bhaisa Fire Station	Operational Urban Fire Station	1,296	
AP_New_Urban_74	Anantapur	Yadiki	New Urban Fire Station	2,631	85
AP_New_Urban_37	Anantapur	Gooty	New Urban Fire Station	2,396	87
AP_New_Urban_113	Anantapur	Rapthadu	New Urban Fire Station	1,151	99
AP1703	Anantapur	Kadiri Fire Station	Operational Urban Fire Station	3,242	
AP1707	Anantapur	Anantapur Fire Station	Operational Urban Fire Station	9,350	
AP1712	Anantapur	Dharmavaram Fire Station	Operational Urban Fire Station	10,860	
AP1716	Anantapur	Rayadurg Fire Station	Operational Urban Fire Station	3,015	
AP1719	Anantapur	Kalyandurg Fire Station	Operational Urban Fire Station	2,086	
AP1720	Anantapur	Uravakonda Fire Station	Operational Urban Fire Station	4,099	
AP1722	Anantapur	Hindupur Fire Station	Operational Urban Fire Station	9,903	
AP1727	Anantapur	Madakasira Fire Station	Operational Urban Fire Station	1,375	
AP1730	Anantapur	Puttaparthi Fire Station	Operational Urban Fire Station	4,318	
AP1735	Anantapur	Guntakal Fire Station	Operational Urban Fire Station	6,180	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1737	Anantapur	Tadipatri Fire Station	Operational Urban Fire Station	6,967	
AP_New_Urban_11	Chittoor	Alamelu Magapuram	New Urban Fire Station	6,038	68
AP_New_Urban_12	Chittoor	Renigunta	New Urban Fire Station	1,912	94
AP_New_Urban_10	Chittoor	Tirupati	New Urban Fire Station	1,568	97
AP1741	Chittoor	Punganur Fire Station	Operational Urban Fire Station	4,468	
AP1747	Chittoor	Pileru Fire Station	Operational Urban Fire Station	2,356	
AP1749	Chittoor	Madanapalli Fire Station	Operational Urban Fire Station	7,286	
AP1751	Chittoor	Palamaneru Fire Station	Operational Urban Fire Station	2,097	
AP1754	Chittoor	Chittoor Fire Station	Operational Urban Fire Station	4,223	
AP1755	Chittoor	Nagari Fire Station	Operational Urban Fire Station	1,975	
AP1759	Chittoor	Srikalahasti Fire Station	Operational Urban Fire Station	3,709	
AP1761	Chittoor	Puttur Fire Station	Operational Urban Fire Station	2,043	
AP1763	Chittoor	Tirupati Fire Station	Operational Urban Fire Station	16,764	
AP_New_Urban_19	East Godavari	Pithapuram	New Urban Fire Station	12,720	48
AP_New_Urban_17	East Godavari	Mallayapeta	New Urban Fire Station	11,850	49
AP_New_Urban_32	East Godavari	Lalitha Nagar	New Urban Fire Station	11,103	53
AP_New_Urban_107	East Godavari	Yeleswaram	New Urban Fire Station	9,697	55
AP_New_Urban_105	East Godavari	Kottapalli	New Urban Fire Station	8,856	57
AP_New_Urban_104	East Godavari	Gokaram	New Urban Fire Station	8,711	58
AP_New_Urban_102	East Godavari	Sitanagaram	New Urban Fire Station	7,984	61
AP_New_Urban_18	East Godavari	Aditya Nagar	New Urban Fire Station	7,406	62
AP_New_Urban_27	East Godavari	Ravulapalem	New Urban Fire Station	7,126	63
AP_New_Urban_14	East Godavari	Vetlapalem	New Urban Fire Station	6,655	64
AP_New_Urban_106	East Godavari	Jaggampeta	New Urban Fire Station	5,466	70

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Urban_13	East Godavari	Samalkota	New Urban Fire Station	4,113	73
AP_New_Urban_103	East Godavari	Korukonda	New Urban Fire Station	3,990	74
AP_New_Urban_108	East Godavari	Machavaram	New Urban Fire Station	2,863	82
AP_New_Urban_101	East Godavari	Dhavaleswaram	New Urban Fire Station	2,803	83
AP1532	East Godavari	Razole Fire Station	Operational Urban Fire Station	1,381	
AP1533	East Godavari	Amalapuram Fire Station	Operational Urban Fire Station	13,630	
AP1536	East Godavari	Mandapeta Fire Station	Operational Urban Fire Station	9,465	
AP1537	East Godavari	Ramachandrapuram Fire Station	Operational Urban Fire Station	9,652	
AP1538	East Godavari	Jaganaikpur Fire Station	Operational Urban Fire Station	6,713	
AP1541	East Godavari	Kakinada Fire Station	Operational Urban Fire Station	11,252	
AP1549	East Godavari	Peddapurm Fire Station	Operational Urban Fire Station	20,406	
AP1565	East Godavari	Rajahamundry Fire Station	Operational Urban Fire Station	10,086	
AP1572	East Godavari	Tuni Fire Station	Operational Urban Fire Station	4,285	
AP_New_Urban_33	Guntur	Panduranga Nagar	New Urban Fire Station	8,592	59
AP_New_Urban_71	Guntur	Amaravathi	New Urban Fire Station	4,208	72
AP_New_Urban_93	Guntur	Stuartpuram	New Urban Fire Station	2,707	84
AP_New_Urban_36	Guntur	Nallapadu	New Urban Fire Station	2,403	86
AP_New_Urban_86	Guntur	Dachepalle	New Urban Fire Station	2,244	89
AP_New_Urban_85	Guntur	Gurazala	New Urban Fire Station	2,212	90
AP_New_Urban_34	Guntur	Pedakakani	New Urban Fire Station	2,020	93
AP_New_Urban_26	Guntur	Tadepalli	New Urban Fire Station	1,206	98
AP_New_Urban_35	Guntur	Perecherla	New Urban Fire Station	1,002	100
AP1584	Guntur	Macherla Fire Station	Operational Urban Fire Station	4,198	
AP1585	Guntur	Narasarao Pet Fire Station	Operational Urban Fire Station	9,031	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1586	Guntur	Vinukonda Fire Station	Operational Urban Fire Station	4,469	
AP1595	Guntur	Ponnuru Fire station	Operational Urban Fire Station	4,750	
AP1602	Guntur	Bapatla Fire station	Operational Urban Fire Station	3,818	
AP1606	Guntur	Mangalagiri Fire station	Operational Urban Fire Station	2,520	
AP1609	Guntur	Guntur II Fire station	Operational Urban Fire Station	13,284	
AP1610	Guntur	Sattenapalli Fire station	Operational Urban Fire Station	3,173	
AP1617	Guntur	Repalle Fire station	Operational Urban Fire Station	8,570	
AP1620	Guntur	Tenali Fire station	Operational Urban Fire Station	9,573	
AP1622	Guntur	Piduguralla Fire station	Operational Urban Fire Station	3,581	
AP1624	Guntur	Chilakaluripet Fire station	Operational Urban Fire Station	4,660	
AP1628	Guntur	Guntur I Fire station	Operational Urban Fire Station	17,530	
AP_New_Urban_116	Hyderabad	Yakutpura	New Urban Fire Station	35,709	28
AP_New_Urban_117	Hyderabad	Nampally	New Urban Fire Station	27,514	29
AP_New_Urban_41	Hyderabad	Humayun Nagar	New Urban Fire Station	24,852	31
AP_New_Urban_119	Hyderabad	Khairtabad	New Urban Fire Station	24,526	32
AP_New_Urban_48	Hyderabad	Ram Nagar	New Urban Fire Station	23,370	33
AP_New_Urban_68	Hyderabad	Journalist Colony, Banjara Hills	New Urban Fire Station	20,961	34
AP_New_Urban_120	Hyderabad	Amberpet	New Urban Fire Station	20,168	35
AP_New_Urban_115	Hyderabad	Secundrabad Cantonment	New Urban Fire Station	19,241	36
AP_New_Urban_64	Hyderabad	Hafiz Baba Nagar	New Urban Fire Station	12,023	37
AP_New_Urban_118	Hyderabad	Jubilee Hills	New Urban Fire Station	10,907	38
AP_New_Urban_65	Hyderabad	Chandrayanagutta	New Urban Fire Station	5,811	40
AP1718	Hyderabad	Gowliguda Fire Station	Operational Urban Fire Station	29,346	
AP1729	Hyderabad	Secundrabad Fire Station	Operational Urban Fire Station	14,905	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1732	Hyderabad	Secretariat Fire Station	Operational Urban Fire Station	15,883	
AP1739	Hyderabad	Punjaputta Film nagar Fire Station	Operational Urban Fire Station	15,623	
AP1743	Hyderabad	Langer house Fire Station	Operational Urban Fire Station	15,853	
AP1746	Hyderabad	Chandulal baradari Fire Station	Operational Urban Fire Station	20,932	
AP1753	Hyderabad	Moghalpura Fire Station	Operational Urban Fire Station	36,240	
AP1765	Hyderabad	Musheerabad Fire Station	Operational Urban Fire Station	33,546	
AP1766	Hyderabad	Malakpet Fire Station	Operational Urban Fire Station	26,872	
AP1715	Hyderabad	Snorkel Fire Station	Operational Urban Fire Station	-	
AP_New_Urban_16	Karimnagar	TTS Township, Ramagundam	New Urban Fire Station	11,143	52
AP_New_Urban_78	Karimnagar	8 Incline Colony	New Urban Fire Station	6,203	67
AP_New_Urban_31	Karimnagar	Korutla	New Urban Fire Station	5,582	69
AP_New_Urban_79	Karimnagar	Jammikunta	New Urban Fire Station	2,128	91
AP_New_Urban_15	Karimnagar	Ramagundam	New Urban Fire Station	2,122	92
AP1459	Karimnagar	Karimnagar Fire Station	Operational Urban Fire Station	13,607	
AP1461	Karimnagar	Godavarikhani Fire Station	Operational Urban Fire Station	10,828	
AP1544	Karimnagar	Jagityal Fire Station	Operational Urban Fire Station	4,699	
AP1546	Karimnagar	Metpally Fire Station	Operational Urban Fire Station	1,867	
AP1556	Karimnagar	Sirsilla Fire Station	Operational Urban Fire Station	6,769	
AP_New_Urban_21	Khammam	Paloncha	New Urban Fire Station	3,486	112
AP_New_Urban_25	Khammam	Pilot Colony	New Urban Fire Station	2,199	119
AP_New_Urban_95	Khammam	Kallur	New Urban Fire Station	1,084	129
AP1599	Khammam	Khammam Fire station	Operational Urban Fire Station	7,346	
AP1611	Khammam	Sattupalli Fire Station	Operational Urban Fire Station	4,358	
AP1614	Khammam	Kothagudem Fire Station	Operational Urban Fire Station	4,273	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1618	Khammam	Bhadrachalam Fire station	Operational Urban Fire Station	1,776	
AP1621	Khammam	Yellandu Fire Station	Operational Urban Fire Station	5,255	
AP_New_Urban_124	Krishna	Satyanarayanapuram	New Urban Fire Station	28,614	102
AP_New_Urban_122	Krishna	Benz Circle	New Urban Fire Station	26,949	103
AP_New_Urban_121	Krishna	Gunadala	New Urban Fire Station	13,974	104
AP_New_Urban_20	Krishna	Pedana	New Urban Fire Station	8,821	107
AP_New_Urban_123	Krishna	Bhavanipuram	New Urban Fire Station	4,693	111
AP_New_Urban_3	Krishna	Padmanabhapuram	New Urban Fire Station	3,448	113
AP_New_Urban_94	Krishna	Ibrahimpatnam	New Urban Fire Station	1,801	123
AP1478	Krishna	Machilipatnam Fire Station	Operational Urban Fire Station	10,277	
AP1490	Krishna	Autonagar Fire Station	Operational Urban Fire Station	17,738	
AP1491	Krishna	Gudivada Fire Station	Operational Urban Fire Station	5,291	
AP1494	Krishna	Jaggaiahpet Fire Station	Operational Urban Fire Station	4,507	
AP1502	Krishna	Vijayavada Fire Station	Operational Urban Fire Station	18,317	
AP1505	Krishna	Kothapeta Fire Station	Operational Urban Fire Station	15,808	
AP1507	Krishna	Ajith Singh Nagar Fire Station	Operational Urban Fire Station	8,638	
AP1510	Krishna	Gannavaram Fire Station	Operational Urban Fire Station	4,110	
AP1514	Krishna	Nuzvidu Fire Station	Operational Urban Fire Station	5,007	
AP_New_Urban_30	Kurnool	Sampath Nagar	New Urban Fire Station	12,167	105
AP_New_Urban_29	Kurnool	Abbas Nagar	New Urban Fire Station	10,961	106
AP_New_Urban_75	Kurnool	Nandikotkur	New Urban Fire Station	2,116	120
AP_New_Urban_44	Kurnool	Betamcherla	New Urban Fire Station	1,367	127
AP1545	Kurnool	Adoni Fire Station	Operational Urban Fire Station	10,263	
AP1548	Kurnool	Yemmiganur Fire Station	Operational Urban Fire Station	5,158	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1557	Kurnool	Kurnool Fire Station	Operational Urban Fire Station	10,874	
AP1568	Kurnool	Dhone Fire Station	Operational Urban Fire Station	2,292	
AP1573	Kurnool	Banagan palli Fire Station	Operational Urban Fire Station	1,382	
AP1575	Kurnool	Allagadda Fire station	Operational Urban Fire Station	1,898	
AP1576	Kurnool	Nandyal Fire Station	Operational Urban Fire Station	9,398	
AP1579	Kurnool	Atmakur Fire Station	Operational Urban Fire Station	1,480	
AP_New_Urban_76	Mahabubnagar	Kalwakurthy	New Urban Fire Station	3,360	114
AP_New_Urban_43	Mahabubnagar	Jadcherla	New Urban Fire Station	2,373	118
AP_New_Urban_38	Mahabubnagar	Farrukh Nagar	New Urban Fire Station	2,082	121
AP_New_Urban_73	Mahabubnagar	Makhtal	New Urban Fire Station	1,842	122
AP1560	Mahabubnagar	Mahbubnagar Fire Station	Operational Urban Fire Station	7,661	
AP1570	Mahabubnagar	Narayanpet Fire Station	Operational Urban Fire Station	3,690	
AP1577	Mahabubnagar	Gadwal Fire Station	Operational Urban Fire Station	6,204	
AP1580	Mahabubnagar	Wanaparty Fire Station	Operational Urban Fire Station	12,467	
AP1589	Mahabubnagar	Kolhapur Fire Station	Operational Urban Fire Station	2,554	
AP_New_Urban_72	Medak	Pashamailaram	New Urban Fire Station	713	101
AP1467	Medak	Patancheruvu Fire Station	Operational Urban Fire Station	2,429	
AP1468	Medak	Sadasivpet Fire Station	Operational Urban Fire Station	1,990	
AP1469	Medak	Sanga reddy Fire Station	Operational Urban Fire Station	7,643	
AP1470	Medak	Zaheerabad Fire Station	Operational Urban Fire Station	4,103	
AP1472	Medak	Siddipet Fire Station	Operational Urban Fire Station	6,615	
AP1475	Medak	Medak Fire Station	Operational Urban Fire Station	3,930	
AP_New_Urban_24	Nalgonda	Venkatadripalem	New Urban Fire Station	1,370	126
AP_New_Urban_84	Nalgonda	Narketpalli	New Urban Fire Station	1,355	128

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1667	Nalgonda	Nalgonda Fire Station	Operational Urban Fire Station	6,743	
AP1675	Nalgonda	Deverkonda Fire Station	Operational Urban Fire Station	2,892	
AP1681	Nalgonda	Nakrekal Fire Station	Operational Urban Fire Station	1,573	
AP1689	Nalgonda	Suryapet Fire Station	Operational Urban Fire Station	4,778	
AP1693	Nalgonda	Kodad Fire Station	Operational Urban Fire Station	5,082	
AP1696	Nalgonda	Miryalguda Fire Station	Operational Urban Fire Station	5,944	
AP1702	Nalgonda	Bhongir Fire Station	Operational Urban Fire Station	3,807	
AP_New_Urban_131	Nizamabad	Nizamabad	New Urban Fire Station	654	130
AP1481	Nizamabad	Bodhan Fire Station	Operational Urban Fire Station	2,780	
AP1482	Nizamabad	Nizamabad Fire Station	Operational Urban Fire Station	5,986	
AP1484	Nizamabad	Armoor Fire Station	Operational Urban Fire Station	2,298	
AP1486	Nizamabad	Kamareddy Fire Station	Operational Urban Fire Station	5,381	
AP_New_Urban_87	Prakasam	Podili	New Urban Fire Station	2,893	115
AP_New_Urban_89	Prakasam	Addanki	New Urban Fire Station	2,858	116
AP_New_Urban_92	Prakasam	Vetlapalem	New Urban Fire Station	2,490	117
AP_New_Urban_88	Prakasam	Chimakurthy	New Urban Fire Station	1,724	124
AP_New_Urban_90	Prakasam	Singarayakonda	New Urban Fire Station	1,631	125
AP1636	Prakasam	Kandukur Fire Station	Operational Urban Fire Station	3,694	
AP1640	Prakasam	Chirala Fire Station	Operational Urban Fire Station	3,554	
AP1643	Prakasam	MarkapurFire Station	Operational Urban Fire Station	2,148	
AP1650	Prakasam	Ongole Fire Station	Operational Urban Fire Station	6,814	
AP1659	Prakasam	Tangutur Fire Station	Operational Urban Fire Station	1,506	
AP1668	Prakasam	Kanigiri Fire Station	Operational Urban Fire Station	2,720	
AP1674	Prakasam	Giddalur Fire Station	Operational Urban Fire Station	1,222	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Urban_62	Rangareddy	LB Nagar	New Urban Fire Station	16,411	1
AP_New_Urban_59	Rangareddy	Malkajgiri	New Urban Fire Station	10,968	4
AP_New_Urban_56	Rangareddy	Dondi	New Urban Fire Station	10,435	5
AP_New_Urban_66	Rangareddy	Babul Reddy Nagar	New Urban Fire Station	9,800	6
AP_New_Urban_50	Rangareddy	Sainikpuri	New Urban Fire Station	8,432	8
AP_New_Urban_47	Rangareddy	Srinivasa Puram	New Urban Fire Station	7,884	9
AP_New_Urban_49	Rangareddy	Anjaiah Nagar	New Urban Fire Station	7,851	10
AP_New_Urban_42	Rangareddy	Peddamma Nagar	New Urban Fire Station	7,016	11
AP_New_Urban_55	Rangareddy	Quthbullapur	New Urban Fire Station	6,511	12
AP_New_Urban_52	Rangareddy	Venkatraya Nagar	New Urban Fire Station	6,332	13
AP_New_Urban_70	Rangareddy	Serilingampally	New Urban Fire Station	6,165	14
AP_New_Urban_61	Rangareddy	Uppal	New Urban Fire Station	5,971	15
AP_New_Urban_63	Rangareddy	Chaitanya Nagar	New Urban Fire Station	5,775	16
AP_New_Urban_53	Rangareddy	Malaysian Township, Kukatpalli	New Urban Fire Station	5,552	17
AP_New_Urban_51	Rangareddy	Prem Nagar	New Urban Fire Station	5,168	18
AP_New_Urban_69	Rangareddy	Bharat Nagar	New Urban Fire Station	4,940	19
AP_New_Urban_67	Rangareddy	Padmasri EStates	New Urban Fire Station	4,886	20
AP_New_Urban_58	Rangareddy	Rajeev Nagar	New Urban Fire Station	4,843	21
AP_New_Urban_60	Rangareddy	Kowkur	New Urban Fire Station	4,254	22
AP_New_Urban_57	Rangareddy	Ambedkar Nagar	New Urban Fire Station	3,285	23
AP_New_Urban_54	Rangareddy	Satyam Enclave	New Urban Fire Station	3,086	24
AP_New_Urban_77	Rangareddy	Medchal	New Urban Fire Station	2,873	25
AP1626	Rangareddy	Jeedimetla Fire Station	Operational Urban Fire Station	6,539	
AP1630	Rangareddy	Madhapur Fire Station	Operational Urban Fire Station	5,953	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1634	Rangareddy	Malkajgiri Fire Station	Operational Urban Fire Station	5,679	
AP1649	Rangareddy	Tandur Fire Station	Operational Urban Fire Station	5,467	
AP1655	Rangareddy	Vikarabad Fire Station	Operational Urban Fire Station	4,191	
AP1661	Rangareddy	Hayath nagar Fire Station	Operational Urban Fire Station	6,969	
AP1711	Rangareddy	Moulali Fire Station	Operational Urban Fire Station	9,214	
AP1736	Rangareddy	Sanath nagar Fire Station	Operational Urban Fire Station	13,304	
AP_New_Urban_22	Sri Potti Sriramulu Nellore	Gayathri Nagar	New Urban Fire Station	9,670	56
AP_New_Urban_91	Sri Potti Sriramulu Nellore	Kovuru	New Urban Fire Station	3,867	76
AP1682	Sri Potti Sriramulu Nellore	Venkatagiri Fire Station	Operational Urban Fire Station	3,863	
AP1692	Sri Potti Sriramulu Nellore	Nellore Fire Station	Operational Urban Fire Station	18,390	
AP1698	Sri Potti Sriramulu Nellore	Atmakur Fire station	Operational Urban Fire Station	1,162	
AP1704	Sri Potti Sriramulu Nellore	Gudur Fire station	Operational Urban Fire Station	6,157	
AP1706	Sri Potti Sriramulu Nellore	Kavali Fire Station	Operational Urban Fire Station	4,385	
AP1710	Sri Potti Sriramulu Nellore	Sullurpet Fire Station	Operational Urban Fire Station	3,946	
AP_New_Urban_110	Srikakulam	Ponduru	New Urban Fire Station	7,448	108
AP_New_Urban_111	Srikakulam	Pathapatnam	New Urban Fire Station	6,214	109
AP1646	Srikakulam	Palakonda Fire Station	Operational Urban Fire Station	6,535	
AP1658	Srikakulam	Amudalavalasa Fire Station	Operational Urban Fire Station	6,100	
AP1664	Srikakulam	Srikakulam Fire Station	Operational Urban Fire Station	5,745	
AP1673	Srikakulam	Tekkali Fire Station	Operational Urban Fire Station	6,070	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1685	Srikakulam	Itchapuram Fire Station	Operational Urban Fire Station	6,640	
AP1690	Srikakulam	Sompeta Fire Station	Operational Urban Fire Station	5,235	
AP1694	Srikakulam	Palasa Fire Station	Operational Urban Fire Station	8,070	
AP_New_Urban_132	Visakhapatnam	TSR Layout	New Urban Fire Station	19,687	43
AP_New_Urban_125	Visakhapatnam	Gajuwaka Main Road	New Urban Fire Station	19,656	44
AP_New_Urban_130	Visakhapatnam	Old PostOffice	New Urban Fire Station	18,900	45
AP_New_Urban_127	Visakhapatnam	Kancharapalem	New Urban Fire Station	17,412	46
AP_New_Urban_45	Visakhapatnam	Madhilapalem	New Urban Fire Station	13,028	47
AP_New_Urban_129	Visakhapatnam	MVP Colony	New Urban Fire Station	11,570	50
AP_New_Urban_126	Visakhapatnam	Gajuwaka Junction	New Urban Fire Station	11,528	51
AP_New_Urban_4	Visakhapatnam	NAD Junction	New Urban Fire Station	10,343	54
AP_New_Urban_7	Visakhapatnam	Kurmannapalem	New Urban Fire Station	8,581	60
AP_New_Urban_9	Visakhapatnam	Malkapuram	New Urban Fire Station	6,350	66
AP_New_Urban_6	Visakhapatnam	Vepagunta	New Urban Fire Station	5,113	71
AP_New_Urban_46	Visakhapatnam	Madhurawada	New Urban Fire Station	3,900	75
AP_New_Urban_128	Visakhapatnam	Arilova	New Urban Fire Station	3,746	77
AP_New_Urban_5	Visakhapatnam	Pendurthi	New Urban Fire Station	3,676	78
AP_New_Urban_8	Visakhapatnam	Shilanagar	New Urban Fire Station	3,543	79
AP_New_Urban_114	Visakhapatnam	Payakaraopet	New Urban Fire Station	1,786	96
AP1578	Visakhapatnam	Narsipatnam Fire Station	Operational Urban Fire Station	8,274	
AP1583	Visakhapatnam	Anakapalli Fire Station	Operational Urban Fire Station	5,395	
AP1597	Visakhapatnam	Pedagantyada Fire Station	Operational Urban Fire Station	8,687	
AP1600	Visakhapatnam	Visakhapatnam Fire Station	Operational Urban Fire Station	11,367	
AP1605	Visakhapatnam	Marripalem Fire Station	Operational Urban Fire Station	8,890	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1608	Visakhapatnam	Chittivalasa Fire Station	Operational Urban Fire Station	1,917	
AP_New_Urban_2	Vizianagaram	Pradeep Colony	New Urban Fire Station	5,337	110
AP1619	Vizianagaram	Vijayanagaram Fire Station	Operational Urban Fire Station	8,821	
AP1625	Vizianagaram	Saluru Fire Station	Operational Urban Fire Station	4,509	
AP1627	Vizianagaram	Bobbili Fire Station	Operational Urban Fire Station	7,949	
AP1629	Vizianagaram	Parvathipuram Fire Station	Operational Urban Fire Station	9,923	
AP_New_Urban_82	Warangal	Adarsh Colony	New Urban Fire Station	26,871	30
AP_New_Urban_83	Warangal	Keerthi Nagar	New Urban Fire Station	7,841	39
AP_New_Urban_80	Warangal	Kazipet	New Urban Fire Station	3,813	41
AP_New_Urban_81	Warangal	Gopalapuram	New Urban Fire Station	3,058	42
AP1466	Warangal	Jangaon Fire Station	Operational Urban Fire Station	4,478	
AP1508	Warangal	Warangal Fire Station	Operational Urban Fire Station	29,429	
AP1509	Warangal	Hanumakonda Fire Station	Operational Urban Fire Station	6,471	
AP1513	Warangal	Parkal Fire Station	Operational Urban Fire Station	893	
AP1515	Warangal	Narsampet Fire Station	Operational Urban Fire Station	2,998	
AP1542	Warangal	Mahabbobabad Fire Station	Operational Urban Fire Station	2,091	
AP_New_Urban_112	West Godavari	Chagallu	New Urban Fire Station	12,950	2
AP_New_Urban_97	West Godavari	Ganapavaram	New Urban Fire Station	11,510	3
AP_New_Urban_100	West Godavari	Koyyalgudem	New Urban Fire Station	9,626	7
AP_New_Urban_98	West Godavari	Srungacruksham	New Urban Fire Station	1,823	26
AP_New_Urban_39	West Godavari	Vatluru	New Urban Fire Station	1,474	27
AP1520	West Godavari	Eluru Fire Station	Operational Urban Fire Station	13,425	
AP1523	West Godavari	Tadepalligudem Fire Station	Operational Urban Fire Station	8,507	
AP1524	West Godavari	Nidadavole Fire Station	Operational Urban Fire Station	19,458	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1525	West Godavari	Tanuku Fire Station	Operational Urban Fire Station	17,520	
AP1527	West Godavari	Bheemavaram Fire Station	Operational Urban Fire Station	5,470	
AP1528	West Godavari	Palakollu Fire Station	Operational Urban Fire Station	16,408	
AP1529	West Godavari	Narasapur Fire Station	Operational Urban Fire Station	18,549	
AP1530	West Godavari	Kovvur Fire Station	Operational Urban Fire Station	10,052	
AP_New_Urban_40	Y.S.R	Aravind Nagar	New Urban Fire Station	6,419	65
AP_New_Urban_1	Y.S.R	Yerraguntla	New Urban Fire Station	2,281	88
AP1723	Y.S.R	Proddatur Fire Station	Operational Urban Fire Station	8,325	
AP1724	Y.S.R	Badvel Fire Station	Operational Urban Fire Station	14,038	
AP1725	Y.S.R	Jammalamadugu Fire Station	Operational Urban Fire Station	4,741	
AP1728	Y.S.R	Railway Koduru Fire Station	Operational Urban Fire Station	3,013	
AP1731	Y.S.R	Pulivendula Fire Station	Operational Urban Fire Station	2,557	
AP1738	Y.S.R	Rajampet Fire Station	Operational Urban Fire Station	13,540	
AP1740	Y.S.R	Rayachoty Fire Station	Operational Urban Fire Station	6,002	
AP1745	Y.S.R	Kadapa Fire Station	Operational Urban Fire Station	18,169	

Table 25-39: Details of operational and new proposed rural Fire Stations with their ideal jurisdiction area, estimated ideal served population under their jurisdiction, and priority ranking for new Fire Stations

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_126	Adilabad	Khanapur	New Rural Fire Station	293	62
AP_New_Rural_125	Adilabad	R.K.Puram	New Rural Fire Station	198	87
AP_New_Rural_13	Adilabad	Hazipur	New Rural Fire Station	184	94
AP_New_Rural_20	Adilabad	Mudhole	New Rural Fire Station	173	100
AP_New_Rural_21	Adilabad	Narsapur	New Rural Fire Station	170	101
AP_New_Rural_6	Adilabad	Rebbena	New Rural Fire Station	136	109
AP_New_Rural_8	Adilabad	Bheemaram	New Rural Fire Station	136	110
AP_New_Rural_1	Adilabad	Bharampur	New Rural Fire Station	131	112
AP_New_Rural_5	Adilabad	Rajura	New Rural Fire Station	130	113
AP_New_Rural_222	Adilabad	Boath	New Rural Fire Station	126	115
AP_New_Rural_2	Adilabad	Indervelly	New Rural Fire Station	117	116
AP_New_Rural_7	Adilabad	Veegaon	New Rural Fire Station	110	120
AP_New_Rural_12	Adilabad	Devapur	New Rural Fire Station	86	133
AP_New_Rural_4	Adilabad	Pembi	New Rural Fire Station	79	135
AP_New_Rural_3	Adilabad	Kerameri	New Rural Fire Station	66	138
AP1464	Adilabad	Asifabad Fire Station	Operational Rural Fire Station	89	
AP1501	Adilabad	Echoda Fire Station	Operational Rural Fire Station	162	
AP1503	Adilabad	Jannaram Fire Station	Operational Rural Fire Station	140	
AP1504	Adilabad	Utnoor Fire Station	Operational Rural Fire Station	140	
AP_New_Rural_178	Anantapur	Manesamudram	New Rural Fire Station	359	47
AP_New_Rural_109	Anantapur	Jambulabande	New Rural Fire Station	227	78
AP_New_Rural_151	Anantapur	Bathalapalli	New Rural Fire Station	219	82
AP_New_Rural_179	Anantapur	Gorantla	New Rural Fire Station	198	86
AP_New_Rural_64	Anantapur	Shinganamala	New Rural Fire Station	185	93

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_141	Anantapur	Kuderu	New Rural Fire Station	157	103
AP_New_Rural_110	Anantapur	Bocchapalli	New Rural Fire Station	148	104
AP_New_Rural_58	Anantapur	Pamidi	New Rural Fire Station	139	106
AP_New_Rural_140	Anantapur	Pendekal	New Rural Fire Station	136	108
AP_New_Rural_66	Anantapur	Kanekal	New Rural Fire Station	134	111
AP_New_Rural_138	Anantapur	Nallamada	New Rural Fire Station	113	118
AP_New_Rural_65	Anantapur	Thagarakunta	New Rural Fire Station	106	123
AP_New_Rural_67	Anantapur	Mudigubba	New Rural Fire Station	93	127
AP_New_Rural_75	Anantapur	Danayanicheruvu	New Rural Fire Station	92	129
AP1721	Anantapur	Penukonda Fir Station	Operational Rural Fire Station	211	
AP_New_Rural_203	Chittoor	Gangadhara Nellore	New Rural Fire Station	416	41
AP_New_Rural_225	Chittoor	Putalapattu	New Rural Fire Station	357	48
AP_New_Rural_200	Chittoor	Nindra	New Rural Fire Station	316	57
AP_New_Rural_167	Chittoor	Chandragiri	New Rural Fire Station	240	75
AP_New_Rural_168	Chittoor	KG Sathram	New Rural Fire Station	226	79
AP_New_Rural_137	Chittoor	Baireddypalle	New Rural Fire Station	217	83
AP_New_Rural_169	Chittoor	Edigapalle	New Rural Fire Station	205	85
AP_New_Rural_136	Chittoor	Thatiguntapalem	New Rural Fire Station	194	88
AP_New_Rural_166	Chittoor	Erramraju Palle	New Rural Fire Station	191	90
AP_New_Rural_77	Chittoor	KVB Puram	New Rural Fire Station	188	91
AP_New_Rural_74	Chittoor	Thambalapally	New Rural Fire Station	146	105
AP_New_Rural_76	Chittoor	Peddauppara Palle	New Rural Fire Station	127	114
AP_New_Rural_73	Chittoor	Bodevandlapalli	New Rural Fire Station	112	119
AP1744	Chittoor	Pakala Fire Station	Operational Rural Fire Station	167	
AP1748	Chittoor	Valmikipuram Fire Station	Operational Rural Fire Station	216	
AP1756	Chittoor	Satyavedu Fire Station	Operational Rural Fire Station	147	

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP1757	Chittoor	Mulakala chervu Fire Station	Operational Rural Fire Station	196	
AP1760	Chittoor	Kuppam Fire Station	Operational Rural Fire Station	258	
AP1762	Chittoor	Tirumala Fire Station	Operational Rural Fire Station	57	
AP_New_Rural_195	East Godavari	Veeravaram	New Rural Fire Station	567	33
AP_New_Rural_104	East Godavari	Rajanagaram	New Rural Fire Station	485	35
AP_New_Rural_131	East Godavari	Ankampalem	New Rural Fire Station	465	38
AP_New_Rural_182	East Godavari	Gollaprollu	New Rural Fire Station	374	44
AP_New_Rural_165	East Godavari	Gollapalem	New Rural Fire Station	342	53
AP_New_Rural_221	East Godavari	P Gannavaram	New Rural Fire Station	337	54
AP_New_Rural_189	East Godavari	Hamsavaram	New Rural Fire Station	317	56
AP_New_Rural_207	East Godavari	Koti	New Rural Fire Station	293	61
AP_New_Rural_158	East Godavari	Addateegala	New Rural Fire Station	89	132
AP_New_Rural_93	East Godavari	Maredumilli	New Rural Fire Station	12	141
AP1534	East Godavari	Mummidivaram Fire Station	Operational Rural Fire Station	188	
AP1535	East Godavari	Kothapeta Fire Station	Operational Rural Fire Station	671	
AP1552	East Godavari	Anaparthi Fire Station	Operational Rural Fire Station	904	
AP1561	East Godavari	Rampachodavaram Fire Station	Operational Rural Fire Station	123	
AP1571	East Godavari	Prathipadu Fire Station	Operational Rural Fire Station	489	
AP_New_Rural_156	Guntur	Chandole	New Rural Fire Station	524	34
AP_New_Rural_157	Guntur	Vemuru	New Rural Fire Station	433	39
AP_New_Rural_133	Guntur	Tadikonda	New Rural Fire Station	423	40
AP_New_Rural_185	Guntur	Appikatla	New Rural Fire Station	407	42
AP_New_Rural_102	Guntur	Peddakurapadu	New Rural Fire Station	405	43
AP_New_Rural_103	Guntur	Patthipadu	New Rural Fire Station	347	51
AP_New_Rural_197	Guntur	Jonnalagadda	New Rural Fire Station	344	52

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_153	Guntur	Mundruvaripalem	New Rural Fire Station	273	64
AP_New_Rural_155	Guntur	Nekarikallu	New Rural Fire Station	267	66
AP_New_Rural_217	Guntur	Nagulavaram	New Rural Fire Station	247	74
AP_New_Rural_187	Guntur	Mollagunta	New Rural Fire Station	193	89
AP_New_Rural_79	Guntur	Acchampet	New Rural Fire Station	182	97
AP_New_Rural_119	Guntur	Rentachintala	New Rural Fire Station	165	102
AP_New_Rural_49	Guntur	Remidicherla	New Rural Fire Station	92	128
AP_New_Rural_177	Guntur	Veldurthi	New Rural Fire Station	69	137
AP_New_Rural_16	Karimnagar	Choppadandi	New Rural Fire Station	366	45
AP_New_Rural_15	Karimnagar	Vemulawada	New Rural Fire Station	353	49
AP_New_Rural_14	Karimnagar	Gollapalle	New Rural Fire Station	348	50
AP_New_Rural_10	Karimnagar	Raikal	New Rural Fire Station	319	55
AP_New_Rural_11	Karimnagar	Dharmapuri	New Rural Fire Station	295	60
AP_New_Rural_19	Karimnagar	Manakondur	New Rural Fire Station	290	63
AP_New_Rural_150	Karimnagar	Kalva Srirampur	New Rural Fire Station	269	65
AP_New_Rural_123	Karimnagar	Poodur	New Rural Fire Station	266	67
AP_New_Rural_17	Karimnagar	Thandriyal	New Rural Fire Station	249	73
AP_New_Rural_92	Karimnagar	Husnabad	New Rural Fire Station	226	80
AP_New_Rural_25	Karimnagar	Gollapalli	New Rural Fire Station	213	84
AP_New_Rural_24	Karimnagar	Anantharam	New Rural Fire Station	183	95
AP_New_Rural_9	Karimnagar	Kataram	New Rural Fire Station	102	124
AP1460	Karimnagar	Peddapalii Fire Station	Operational Rural Fire Station	381	
AP1462	Karimnagar	Manthani Fire Station	Operational Rural Fire Station	178	
AP1551	Karimnagar	Huzurabad Fire Station	Operational Rural Fire Station	364	
AP_New_Rural_224	Khammam	Wyra	New Rural Fire Station	420	144
AP_New_Rural_192	Khammam	Laxmipuram	New Rural Fire Station	318	153

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_41	Khammam	Paler	New Rural Fire Station	285	159
AP_New_Rural_128	Khammam	Tekulapalli	New Rural Fire Station	123	213
AP_New_Rural_127	Khammam	Aswapuram	New Rural Fire Station	111	217
AP_New_Rural_38	Khammam	Abbugudem	New Rural Fire Station	105	219
AP_New_Rural_129	Khammam	Pinapaka	New Rural Fire Station	77	224
AP_New_Rural_39	Khammam	Velairpad	New Rural Fire Station	42	226
AP_New_Rural_36	Khammam	Gundala	New Rural Fire Station	41	227
AP1547	Khammam	Pitapuram Fire Station	Operational Rural Fire Station	237	
AP1603	Khammam	Madhira Fire station	Operational Rural Fire Station	365	
AP1607	Khammam	Ashwaraopet Fire Station	Operational Rural Fire Station	128	
AP_New_Rural_213	Krishna	Vatsavai	New Rural Fire Station	295	157
AP_New_Rural_228	Krishna	Jakkampudi	New Rural Fire Station	233	174
AP1483	Krishna	Muvva Fire Station	Operational Rural Fire Station	444	
AP1485	Krishna	Avanigadda Fire Station	Operational Rural Fire Station	404	
AP1488	Krishna	Pamarru Fire Station	Operational Rural Fire Station	390	
AP1492	Krishna	Kaikaluru Fire Station	Operational Rural Fire Station	268	
AP1493	Krishna	Bantumilli Fire Station	Operational Rural Fire Station	210	
AP1497	Krishna	Nandigama Fire Station	Operational Rural Fire Station	384	
AP1499	Krishna	Kanchikacherla Fire Station	Operational Rural Fire Station	265	
AP1512	Krishna	Hanuman Junction Fire Station	Operational Rural Fire Station	400	
AP1516	Krishna	Mylavaram Fire Station	Operational Rural Fire Station	211	
AP1517	Krishna	Visannapet Fire Station	Operational Rural Fire Station	212	
AP1518	Krishna	Tiruvur Fire Station	Operational Rural Fire Station	280	
AP1788	Krishna	Vuyyuru Fire Station	Operational Rural Fire Station	470	
AP_New_Rural_61	Kurnool	Govindapalle	New Rural Fire Station	305	156

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_171	Kurnool	Mantralayam	New Rural Fire Station	245	172
AP_New_Rural_211	Kurnool	Tammadapalle	New Rural Fire Station	212	183
AP_New_Rural_56	Kurnool	Panyam	New Rural Fire Station	179	194
AP_New_Rural_144	Kurnool	Musalimadugu	New Rural Fire Station	174	195
AP_New_Rural_143	Kurnool	Narnuru	New Rural Fire Station	169	197
AP_New_Rural_60	Kurnool	Perusomula	New Rural Fire Station	168	198
AP_New_Rural_116	Kurnool	Kowthalam	New Rural Fire Station	167	199
AP_New_Rural_62	Kurnool	Chagalamarri	New Rural Fire Station	155	202
AP_New_Rural_111	Kurnool	B.Agraharam	New Rural Fire Station	148	204
AP_New_Rural_117	Kurnool	Gollagutta	New Rural Fire Station	143	207
AP_New_Rural_57	Kurnool	Veldurthi	New Rural Fire Station	127	212
AP_New_Rural_170	Kurnool	Eddupenta	New Rural Fire Station	120	214
AP_New_Rural_55	Kurnool	Velugodu	New Rural Fire Station	113	216
AP_New_Rural_118	Kurnool	Chitrenipalli	New Rural Fire Station	90	221
AP_New_Rural_59	Kurnool	Racherla	New Rural Fire Station	77	223
AP1441	Kurnool	Srisailam Fire Station	Operational Rural Fire Station	55	
AP1543	Kurnool	Alur Fire Station	Operational Rural Fire Station	125	
AP1554	Kurnool	Kodumur Fire Station	Operational Rural Fire Station	205	
AP1582	Kurnool	Pathikonda Fire Station	Operational Rural Fire Station	121	
AP_New_Rural_43	Mahabubnagar	Siddapur	New Rural Fire Station	278	161
AP_New_Rural_84	Mahabubnagar	Kethapally	New Rural Fire Station	249	169
AP_New_Rural_114	Mahabubnagar	Alampur	New Rural Fire Station	248	170
AP_New_Rural_175	Mahabubnagar	Kodangal	New Rural Fire Station	239	173
AP_New_Rural_83	Mahabubnagar	Velkicherla	New Rural Fire Station	232	175
AP_New_Rural_46	Mahabubnagar	Devarakadra	New Rural Fire Station	229	176
AP_New_Rural_47	Mahabubnagar	Shantinagar	New Rural Fire Station	227	179

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_145	Mahabubnagar	Janumpalli	New Rural Fire Station	218	181
AP_New_Rural_45	Mahabubnagar	Gundumal	New Rural Fire Station	203	186
AP_New_Rural_172	Mahabubnagar	Balijapally	New Rural Fire Station	189	191
AP_New_Rural_115	Mahabubnagar	Maldakal	New Rural Fire Station	188	192
AP_New_Rural_100	Mahabubnagar	Nawabpet	New Rural Fire Station	188	193
AP_New_Rural_146	Mahabubnagar	Manthangode	New Rural Fire Station	147	205
AP_New_Rural_95	Mahabubnagar	Amangal	New Rural Fire Station	144	206
AP_New_Rural_173	Mahabubnagar	Donur	New Rural Fire Station	133	209
AP_New_Rural_78	Mahabubnagar	Lingal	New Rural Fire Station	132	210
AP_New_Rural_112	Mahabubnagar	Andugula	New Rural Fire Station	129	211
AP_New_Rural_48	Mahabubnagar	Udimilla	New Rural Fire Station	40	228
AP1574	Mahabubnagar	Atmakur Fire Station	Operational Rural Fire Station	282	
AP1592	Mahabubnagar	Nagarkurnool Fire Station	Operational Rural Fire Station	281	
AP1596	Mahabubnagar	Achampet Fire Station	Operational Rural Fire Station	219	
AP_New_Rural_196	Medak	Kajipally	New Rural Fire Station	481	36
AP_New_Rural_99	Medak	Dubbaka	New Rural Fire Station	303	58
AP_New_Rural_32	Medak	Vattipally	New Rural Fire Station	266	68
AP_New_Rural_148	Medak	Tekmal	New Rural Fire Station	260	69
AP_New_Rural_97	Medak	Narsapur	New Rural Fire Station	250	71
AP_New_Rural_122	Medak	Lingareddy Palli	New Rural Fire Station	249	72
AP_New_Rural_149	Medak	Yeldurthy	New Rural Fire Station	228	77
AP_New_Rural_98	Medak	Raikode	New Rural Fire Station	224	81
AP1471	Medak	Narayankhed Fire Station	Operational Rural Fire Station	250	
AP1474	Medak	Jogipet Fire Station	Operational Rural Fire Station	277	
AP_New_Rural_210	Nalgonda	Bibinagar	New Rural Fire Station	513	143
AP_New_Rural_181	Nalgonda	Singavaram	New Rural Fire Station	340	150

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_162	Nalgonda	Thungathurthy	New Rural Fire Station	277	162
AP_New_Rural_176	Nalgonda	Kandagatla	New Rural Fire Station	272	164
AP_New_Rural_218	Nalgonda	Isukabaigudam	New Rural Fire Station	248	171
AP_New_Rural_81	Nalgonda	Gurajala	New Rural Fire Station	222	180
AP_New_Rural_107	Nalgonda	Aler	New Rural Fire Station	206	185
AP_New_Rural_42	Nalgonda	Valigonda	New Rural Fire Station	190	189
AP_New_Rural_215	Nalgonda	Mella Duppalapally	New Rural Fire Station	173	196
AP_New_Rural_44	Nalgonda	Damera	New Rural Fire Station	133	208
AP_New_Rural_82	Nalgonda	Dindi	New Rural Fire Station	116	215
AP1684	Nalgonda	Huzurnagar Fire Station	Operational Rural Fire Station	278	
AP1699	Nalgonda	Halia Fire Station	Operational Rural Fire Station	188	
AP1705	Nalgonda	Choutuppal Fire Station	Operational Rural Fire Station	200	
AP_New_Rural_23	Nizamabad	Balkonda	New Rural Fire Station	364	148
AP_New_Rural_22	Nizamabad	Nandipet	New Rural Fire Station	311	155
AP_New_Rural_29	Nizamabad	Rudrur	New Rural Fire Station	293	158
AP_New_Rural_28	Nizamabad	Kondapur	New Rural Fire Station	271	165
AP_New_Rural_26	Nizamabad	Thirmanpally	New Rural Fire Station	262	168
AP_New_Rural_31	Nizamabad	Sirikonda	New Rural Fire Station	208	184
AP_New_Rural_30	Nizamabad	Jukkal	New Rural Fire Station	193	188
AP_New_Rural_27	Nizamabad	Gandhari	New Rural Fire Station	153	203
AP1476	Nizamabad	Yella reddy Fire Station	Operational Rural Fire Station	200	
AP1479	Nizamabad	Banswada Fire Station	Operational Rural Fire Station	227	
AP_New_Rural_51	Prakasam	Martur	New Rural Fire Station	389	146
AP_New_Rural_184	Prakasam	Chinthalapalem	New Rural Fire Station	313	154
AP_New_Rural_199	Prakasam	Gudlur	New Rural Fire Station	279	160
AP_New_Rural_226	Prakasam	Santhanuthalapadu	New Rural Fire Station	263	167

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_154	Prakasam	Medarametla	New Rural Fire Station	227	178
AP_New_Rural_208	Prakasam	Ammanabrolu	New Rural Fire Station	216	182
AP_New_Rural_204	Prakasam	Parchur	New Rural Fire Station	201	187
AP_New_Rural_50	Prakasam	Darsi	New Rural Fire Station	167	200
AP_New_Rural_52	Prakasam	Chundi	New Rural Fire Station	160	201
AP_New_Rural_94	Prakasam	Chandrasekharapuram	New Rural Fire Station	105	218
AP_New_Rural_134	Prakasam	Pathapadu	New Rural Fire Station	104	220
AP_New_Rural_54	Prakasam	Komarolu	New Rural Fire Station	78	222
AP_New_Rural_53	Prakasam	Rallapalle	New Rural Fire Station	68	225
AP1637	Prakasam	Cumbum Fire Station	Operational Rural Fire Station	111	
AP1645	Prakasam	Yerragonda palem Fire Station	Operational Rural Fire Station	127	
AP1648	Prakasam	Dornala Fire Station	Operational Rural Fire Station	61	
AP1665	Prakasam	Kondepi Fire Station	Operational Rural Fire Station	217	
AP_New_Rural_209	Rangareddy	Madhura Nagar	New Rural Fire Station	629	1
AP_New_Rural_180	Rangareddy	Kondakal	New Rural Fire Station	596	2
AP_New_Rural_174	Rangareddy	Ravirala	New Rural Fire Station	430	3
AP_New_Rural_164	Rangareddy	Pillaipalli	New Rural Fire Station	386	4
AP_New_Rural_85	Rangareddy	Chevella	New Rural Fire Station	296	9
AP_New_Rural_86	Rangareddy	Uddemarri	New Rural Fire Station	269	10
AP_New_Rural_147	Rangareddy	Mominpet	New Rural Fire Station	259	11
AP_New_Rural_206	Rangareddy	Patlur	New Rural Fire Station	235	13
AP_New_Rural_212	Rangareddy	Mambapur	New Rural Fire Station	231	15
AP_New_Rural_163	Rangareddy	Yacharam	New Rural Fire Station	150	17
AP1644	Rangareddy	Parigi Fire Station	Operational Rural Fire Station	270	
AP_New_Rural_198	Sri Potti Sriramulu Nellore	Sarwepalli	New Rural Fire Station	363	46

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_186	Sri Potti Sriramulu Nellore	Parlapalli	New Rural Fire Station	257	70
AP_New_Rural_220	Sri Potti Sriramulu Nellore	GVR Palem	New Rural Fire Station	229	76
AP_New_Rural_71	Sri Potti Sriramulu Nellore	Bogole	New Rural Fire Station	181	98
AP_New_Rural_70	Sri Potti Sriramulu Nellore	Kaluvoya	New Rural Fire Station	98	126
AP1677	Sri Potti Sriramulu Nellore	Naidupet Fire Station	Operational Rural Fire Station	185	
AP1687	Sri Potti Sriramulu Nellore	Podalakur Fire Station	Operational Rural Fire Station	206	
AP1691	Sri Potti Sriramulu Nellore	Rapur Fire station	Operational Rural Fire Station	108	
AP1697	Sri Potti Sriramulu Nellore	Udayagiri Fire Station	Operational Rural Fire Station	68	
AP1713	Sri Potti Sriramulu Nellore	Vinjamur Fire Station	Operational Rural Fire Station	136	
AP1717	Sri Potti Sriramulu Nellore	Kota Fire Station	Operational Rural Fire Station	183	
AP_New_Rural_188	Srikakulam	Mamidivalasa	New Rural Fire Station	548	142
AP_New_Rural_201	Srikakulam	Garikapadu	New Rural Fire Station	378	147
AP_New_Rural_91	Srikakulam	Miriapalli	New Rural Fire Station	266	166
AP_New_Rural_160	Srikakulam	Pattangi	New Rural Fire Station	229	177
AP_New_Rural_106	Srikakulam	Dimmidijola	New Rural Fire Station	189	190
AP1642	Srikakulam	Rajam Fire Station	Operational Rural Fire Station	608	
AP1651	Srikakulam	Kothuru Fire Station	Operational Rural Fire Station	165	
AP1654	Srikakulam	Narasannapeta Fire Station	Operational Rural Fire Station	665	
AP1671	Srikakulam	Kotabommali Fire Station	Operational Rural Fire Station	348	
AP1678	Srikakulam	Ranastalam Fire Station	Operational Rural Fire Station	339	
AP_New_Rural_191	Visakhapatnam	Parwada	New Rural Fire Station	480	37

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_183	Visakhapatnam	Kailasapatnam	New Rural Fire Station	298	59
AP_New_Rural_87	Visakhapatnam	PK Gudem	New Rural Fire Station	186	92
AP_New_Rural_88	Visakhapatnam	Chintapalli	New Rural Fire Station	82	134
AP_New_Rural_89	Visakhapatnam	Araku	New Rural Fire Station	76	136
AP_New_Rural_40	Visakhapatnam	Koyyuru	New Rural Fire Station	55	140
AP1581	Visakhapatnam	Elamanchili Fire Station	Operational Rural Fire Station	387	
AP1587	Visakhapatnam	Sabbavaram Fire Station	Operational Rural Fire Station	380	
AP1588	Visakhapatnam	Chodavaram Fire Station	Operational Rural Fire Station	377	
AP1590	Visakhapatnam	Madugula Fire Station	Operational Rural Fire Station	161	
AP1594	Visakhapatnam	Paderu Fire Station	Operational Rural Fire Station	95	
AP_New_Rural_159	Vizianagaram	Bhogapuram	New Rural Fire Station	400	145
AP_New_Rural_105	Vizianagaram	Balijipeta	New Rural Fire Station	362	149
AP_New_Rural_227	Vizianagaram	Nellimara	New Rural Fire Station	324	151
AP_New_Rural_194	Vizianagaram	Gottivalasaa	New Rural Fire Station	321	152
AP_New_Rural_90	Vizianagaram	Alamanda	New Rural Fire Station	277	163
AP1612	Vizianagaram	Kothavalasa Fire Station	Operational Rural Fire Station	153	
AP1616	Vizianagaram	Srungavarapukota Fire Station	Operational Rural Fire Station	202	
AP1623	Vizianagaram	Gajapathinagaram Fire Station	Operational Rural Fire Station	305	
AP1633	Vizianagaram	Gumma Lakshmi Puram Fire Station	Operational Rural Fire Station	132	
AP1635	Vizianagaram	Chipurupalli Fire Station	Operational Rural Fire Station	623	
AP_New_Rural_202	Warangal	Manugonda	New Rural Fire Station	315	19
AP_New_Rural_121	Warangal	Gavicharla	New Rural Fire Station	315	20
AP_New_Rural_124	Warangal	Mogullapalle	New Rural Fire Station	269	21
AP_New_Rural_34	Warangal	Thorrur	New Rural Fire Station	259	22
AP_New_Rural_96	Warangal	Chinnagudur	New Rural Fire Station	236	23

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_120	Warangal	Kadavendi	New Rural Fire Station	219	24
AP_New_Rural_161	Warangal	Dornakal	New Rural Fire Station	217	25
AP_New_Rural_101	Warangal	Station Ghanpur	New Rural Fire Station	216	26
AP_New_Rural_37	Warangal	Gudur	New Rural Fire Station	206	27
AP_New_Rural_33	Warangal	Cherial	New Rural Fire Station	195	28
AP_New_Rural_223	Warangal	Palakurthy	New Rural Fire Station	182	29
AP_New_Rural_18	Warangal	Bhoopalapally	New Rural Fire Station	154	30
AP_New_Rural_35	Warangal	Eturnagaram	New Rural Fire Station	73	31
AP_New_Rural_113	Warangal	Kalvalpally	New Rural Fire Station	39	32
AP1540	Warangal	Mulugu Fire Station	Operational Rural Fire Station	173	
AP_New_Rural_214	West Godavari	Yanamadurru	New Rural Fire Station	370	5
AP_New_Rural_132	West Godavari	Achanta	New Rural Fire Station	343	6
AP_New_Rural_216	West Godavari	Tirugudumetta	New Rural Fire Station	325	7
AP_New_Rural_130	West Godavari	Kalavalapalli	New Rural Fire Station	301	8
AP_New_Rural_193	West Godavari	Rajavarama	New Rural Fire Station	252	12
AP_New_Rural_205	West Godavari	Denduluru	New Rural Fire Station	233	14
AP_New_Rural_219	West Godavari	Polavaram	New Rural Fire Station	230	16
AP_New_Rural_80	West Godavari	Kotarapalle	New Rural Fire Station	75	18
AP1519	West Godavari	Chintalapudi Fire Station	Operational Rural Fire Station	250	
AP1521	West Godavari	Bhimadole Fire Station	Operational Rural Fire Station	279	
AP1522	West Godavari	Attili Fire Station	Operational Rural Fire Station	479	
AP1526	West Godavari	Akivedu Fire Station	Operational Rural Fire Station	500	
AP1531	West Godavari	Jangareddygudem Fire Station	Operational Rural Fire Station	604	
AP_New_Rural_139	Y.S.R	Muddanur	New Rural Fire Station	182	96
AP_New_Rural_135	Y.S.R	Pullampet	New Rural Fire Station	175	99

FSRefNo	District	Name	Operational Type	Population Density	Priority ranking for new FS
AP_New_Rural_69	Y.S.R	Vontimitta	New Rural Fire Station	137	107
AP_New_Rural_108	Y.S.R	Settigunta	New Rural Fire Station	115	117
AP_New_Rural_152	Y.S.R	Venkatshetty Palli	New Rural Fire Station	106	121
AP_New_Rural_63	Y.S.R	Simhadripuram	New Rural Fire Station	106	122
AP_New_Rural_68	Y.S.R	Vempalli	New Rural Fire Station	101	125
AP_New_Rural_190	Y.S.R	Ulavapalle	New Rural Fire Station	92	130
AP_New_Rural_142	Y.S.R	Talla Proddatur	New Rural Fire Station	91	131
AP_New_Rural_72	Y.S.R	Kottapeta	New Rural Fire Station	63	139
AP1726	Y.S.R	Porumamilla Fire Station	Operational Rural Fire Station	89	
AP1734	Y.S.R	Mydukur Fire Station	Operational Rural Fire Station	215	
AP1742	Y.S.R	Lakkireddipalli Fire Station	Operational Rural Fire Station	68	
AP1750	Y.S.R	Kamalapuram Fire Station	Operational Rural Fire Station	270	

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