

EXPLORING APPLICATIONS OF GEOSPATIAL TECHNOLOGY IN WATERLOGGING CURTAILMENT

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I, **Vidit Jain**, Roll No. 2K21/GEO/04 of M. Tech Geoinformatics, hereby declare that the project dissertation titled “**EXPLORING APPLICATIONS OF GEOSPATIAL TECHNOLOGY IN WATERLOGGING CURTAILMENT**” which is submitted by me to the Department of Civil Engineering, Delhi Technological University, Delhi in partial fulfilment of the requirement for the award of the degree of Master of Technology, is original and not copied from any source without proper citation. This work has not previously formed the basis for the award of any Degree, Diploma, Associateship, Fellowship, or other similar title or recognition.

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CERTIFICATE

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ABSTRACT

Geoinformatics has become an integral part of modern technology of the 21st Century in many fields. With its ability to collect, store and analyze geospatial data, it has proven to be a valuable tool for industries ranging from environmental management to urban planning. The combination of remote sensing, Geographical Information System (GIS), and Global Positioning Satellites (GPS) technologies has helped to create accurate maps, track changes in the environment, and provide valuable information on complex issues. The versatility of geoinformatics has allowed it to be applied in a variety of situations, from identifying potential natural disasters to optimizing transportation networks. The focus of this thesis is set upon the possibilities of the potential of geoinformatics in addressing waterlogging challenges in the National Capital Territory of Delhi, which are particularly relevant considering the rapid growth and development of this region. With unplanned construction and inadequate infrastructure, waterlogging has become a serious problem, causing serious disruption to daily life and posing risks to public safety. Using geoinformatics to understand the geographical aspect, geospatial extent and development of a geospatial-based model for waterlogging vulnerability prediction in and around critical road infrastructure of the Indian Subcontinent.

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LIST OF ABBREVIATIONS

AHP	Analytical Hierarchy Process
ANN	Artificial Neural Networks
DEM	Digital Elevation Model
EM	Electromagnetic Radiation
ESRI	Environmental Systems Research Institute
GIS	Geographic Information System
GNSS	Global Positioning Satellite System
GPS	Global Positioning System
IRNSS	Indian Regional Navigation Satellite System
LiDAR	Light Detection and Ranging
NDMI	Normalized Difference Moisture Index
NDVI	Normalized Difference Vegetation Index
NDWI	Normalized Difference Water Index
QZSS	Quasi-Zenith Satellite System
RBF	Radial Basis Function
RGB	Red, Blue, Green
SAR	Synthetic Aperture Radar
UAV	Unmanned Aerial Vehicle

INTRODUCTION

1.1 GEOSPATIAL TECHNOLOGY AT GLANCE

Geospatial technology is an application-based discipline that utilises computation power and information technology (hardware and software) to perform geographical research and analytics. It can be considered an innovation in cartography and surveying-related methods. Geoinformatics invokes the principles of remote sensing, geographic information systems (GIS), global positioning satellite systems (GNSS), and internet mapping services. These principles are intertwined in tandem to optimise and improve the efficiency of decision-making process based on the geographical conditions of an area of focus. Subsequently, geospatial data that is acquired, processed, and mapped includes metadata related to a geographical location and a reference. This data may include GPS coordinates, satellite imagery, aerial photographs, or inventory maps. Geospatial technology has applications in various fields such as defence, mining, agriculture, meteorology, disaster management, urban planning, transportation, geophysics, health services, etc [1].

The principle of remote sensing involves obtaining geospatial data from a physical source of electromagnetic radiation without being in direct contact with the same source [2]. The process of remote sensing requires components like sources of EM radiation (active or passive) and airborne sensors, amongst others. The most commonly practised is passive remote sensing, which utilises the sun as the most reliable source of EM

radiation. Airborne sensors may include optical RGB, thermal, hyperspectral, multispectral, LiDAR, SAR, etc., mounted on either an aircraft, UAV, or satellite. Sensors used for remote sensing can detect different wavelengths of radiation, including visible light, infrared radiation, and microwave radiation. Each wavelength provides information about different features of the Earth's surface, such as land cover, temperature, and humidity.

Remote sensing provides us with the raw data, which is then required to be digitally processed to convert it into special-based visual information, which can then be obtained both digitally through screening as well as hardcopy. This journey from data pre-processing to the generation of deliverables can be confined to a system known as the Geographic Information System (GIS). A GIS is a computerised system for acquiring, storing, manipulating, analysing, and displaying georeferenced data. GIS technology allows users to explore, visualise, and analyse spatial relationships, patterns, and trends in data. GIS consists of a spatial database that contains information about the location, shape, and characteristics of geographic features such as roads, buildings, rivers, and forests. This data can be obtained from a variety of sources, including satellite imagery, aerial photography, and ground surveys. The software GIS provides tools to organise and manage this data, as well as perform spatial analysis and create maps and other visualisations. GIS enables us to identify hidden patterns and relationships and make informed decisions based on the spatial data we collect and analyse. Through GIS, it is possible to associate social, cultural, political, and economic attributes with a geographical landscape [3].

GNSS provides the geographical coordinates critical for the application of geospatial technology. It consists of a constellation of artificial satellites hovering around the planet Earth in their respective orbits. Along with coordinates, it can also provide real-

time position, navigation, and time information to users located on or near the Earth's surface. Several countries have their own version of GNSS, such as GPS (United States of America), GLONASS (European Union), QNSS (Japan), BeiDou (China), IRNSS (India), etc. It utilises the principles of triangulation and trilateration to obtain the required data [4].

1.2 THE ISSUE OF WATERLOGGING

Waterlogging is the result of the stoppage of natural runoff flow. It can occur due to various factors, including poor drainage, impervious surface conditions, saturated soil, heavy rainfall, etc. It has direct implications for agriculture, health, infrastructure, and overall day-to-day movements. Further denial and ignorance may lead to permanent damage to roads, soil, buildings, crops, etc., which then impacts the overall economy of a nation in a negative manner. Waterlogging not only renders areas inaccessible and unusable for agriculture and life, but it can also permanently damage soils and ecosystems and restore damaged ecosystems. This can be more expensive and time-consuming. In recent years, urbanisation and unplanned development have upset the balance, and water levels have multiplied due to drainage blockages and repeated flooding. To prevent waterlogging, a number of measures can be taken to achieve this, for e.g expanding the range of permeable surfaces in urban areas, the construction of drainage channels and ditches, and the use of crop rotation and other agricultural techniques. By taking action to prevent and manage waterlogging, we can protect our infrastructure, crops and health, while ensuring that our communities can thrive in the face of heavy rainfall and other environmental challenges.

1.3 GEOSPATIAL TECHNOLOGY IN WATERLOGGING

One of the main applications of geospatial technology in waterlogging curtailment is the ability to create detailed maps and three-dimensional models of existing drainage system. By combining data on topography, land use and rainfall patterns with information on the location and capacity of drainage infrastructure, GIS can be used to create comprehensive models of drainage systems for accurate and precise visuals interpretation. These models can help identify the locations most at risk of waterlogging and allow planners to prioritise investments in drainage infrastructure. Satellite imagery and other remote sensing data can be used to monitor the extent and severity of flooding, even during heavy rainfall. Planners can identify the locations most at risk of waterlogging and develop targeted solutions for these areas. In addition to identifying flood-prone areas, geospatial technology can also be used to monitor the effectiveness of drainage infrastructure and other water management strategies. Using sensors and other monitoring devices, real-time data on rainfall, water levels and runoff can be collected and then fed into a GIS model to assess the effectiveness of drainage infrastructure. This information can be used to fine-tune the drainage system and identify areas that need further investment. A specific example of the use of geospatial technology in waterlogging curtailment is to identify areas with highly impervious surface coverings. Impervious surfaces, such as concrete and asphalt, prevent water from seeping into the ground and can exacerbate waterlogging problems during heavy rainfall. By identifying areas with high impervious surface coverage, planners can develop strategies to minimise the impact of these surfaces on the existing drainage systems. For example, green infrastructure solutions such as rain gardens and permeable pavements can be installed in highly impervious areas to increase runoff capacity.

Another example of the use of geospatial technology in reducing waterlogging is the use of GPS sensors to monitor water levels in drainage infrastructure. These sensors can provide real-time data on the performance of the drainage system and alert planners to potential problems before they become major issues. This information can be used to prioritise maintenance and repair work and ensure that the drainage infrastructure is functioning optimally. By providing detailed information on drainage infrastructure, land use patterns and rainfall, GIS and remote sensing can help planners identify areas at risk of flooding and develop targeted solutions for these areas. As cities continue to grow and face new challenges related to climate change and land use, geospatial technology will play an increasingly important role in water management and urban planning [5][6][7].

1.4 LITERATURE REVIEW

Singh et. al., (2018) focuses on floods in urban areas have a significant impact on the road transportation system. It is expected for the issue of waterlogging to worsen in the future due to the projected increase in rainfall intensity in India. Moreover, with India being the most populous country with a growing economy, urbanization is bound to increase, making the transport system more vulnerable to floods. In this regard, they proposed and developed a Road Network Vulnerability Index could be a potential solution. This index could combine hydro-meteorology and land function with flood mapping to assess the exposure of the road network to floods. It could also determine the safe speed in relation to flood depth, thereby ensuring the safety of commuters during flood events [8].

Zhang, Z. et al., (2023) highlights the issue of urban waterlogging risk becoming a growing concern in many metropolitan areas worldwide. To combat this problem, a

framework was developed that combines Multi-Source Data Fusion with Hydrodynamics (MDF-H) to identify the risk of waterlogging in urban areas. Among the various factors considered, the surface runoff coefficient was found to be the most critical. This coefficient varies significantly across different types of land, with metropolitan areas having a higher percentage of asphalt, concrete, and cement surfaces, which have larger runoff coefficients. In contrast, woodlands, grassland, wetland, and bare soil have smaller runoff coefficients and a stronger ability to accumulate rainfall. To showcase the effectiveness of the MDF-H framework, substantial maps were presented depicting the extent and depth of waterlogging in the Futian District of Shenzhen. By integrating these various factors, the MDF-H framework can provide a comprehensive and accurate assessment of the risk of waterlogging in urban areas [9].

Tran D. et. al. (2020), showcased the application of a regression model in ArcGIS using internet open-data sources. This is intended to forecast the likelihood of urban waterlogging in Hanoi, Vietnam. As per the data availability, the timeline been taken between the years of 2012 and 2018. This GIS-based regression model was developed while taking into account six spatial factors, including population density, road density, distances from water bodies, impervious surface percentage, normalised difference vegetation index, and digital elevation model (DEM) [10].

Roy S. et. al. (2021), addressed the recurring issue of waterlogging in the city of Siliguri, West Bengal, India. In this region, waterlogging has a seasonal occurrence during the monsoon seasons. Therefore, waterlogging can be considered as one of the direct implications of short-duration and high-intensity rainfall. To address this problem, GIS tools are being used to generate a model and identify the hazard, vulnerability, and risk zones. An integrated Analytical Hierarchy Process (AHP) has been selected as the most prominent one. AHP is a multi-criteria decision tool that is

being utilized to balance the distribution of weights amongst subsequent features. With its help, it aims to improve the efficiency of resources allocation amongst the respective wards within the scope of work and prioritize interventions in the areas that are most vulnerable to waterlogging [11].

Cui, P. et al., (2022) claims that waterlogging is a complex phenomenon that results from various factors, including natural factors and man-made infrastructure. The risk factors associated with urban drainage systems have been widely discussed, and efforts are being made to mitigate their impacts. A project was initiated to provide a highly representative case study of Tianjin, China, focusing on waterlogging risk factors in the city. Further data-driven developments include categorizing the risks into four subsets: Physical, Natural, Management, and Social Risks. The study aims to drive policy-based changes in the plans of town planning authorities to prevent and manage waterlogging and mitigate its adverse effects. This research work is significant for achieving sustainable development and providing a better quality of life to urban residents [12].

Weng Q. (2010) emphasizes the crucial role of impervious surface data in urban planning, environmental management, and resource management. Remote Sensing is being encouraged as a tool for better understanding the extent of impervious surfaces in urban areas. The tools can be utilized to perform visual-based data analytics. In addition, various digital remote sensing approaches such as pixel, sub-pixel, and object-oriented programming system (OOPS) was employed to extract and estimate impervious surfaces. A handful of insights into the most effective techniques for analysing impervious surfaces was discussed in the conclusion [13].

Zou, L. et. al. (2022), discussed the possibilities of developing a new waterlogging depth model to simplify the effect of complex terrain characteristics and hydrological

situations in different areas with different drainage capacities and rainfall consumption. The model is then would be utilised to establish a Rain-induced Urban Waterlogging Risk Model (RUWRM). This model is then tested to evaluate the waterlogging risk in Shanghai, China. To generalize the complex hydrodynamic action, the hydrodynamic process is simplified, and the drainage capacity is adopted in the grid unit. The waterlogging depth is determined using the equation "waterlogging depth = rain-induced waterlogging depth – depth in drainage capacity," which is based on the classification collection of urban waterlogging depth. The RUWRM is expected to provide valuable information for urban planners and decision-makers to manage and mitigate the risk of waterlogging [14].

Gupta A. et. al. (2017), expresses its contribution towards the ‘Smart City Mission’ by developing a method based on Artificial Neural Networks (ANN) that detects the areas prone to waterlogging along with its severity in the future. The method utilizes elevation, rainfall, and the frequency of occurrence to identify susceptible areas on an annual basis. To measure waterlogging intensity, the frequency score and elevation score are used. This method of ANN is utilised as per its effectiveness in urban areas. If implemented, it can empower cities to prepare well for potential waterlogging and take appropriate measures to mitigate its impact [15].

1.5 RESEARCH GAPS & OBJECTIVES

There is a need for effective waterlogging solutions before the issue becomes more urgent. A key aspect of addressing this problem is harnessing the power of geospatial technology. GIS-based mapping can be used to more efficiently identify and analyze the key factors that contribute to flooding. In countries where mixed traffic scenarios exist on the roads, incorporating geospatial technology into urban planning and management

can prove invaluable. A comprehensive understanding of complex road networks, drainage systems and urban infrastructure would allow the concerned authorities to pinpoint vulnerable areas prone to waterlogging. Geospatial technology integrates real-time data on precipitation patterns, soil conditions, and water flow to enable accurate forecasting and early warning systems to mitigate the effects of waterlogging. Additionally, mapping of key factors associated with flooding can help identify potential areas for infrastructure improvement by visualizing the relationships between land use patterns, topography and drainage systems, decision makers are encouraged to invest in infrastructure improvements to reduce flooding problems, such as building proper storm drains and improving road slopes. Geospatial technology can also be used to assess the ability of existing infrastructure to handle excess water during heavy rainfalls, helping to identify areas in need of immediate response. By creating a common platform that collects data from a variety of sources, geospatial technology can get integrated with departments such as meteorological departments, local governments and emergency services, which will facilitate collaboration and provide better solutions for addressing waterlogging problems, thus following a pathway towards a comprehensive approach. This data integration enables the concerned agencies to make informed decisions, optimize resource allocation, and take timely action in flood emergencies. Additionally, geospatial technology can facilitate the development of urban resilience strategies by considering flooding as a key parameter. Combining mapping data with population density, land use, and vulnerability indicators, effective land use policies, urban planning policies, and disaster preparedness plans can be developed. This comprehensive approach can minimize the impact of waterlogging on urban areas and protect lives, livelihoods and critical infrastructure.

Research Gaps are summarised in brief as follows:

Research Gap 1. There is a need to pinpoint specific key spatial factors associated with incubation of waterlogging conditions.

Research Gap 2. GIS-based mapping has the potential to develop a system which can predict the possibilities of waterlogging at key impact areas.

Research Gap 3. Much work is needed with application in case of a subcontinental region like India, which can draw huge benefits from this opportunity.

In view of the research gaps, this work has been based on the following objectives.

Objective 1. Critical review of spatial factors affecting waterlogging.

Objective 2. Mapping of waterlogging Sites in the National Capital Territory of Delhi with superimposition of important spatial factors data.

Objective 3. Development of a prediction model of waterlogging site in Delhi region alongside the National Highway(s).

1.6 THESIS OVERVIEW

This manuscript provides an introduction of the factors in chapter 2, then goes on to explaining step by step the process of mapmaking in chapter 3, and the development of prediction model with commentary in chapter 4. Finally, in Chapter 5, there are concluding notes on the results of prediction model.



Figure 1: Waterlogging Condition

CRITICAL REVIEW OF SPATIAL FACTORS AFFECTING WATERLOGGING

2.1 DRAINAGE SYSTEM

An urban drainage system refers to a network of infrastructure and components designed to manage and control the flow of stormwater and sewage in urban areas. This includes various elements such as pipes, aqueducts, gutters, drains and storage facilities that collect, transport and treat water within the city. The main purpose of urban drainage systems is to prevent flooding by efficiently removing excess rainwater and sewage from urban areas. This helps manage water quantity and quality, ensuring that it is well managed and does not cause damage to infrastructure or a risk to public health. Components of an urban drainage system typically include a catchment area that supplies water to the drainage system and are usually defined by natural terrain or urban boundaries. Surface drainage systems, such as gutters, curb drains, and surface drains, collect water from roads, sidewalks, and other paved surfaces and channel it to underground systems. A network of pipes that collects stormwater from a surface runoff and directs it to a treatment plant or natural body of water. Some old towns use a mixed sewage system, where both stormwater runoff and sewage from buildings are sent through the same pipes. This system requires a process to separate and manage the merged flows. Detention ponds, reservoirs, or underground tanks are used to temporarily store excess rainwater during heavy rains, helping to regulate runoff and prevent flooding downstream. In areas of low elevation or where gravity flow is not possible, pumping stations are used to raise water to higher levels and pump it efficiently through the system. Manholes, inlet structures and control gates are installed at strategic points within the system to allow access for maintenance and regulation of

water flow. Urban drainage systems are typically designed based on the expected precipitation patterns and local topography. Engineers consider factors such as peak flow, hydraulic capacity, and water quality to ensure that the system can handle the anticipated volume of water, enabling effective management of stormwater and wastewater in urban environments. Indian urban drainage system refers to the existing infrastructure and mechanisms for managing and controlling the flow of stormwater and sewage in urban areas of India. It includes a network of underground pipes, drains, and treatment plants designed to collect, transport, and treat wastewater and stormwater generated by urban activities.

In urban areas, wastewater is treated in central sewage treatment plants. These plants use a variety of processes, including physical, chemical, and biological treatment methods, to remove contaminants and contaminants from wastewater before it is discharged or reused. The treated water can be used for non-potable purposes such as irrigation or discharged into bodies of water. In addition to central systems, there are also decentralized systems, especially in small towns and suburban areas. These decentralized systems include on-site treatment and disposal of wastewater at the individual or municipal level. Technologies such as septic tanks, septic tanks, and constructed wetlands are commonly used for decentralized wastewater treatment. India's urban drainage system faces several challenges. Rapid urbanization, inadequate infrastructure, population growth, and encroachment on drainage systems pose significant challenges to the effective functioning of the system. Inadequate maintenance, inadequate planning, and lack of public awareness of proper waste treatment and disposal are causing clogging and flooding problems in many cities. The government and various agencies are working to improve and expand urban drainage systems in India. This includes upgrading and expanding existing infrastructure,

implementing sustainable wastewater practices, and promoting public awareness campaigns on the importance of proper waste disposal and maintenance of wastewater systems [16].

A well-designed and well-functioning drainage system can greatly reduce or even eliminate waterlogging in an area. Flooding occurs when excessive amounts of water accumulate on the soil surface and can cause a variety of problems, including reduced soil productivity, damage to infrastructure, and increased risk of flooding. Drainage systems, consisting of pipes, ditches, and channels, help drain excess water from an area. Efficiently collects and drains water to prevent flooding and flooding. By providing an outlet for water, the system maintains a balanced water table and prevents soil saturation. Soggy soil becomes oxygen deficient, which can adversely affect plant growth and microbial activity. A drainage system ensures that excess water is drained and that the soil is well aerated. Improved soil aeration promotes root development, nutrient uptake, and microbial activity, resulting in healthier plants and better soil conditions. Flooding can threaten infrastructure such as buildings, roads, and foundations. Excessive accumulation of water weakens structures and leads to structural damage and collapse. A functioning drainage system keeps water away from vulnerable areas, protects infrastructure integrity, and prevents costly repairs. In flood-prone areas, an effective drainage system is essential to combat flooding. This system reduces the potential for flooding by removing excess water immediately. It controls the flow of water during heavy rains and rising water levels in rivers and lakes, minimizing impacts on communities and reducing risks to life and property. Flooding limits land use and agricultural productivity. Proper drainage enables efficient land use planning and development, enabling activities such as agriculture, construction, and urbanization.

2.2 IMPERVIOUS SURFACE

An impervious surface is a surface that does not allow water or other liquids to pass through. The term is often used in the context of urban development and refers to surfaces such as sidewalks, concrete, asphalt, roofs, and other materials that prevent water from penetrating into the ground. Impervious surfaces have important implications for environmental and water management. When rainwater falls on impermeable surfaces, it is not absorbed by the soil, increasing surface runoff. On an impermeable surface, rainwater flows over the surface and does not penetrate the ground. This can lead to increased stormwater runoff, overloading drainage systems, causing waterlogging and eroding streams and bodies of water. Water cannot penetrate the impermeable surface, which interferes with the natural recharge process of groundwater. This can have long-term effects on water availability and aquifer health. As water flows over impermeable surfaces, it can pick up various contaminants such as oils, chemicals, and dirt. Also known as stormwater runoff, this polluted runoff can bypass natural filtration processes and enter bodies of water, leading to water pollution and degradation of aquatic ecosystems. Impermeable surfaces tend to absorb and retain heat, causing the so-called "urban heat island effect". This phenomenon can significantly increase localized temperatures in urban areas, impacting human well-being, energy consumption and air quality.

Impermeable surfaces are prominent in urban areas. Rapid urbanization and population growth in cities has led to growing impenetrable areas, which has caused several environmental and infrastructure problems. The rapid growth of cities has resulted in large-scale building works transforming natural landscapes into urban areas. As a result, the number of enclosed areas such as roads, parking lots and buildings has increased

significantly. Expanding enclosed areas pose challenges to stormwater management. As rainwater is no longer able to penetrate the ground, surface runoff increases, increasing the risk of waterlogging. Traditional drainage systems often struggle to cope with the volume of water during heavy rains, causing urban waterlogging. Given the challenges posed by impermeable surfaces, there is an increasing focus on integrating green infrastructure and sustainable solutions into urban planning. This includes installing permeable walkways, rainwater collection systems, green roofs and urban green spaces to reduce the negative impacts of impervious surfaces. Enclosed areas contribute to increased runoff and reduced penetration of stormwater into the ground. Planted areas such as lawns and gardens have high evapotranspiration, releasing water into the atmosphere through evaporation and transpiration from plants [17].

An impermeable surface in the context of geospatial data refers to a surface that does not allow water to penetrate or infiltrate the underlying soil or soil. Geospatial data on impermeable land surfaces are commonly collected and analyzed to understand the extent of urbanization, stormwater management, and land cover change. Remote sensing techniques such as satellite imagery and aerial photography are often used to obtain information about impermeable surfaces at various scales. A geospatial dataset representing impermeable areas can be created using a classification algorithm that distinguishes closed areas from other land cover types. These datasets provide valuable information for urban planning, environmental assessment, hydrological modelling and flood risk analysis. They can be used to identify areas prone to storm runoff, assess the effectiveness of drainage systems, and monitor changes in land use over time. Sealed surface data are often represented as raster or vector datasets. In raster formats, each pixel or cell in a dataset is assigned a value representing a percentage of opacity ranging

from 0% (completely transparent) to 100% (completely opaque). Vector representations may contain polygon features that outline opaque areas [18].

2.3 ELEVATION

Elevation is the height or altitude of a point or object above a reference level (usually the surface of the earth). Usually measured in meters or feet. Elevation is an important geographic parameter used to describe and understand the topography and relief of a region. Altitude can be measured using a variety of technologies which provides precise location information, and specialized equipment such as altimeters and surveying instruments. Additionally, a DEM model can be generated as a digital representation of the earth's surface that provides elevation data for various locations. The elevation is a determining factor in many fields, including geography, cartography, geology, urban planning, and environmental science. It helps us understand terrain distribution, determine water flow patterns, assess flood risk, design infrastructure, and study the effects of elevation on climate and vegetation.

Elevation plays an important role in waterlogging, where excessive water builds up within an area. The terrain and elevation of an area affect water movement and drainage capacity. The slope of the terrain determines how efficiently water is drained. When it rains, water flows downwards due to gravity. Higher elevations often have steeper slopes, allowing water to flow downhill faster and reducing the chance of waterlogging. In contrast, lowlands with little or no slope can slow runoff, accumulate water, and increase the risk of waterlogging. At higher elevations, the water table is usually lower due to increased gravity and the ability of water to flow downwards. This deep-water table allows for better drainage and reduces the potential for waterlogging. At low

altitudes, the groundwater table is close to the ground surface, so water tends to accumulate, which can cause waterlogging [19]

Elevation data in the context of geospatial information is altitude or elevation measurements above a reference point (usually global mean sea level). It is an important part of spatial datasets and is used in various fields such as cartography, surveying, environmental modelling and urban planning. Traditional ground surveys use specialized equipment such as spirit levels and total stations to physically measure height. Surveyors take measurements at various points to create a detailed elevation model. Satellite-based remote sensing platforms such as radar altimeters and light detection and ranging (LiDAR) sensors can collect elevation data over a wide area. For example, LiDAR uses laser pulses to measure the distance between a sensor and the ground, enabling the creation of highly accurate elevation models. Elevation data can be obtained by analysing overlapping images and using techniques such as stereoscopy. Elevation data can also be generated by interpolating existing data sources or elevation values. This method estimates the height between known points based on a mathematical algorithm. The resulting elevation data can be represented in a variety of formats, including digital elevation models (DEMs), point clouds, and triangulated irregular networks (TINs). These representations enable visualization, analysis, and integration with other spatial data sets. Elevation information helps assess flood risk by analysing how water flows over terrain, thus helps in designing transportation networks, urban development, and infrastructure. Elevation data are used to study various environmental factors such as slope, orientation, and landform classification that affect ecosystems and natural resource management. Elevation data can be used to create realistic 3D visualizations and simulations for applications such as virtual reality, gaming, and architectural design [20].

2.4 RAINFALL

Rainfall is an essential component of the Earth's water cycle and plays an important role in sustaining life and supporting various ecosystems. It is usually measured in units of length, such as millimetres (mm) or inches. It is often reported as the depth of water that will accumulate on a flat surface over a specific period of time, such as an hour, a day, a month, or a year. Rainfall measurements are collected using specialized equipment such as rain gauges, weather radar systems, and satellite observations. Rainfall patterns vary widely between regions and can be influenced by factors such as geographic location, prevailing winds, topography, and climate systems. Some regions with high rainfall, are known as wet or rainy regions, while others may have limited rainfall, known as arid or arid regions. The distribution of rainfall during the year can also vary, with some regions having distinct wet and dry seasons, while others have more evenly distributed rainfall throughout the year. Rainfall plays an important role in waterlogging, depending on various factors such as the intensity, duration, and frequency of rainfall, as well as the existing drainage system and the topography of the area. These data sources provide information on the amount, intensity, duration, and frequency of precipitation [21][22].

Geospatial techniques are used to analyze precipitation data in relation to geographical and topographic features. It involves methods such as interpolation, spatial statistics, and spatial modelling to estimate precipitation values at unobserved locations. Geospatial techniques can be used to delineate and analyze watersheds, areas of land that flow into a common body of water. By overlaying precipitation data on the boundaries of a watershed, hydrologists can assess the impact of precipitation on water resources, flows, and the potential for flooding. Integrate precipitation data with geographic information to create, manage, analyze, and visualize spatial precipitation

data. GIS software enables the creation of maps, overlays, and spatial queries to explore precipitation patterns. Satellite imagery is used to track rainfall over large areas. Advanced remote sensing techniques, such as radar precipitation estimation and satellite precipitation algorithms, are used to obtain spatially distributed precipitation data. Geoinformatics is used to develop rainfall prediction models and algorithms. These models consider various factors such as historical precipitation patterns, atmospheric conditions, and climate change to predict future precipitation scenarios. Geoinformatics precipitation is closely related to hydrological studies. Precipitation data is used as input in hydrological models to simulate water discharge, river flow, flood forecasting, and water resource management. Geoinformatics tools and techniques are used in decision support systems for applications involving precipitation. These systems support disaster management, urban planning, agriculture, and water resource management by providing spatially clear information and analysis. Once precipitation data are collected, geospatial analysis techniques can be applied to understand spatial patterns and their distribution. Several popular geospatial analysis methods are used for precipitation data. Interpolation methods, such as inverse distance weighting, kriging, or splining, can be used to estimate precipitation values between measured points. This allows the creation of continuous geospatial precipitation surfaces [9].

2.5 OTHER FACTORS

There are several factors which contributes towards the waterlogging condition. Indicators like altitude, slope, distance to water bodies, annual rainfall, Normalized Difference Water Index (NDWI), Normalized Difference Moisture Index, (NDMI), Normalized Difference Vegetation Index (NDVI), Flow accumulation, geomorphology, soil, population density, stormwater drainage capacity, land use, road network density,

infrastructure density, other topographic factors, landscape patterns, etc. are useful in understanding the extent of waterlogging and its impact on day-to-day life[8][9].

Further understanding of these factors invokes a simple and practicable waterlogging assessment mainly focusing on rainfall conditions, drainage capacity, slope, and impervious surfaces to simplify the cumbersome data processing as much as possible [10]. This ensures that the key factors associated with waterlogging get highlighted and that quick and effective solutions can be generated as per the scope of the respective waterlogging condition.

**MAPPING OF WATERLOGGING AREAS IN THE NATIONAL CAPITAL
TERRITORY OF DELHI WITH SUPERIMPOSITION OF IMPORTANT
SPATIAL FACTORS DATA**

3.1 PROBLEM STATEMENT

To generate a map of waterlogging sites based on the key factors such as Drainage, Rainfall, Elevation & Impervious Surface.

3.2 STUDY AREA

Delhi is located in the north of India and shares a border with the states of Uttar Pradesh and Haryana. It has an area of 1,483 km² with a maximum length of 51.90 km and a maximum width of 48.48 km. Delhi's average annual rainfall is 670 mm, most of which falls during the July and August monsoons. The flood season as observed by the Delhi government lasts from July to October. Delhi has a total of 272 districts divided into three municipalities: Municipal Corporation of Delhi, New Delhi Municipal Council, and Delhi Cantonment Board. Delhi is located on the banks of the Yamuna River in the Ganges Delta. The average altitude is 216 meters (709 feet) above sea level. Delhi is a vast metropolis that has grown rapidly over the years. It is divided into several administrative districts, with New Delhi serving as the central district and seat of government [23][17][24].

It is located on the right bank of the Yamuna River on the outskirts of the Ganges Delta. To the west and southwest is the great Thar desert of India in the state of Rajasthan, and to the east is the Yamuna River through which present-day Great Delhi has spread. The

ridges of the Aravalli range extend as far as Delhi, to the west of the city, giving parts of Delhi an undulating character. The winding course of the Yamuna River meets the Wazirabad Mountains in the north; while in the south it branches from Mehrauli [16][25].

Delhi is bounded by Indo-Gangetic alluvial plains to the north and east ancient alluvial deposits to the west and the Aravalli Hills to the south. The land of Delhi is generally flat except for a low ridge that tends from northeast to southwest which is considered an extension of the Aravalli Hills of Rajasthan. The ridge can be said to enter Delhi from the southwest. The eastern part of the ridge extends to Okhla in the south and disappears under the alluvial layer of Yamuna to the northeast on the right bank of the river. Delhi's topography is a blend of historic architecture, modern infrastructure and natural features, making it a vibrant and diverse city [24][26].

3.3 DATA USED

As per the study area, waterlogging sites data was acquired from government sources. In this case, the data was sourced from Annual Flood Report by Municipal Corporation of Delhi [2022]. The data consists of site location and the date of occurrence within the time period of 2017-2021. Along with this, another map showcasing waterlogging sites has been referred, which is being published by the Delhi Traffic Police on their website [See Appendices].

3.4 METHODOLOGY

The most important details lie in the steps needed to create a digital map. These steps include defining the purpose and scope of the map, gathering relevant data, cleaning and pre-processing the data, choosing a mapping software, importing and organizing data, customizing and styling the appearance of the map, adding labels and annotations,

defining map interactions, testing and refining the map, and reviewing it for accuracy, completeness, and usability. These steps include making any necessary adjustments to improve the map's quality and user experience, publishing and sharing the map, obtaining the existing map, gathering the features data, importing the map, adding the features data, aligning and styling the features data, fine-tuning the map, and adding labels, legends, scales, and other map elements. This procedure helps improve the readability and usability of your map by adding labels, legends, scales, and other map elements. Overlaying multiple maps involves combining and visualizing multiple map layers to gain insights and extract useful information [27].

Here is a general methodology for overlaying multiple maps:

- a) Define your objectives: Determine the purpose of overlaying the maps and identify the specific information you want to extract or analyze. This could include understanding relationships, identifying patterns, or making comparisons.
- b) Collect map data: Gather the necessary map data for each layer you want to overlay. This can include obtaining digital map files, downloading or scanning paper maps, or accessing online map services.
- c) Georeferencing: Ensure that all the maps you want to overlay are properly georeferenced. Georeferencing involves aligning the maps to a common coordinate system, allowing them to be spatially accurate and correctly aligned with each other. Use georeferencing software or GIS (Geographic Information System) tools to perform this task.
- d) Digitize or convert maps: If your maps are not in a digital format, you may need to digitize them using GIS software. This process involves manually tracing the features of the maps or using image processing techniques to convert them into digital vector or raster formats.

- e) Pre-process and standardize data: Before overlaying the maps, ensure that the data from different sources are in a compatible format and standardized. This may involve converting file formats, harmonizing attribute tables, and normalizing data values for consistent analysis.
- f) Perform the overlay: Using GIS software, overlay the maps by combining the different map layers into a single composite map. This can be done by using Boolean operations (such as intersection, union, or difference) or by assigning weights or transparency to individual layers to make them visible simultaneously.
- g) Symbolize and classify data: Apply appropriate symbology and classification methods to represent the data effectively. This could include using different colours, line styles, or symbols to distinguish between different map layers or classes of information.
- h) Analyze and interpret the overlay: Once the maps are overlaid, analyze the resulting composite map to extract insights or patterns. This could involve visually inspecting the map, conducting spatial analysis, or performing statistical analysis on the combined data.
- i) Document and present the results: Document your methodology, data sources, and any assumptions made during the overlay process. Prepare visualizations, maps, and reports to effectively communicate the results to others.

Methodology of GIS-based mapping may change subject to the respective scope of work [28].

3.5 RESULT

To generate maps with the highest level of accuracy and precision, it is extremely critical to perform data preparation. Based on the data available in Annual Flood Report by Municipal Corporation of Delhi [2022], following tables can be inferred:

S No.	Latitude	Longitude	Waterlogging Site	Frequency (2017-2020)	Elevation (m)
1	28.57353268	77.16205962	Rao Tularam Flyover	26	240
2	28.70238111	77.30362623	Loni Roundabout	21	211
3	28.66309128	77.21155288	Azad Market	20	225
4	28.5571093	77.26942404	Modi Mill Flyover	18	221
5	28.51466479	77.24121818	Vayusenabad	15	239
6	28.49933767	77.2990067	Badarpur Underpass	14	213
7	28.66799739	77.1671587	Zakhira Flyover	13	210
8	28.62621754	77.32232414	Ghazipur Murga Mandi	12	204
9	28.70525226	77.25407754	Khajoori	11	207
10	28.50616135	77.27728609	M.B. Road (Mehrauli-Badarpur Road)	10	239
11	28.58337704	77.23930995	Jangpura Metro Station	9	218
12	28.63629934	77.22239963	Minto Bridge	9	228
13	28.64234207	77.22991846	Ramlila Ground	8	215
14	28.66159061	77.24014681	Hanuman Setu	7	211
15	28.53835618	77.28380425	Jasola Apollo Metro Station	7	201
16	28.63068752	77.276915	Laxmi Nagar Metro Station	7	221
17	28.62399438	77.13464553	Naraina Flyover	7	227
18	28.58891544	77.25694292	Sarai Kale Khan Bus Adda Railways Station	7	206
19	28.61017736	77.19176767	11 Murti	6	227
20	28.72797347	77.16197493	Jahangir Puri Metro Station	6	202

Table 1: Waterlogging Sites: Geolocation

Date	Name	Rainfall (mm)
01.09.2018	11 Murti	0.1
02.09.2018	11 Murti	0.1
10.08.2018	11 Murti	0.1
26.07.2018	11 Murti	0.1
01.07.2017	Azad Market	0.1
01.09.2018	Azad Market	0
02.07.2017	Azad Market	0
02.09.2018	Azad Market	1.8
07.08.2017	Azad Market	1.8
07.09.2017	Azad Market	1.8
13.07.2018	Azad Market	1.8
15.05.2019	Azad Market	1.8
16.07.2018	Azad Market	1.8
18.08.2019	Azad Market	1.8
20.06.2017	Azad Market	1.8
20.07.2017	Azad Market	1.8
21.07.2018	Azad Market	1.8
22.08.2018	Azad Market	1.8
30.06.2017	Azad Market	6.1
01.09.2018	Badarpur Underpass	6.1
03.09.2018	Badarpur Underpass	6.1
05.07.2018	Badarpur Underpass	0
06.09.2018	Badarpur Underpass	8.4
10.08.2018	Badarpur Underpass	8.4
23.08.2018	Badarpur Underpass	8.4
27.07.2018	Badarpur Underpass	8.4
01.09.2018	Ghazipur Murga Mandi	8.4
03.07.2018	Ghazipur Murga Mandi	8.4
03.07.2018	Ghazipur Murga Mandi	8.4
13.07.2018	Ghazipur Murga Mandi	2.3
16.07.2018	Ghazipur Murga Mandi	2.3
20.07.2018	Ghazipur Murga Mandi	2.3
21.07.2018	Ghazipur Murga Mandi	1.1
22.07.2018	Ghazipur Murga Mandi	1.1
23.08.2018	Ghazipur Murga Mandi	1.1
26.07.2018	Ghazipur Murga Mandi	0.3
27.07.2018	Ghazipur Murga Mandi	3
28.06.2018	Ghazipur Murga Mandi	3
21.07.2019	Hanuman Setu	2.9
27.08.2017	Hanuman Setu	7.8
01.07.2017	Jahangir Puri Metro Station	7.8
20.07.2017	Jahangir Puri Metro Station	7.8

21.06.2017	Jahangir Puri Metro Station	7.8
23.07.2017	Jahangir Puri Metro Station	7.8
23.09.2017	Jahangir Puri Metro Station	7.8
30.06.2017	Jahangir Puri Metro Station	7.8
01.09.2017	Jangpura Metro Station	7.9
02.09.2017	Jangpura Metro Station	7.9
11.07.2017	Jangpura Metro Station	0
19.06.2017	Jangpura Metro Station	0
20.06.2017	Jangpura Metro Station	0
20.07.2017	Jangpura Metro Station	0
23.09.2017	Jangpura Metro Station	0
24.07.2017	Jangpura Metro Station	0
01.07.2017	Jasola Apollo Metro Station	0
02.07.2017	Jasola Apollo Metro Station	0
06.09.2018	Jasola Apollo Metro Station	0
07.07.2017	Jasola Apollo Metro Station	0.2
07.08.2017	Jasola Apollo Metro Station	0.2
20.07.2017	Jasola Apollo Metro Station	0.2
29.06.2017	Jasola Apollo Metro Station	0.7
01.09.2018	Khajoori	0.3
03.07.2018	Khajoori	3.8
05.09.2018	Khajoori	3.8
07.08.2017	Khajoori	0
07.09.2018	Khajoori	0
13.08.2018	Khajoori	0
18.08.2018	Khajoori	0
20.07.2018	Khajoori	0
22.07.2018	Khajoori	1.1
23.08.2018	Khajoori	1.1
26.07.2018	Khajoori	1.1
01.09.2018	Laxmi Nagar Metro Station	1.1
02.09.2018	Laxmi Nagar Metro Station	6.4
03.09.2018	Laxmi Nagar Metro Station	6.4
06.09.2018	Laxmi Nagar Metro Station	6.4
13.07.2018	Laxmi Nagar Metro Station	6.4
23.07.2017	Laxmi Nagar Metro Station	6.4
27.07.2018	Laxmi Nagar Metro Station	6.4
01.09.2018	Loni Roundabout	6.4
06.09.2018	Loni Roundabout	6.4
07.08.2017	Loni Roundabout	6.4
13.07.2018	Loni Roundabout	6.4
13.08.2018	Loni Roundabout	0.2
13.08.2020	Loni Roundabout	0.2

15.05.2019	Loni Roundabout	45.6
17.08.2020	Loni Roundabout	1
18.08.2018	Loni Roundabout	1
19.07.2018	Loni Roundabout	7.2
19.07.2020	Loni Roundabout	7.2
19.08.2020	Loni Roundabout	7.2
20.07.2017	Loni Roundabout	7.2
20.07.2018	Loni Roundabout	26.4
21.07.2020	Loni Roundabout	26.4
22.07.2018	Loni Roundabout	0
23.08.2018	Loni Roundabout	0
25.07.2018	Loni Roundabout	21.5
26.07.2018	Loni Roundabout	0
27.07.2018	Loni Roundabout	0
31.07.2017	Loni Roundabout	0
03.09.2018	M.B. Road (Mehrauli-Badarpur Road)	0.7
06.09.2018	M.B. Road (Mehrauli-Badarpur Road)	1.5
07.08.2018	M.B. Road (Mehrauli-Badarpur Road)	1.5
10.08.2018	M.B. Road (Mehrauli-Badarpur Road)	1.5
13.07.2018	M.B. Road (Mehrauli-Badarpur Road)	2.4
19.08.2018	M.B. Road (Mehrauli-Badarpur Road)	2.4
22.07.2018	M.B. Road (Mehrauli-Badarpur Road)	2.4
23.08.2018	M.B. Road (Mehrauli-Badarpur Road)	1.8
24.09.2018	M.B. Road (Mehrauli-Badarpur Road)	6.9
28.08.2018	M.B. Road (Mehrauli-Badarpur Road)	0.9
01.09.2018	Minto Bridge	0.9
02.09.2018	Minto Bridge	0.9
05.07.2018	Minto Bridge	0.9
13.07.2018	Minto Bridge	0.9
16.07.2018	Minto Bridge	0.9
17.08.2020	Minto Bridge	1.5
19.07.2020	Minto Bridge	1.5
26.07.2018	Minto Bridge	1.5
26.07.2020	Minto Bridge	1.5
01.09.2017	Modi Mill Flyover	1.5
01.09.2018	Modi Mill Flyover	1.5
02.09.2018	Modi Mill Flyover	1.5
07.07.2017	Modi Mill Flyover	1.5
07.08.2017	Modi Mill Flyover	1.5
10.08.2018	Modi Mill Flyover	0.2
11.07.2017	Modi Mill Flyover	0.2
19.08.2017	Modi Mill Flyover	0.2
20.06.2017	Modi Mill Flyover	1.7

20.07.2017	Modi Mill Flyover	0.2
22.09.2017	Modi Mill Flyover	0.2
23.08.2017	Modi Mill Flyover	4
23.08.2018	Modi Mill Flyover	39.9
26.07.2018	Modi Mill Flyover	0.2
27.07.2018	Modi Mill Flyover	0.2
28.06.2018	Modi Mill Flyover	0.2
31.07.2017	Modi Mill Flyover	0.2
31.08.2017	Modi Mill Flyover	0.2
01.09.2018	Naraina Flyover	0
05.07.2018	Naraina Flyover	0
13.07.2018	Naraina Flyover	7.8
13.07.2018	Naraina Flyover	7.8
26.07.2018	Naraina Flyover	7.8
27.06.2018	Naraina Flyover	7.8
28.08.2018	Naraina Flyover	0.2
02.09.2018	Ramlila Ground	0.2
06.09.2018	Ramlila Ground	0.2
07.08.2017	Ramlila Ground	5.5
09.08.2017	Ramlila Ground	15.2
13.07.2018	Ramlila Ground	15.2
19.07.2020	Ramlila Ground	15.2
27.07.2018	Ramlila Ground	15.2
28.06.2017	Ramlila Ground	15.2
01.09.2018	Rao Tularam Flyover	15.2
02.09.2018	Rao Tularam Flyover	0
04.09.2018	Rao Tularam Flyover	0
07.08.2017	Rao Tularam Flyover	0
06.09.2018	Rao Tularam Flyover	0
07.08.2018	Rao Tularam Flyover	0
09.08.2017	Rao Tularam Flyover	0
10.08.2018	Rao Tularam Flyover	0
13.07.2018	Rao Tularam Flyover	6.6
19.07.2017	Rao Tularam Flyover	0
19.08.2017	Rao Tularam Flyover	0
20.06.2017	Rao Tularam Flyover	0
20.07.2017	Rao Tularam Flyover	0
22.07.2018	Rao Tularam Flyover	0
22.09.2017	Rao Tularam Flyover	0
23.09.2017	Rao Tularam Flyover	0
25.08.2017	Rao Tularam Flyover	0
26.07.2018	Rao Tularam Flyover	0
26.08.2017	Rao Tularam Flyover	0

27.07.2018	Rao Tularam Flyover	0.1
28.06.2017	Rao Tularam Flyover	0
28.06.2018	Rao Tularam Flyover	4.8
28.08.2018	Rao Tularam Flyover	29.3
29.08.2018	Rao Tularam Flyover	29.3
30.06.2017	Rao Tularam Flyover	29.3
31.08.2017	Rao Tularam Flyover	29.3
07.08.2017	Sarai Kale Khan Bus Adda Railways Station	29.3
11.07.2017	Sarai Kale Khan Bus Adda Railways Station	29.3
19.08.2017	Sarai Kale Khan Bus Adda Railways Station	29.3
20.07.2017	Sarai Kale Khan Bus Adda Railways Station	0
22.09.2017	Sarai Kale Khan Bus Adda Railways Station	0.7
23.09.2017	Sarai Kale Khan Bus Adda Railways Station	0.7
31.07.2017	Sarai Kale Khan Bus Adda Railways Station	0.7
01.07.2017	Vayusenabad	0.7
02.07.2017	Vayusenabad	16.1
07.08.2017	Vayusenabad	16.1
11.07.2017	Vayusenabad	16.1
19.06.2017	Vayusenabad	5.6
20.06.2017	Vayusenabad	5.6
20.07.2017	Vayusenabad	5.6
22.09.2017	Vayusenabad	8.3
23.07.2017	Vayusenabad	0.3
23.09.2017	Vayusenabad	0.3
28.06.2017	Vayusenabad	1.2
28.08.2020	Vayusenabad	0.5
29.06.2017	Vayusenabad	0.5
31.07.2017	Vayusenabad	0.5
31.08.2017	Vayusenabad	0
01.07.2017	Zakhira Flyover	0
16.07.2018	Zakhira Flyover	0
20.06.2017	Zakhira Flyover	0
22.08.2018	Zakhira Flyover	6.8
23.09.2017	Zakhira Flyover	6.8
28.06.2017	Zakhira Flyover	6.8

Table 2: Waterlogging Sites: Rainfall

Based on the data mentioned above, following data can be generated in visual format:

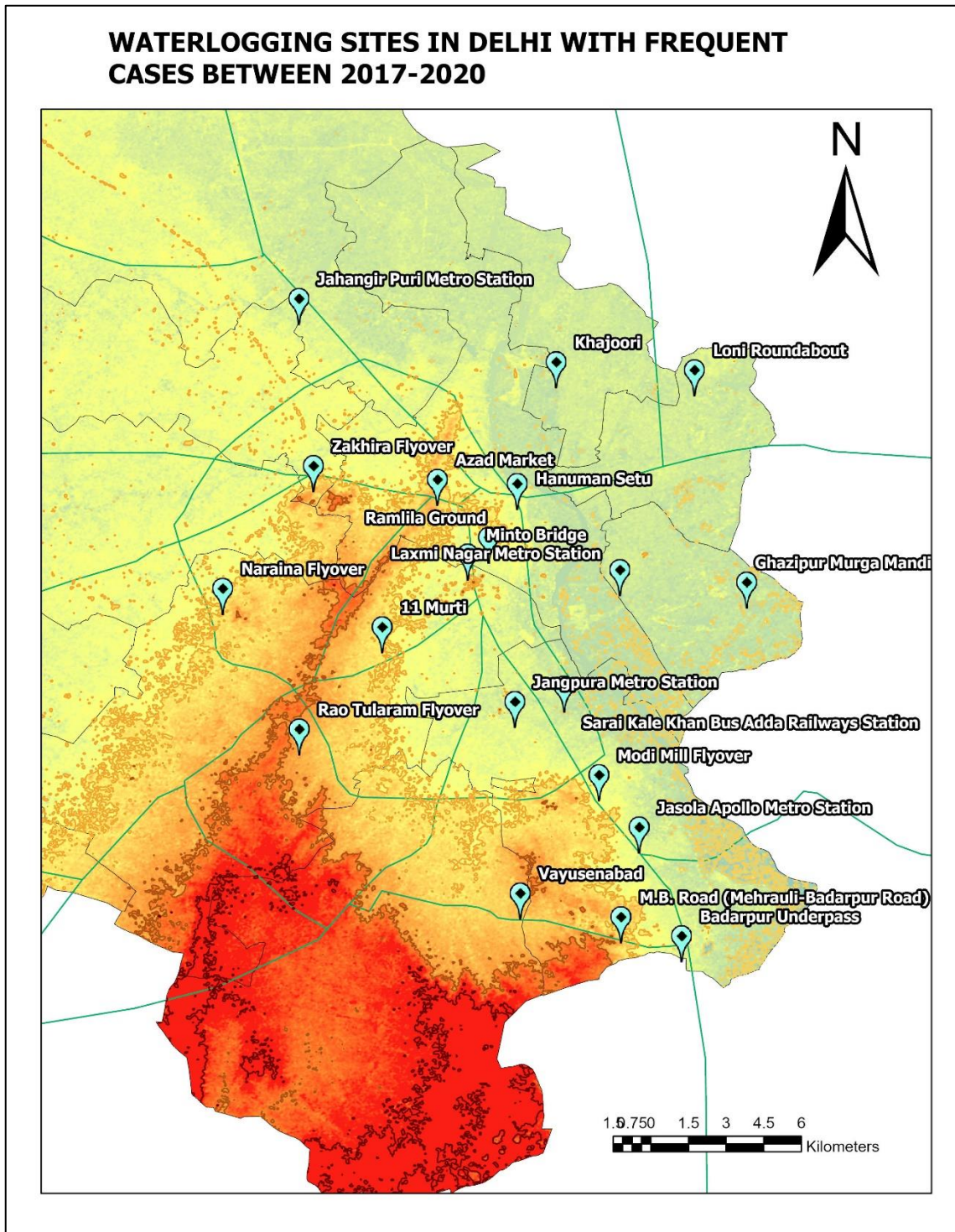


Figure 2: Delhi Waterlogging Sites

The map which is being showcased above represent the major waterlogging areas in Delhi. This was achieved by encircling valley-like conditions around the parts of major roads in Delhi. Based on this visual interpretation, following conclusions can be drawn:

1. Most of the waterlogging sites are flyovers/underpass. This shows that there are higher chances of waterlogging incident at such structures. Engineers must take note of this condition while designing such infrastructures.
2. Many sites have witnessed waterlogging even though the rainfall was negligible at the time of recording. This can be interpreted as result of poor drainage at that particular location.
3. All the sites lie on the infrastructure related to transportation, such as roads, bridges, underpass, etc. Therefore, it can be inferred that the condition of waterlogging has the highest impact on such structures, which are impervious by default.

DEVELOPMENT OF A PREDICTION MODEL OF WATERLOGGING SITE IN DELHI REGION ALONGSIDE THE NATIONAL HIGHWAY(S).

4.1 PROBLEM STATEMENT

To generate a suitable prediction model of waterlogging sites in Delhi region alongside the National Highways

4.2 STUDY AREA

India has an extensive network of national highways that connect various parts of the country. These highways are managed and maintained by the National Highways Authority of India (NHAI). Many of these highways pass through Delhi, such as [7]:

4.2.1 National Highway 1 (NH 1): This highway connects Delhi with the town of Attari near the India-Pakistan border, passing through states like Haryana, Punjab, and Jammu and Kashmir.

4.2.2 National Highway 2 (NH 2): NH 2 connects the cities of Delhi and Kolkata. It passes through states such as Uttar Pradesh, Bihar, and Jharkhand [29].

4.2.3 National Highway 8 (NH 8): NH 8 connects the cities of Delhi and Mumbai. It passes through states like Rajasthan and Gujarat.

4.2.4 National Highway 10 (NH 10): NH 10 connects the cities of Delhi and Fazilka in Punjab. It passes through states like Haryana and Rajasthan.

4.2.5 National Highway 44 (NH 44): NH 44 connects the cities of Delhi and Kanniyakumari in Tamil Nadu. It passes through states like Madhya Pradesh and Andhra Pradesh.

4.3 METHODOLOGY

4.3.1 Analytical Hierarchy Process (AHP): The Analytical Hierarchy Process (AHP) is a structured decision-making technique developed by Thomas Saaty in the 1970s. It is often used to prioritize and make decisions on complex issues involving multiple criteria and alternatives. AHP helps individuals or groups systematically evaluate different options and assign relative weight or priority to criteria based on their importance. It follows a hierarchical structure in which decision-making problems are categorized into primary objectives, secondary objectives, criteria, and alternatives [29].

The main steps of the AHP process are:

- a) Define the decision problem: Articulate the primary objective and identify the criteria by which alternatives will be evaluated.
- b) Create a hierarchical structure: Organize decision problems into a hierarchy. The main goal is at the top, the sub-goals are below it, and the criteria are below each sub-goal. The lowest level consists of alternatives.
- c) Pairwise comparison: Use pairwise comparisons to compare each element at a given level to all other elements at the same level. Pairwise comparisons are made using a scale that expresses the relative importance or priority of one item over another. A scale of 1 to 9 is commonly used, with 1 representing equal importance and higher numbers representing higher priority. Sets the priority weight. Analyze the results of the pairwise comparisons to calculate the priority weight for each item in the hierarchy. This is typically done using matrix and eigenvector calculations.
- d) Consistency check: Evaluate the consistency of the pairwise comparisons to ensure that the judgments are reliable. If you find discrepancies, you can adjust the comparison to improve consistency.

- e) Aggregation and composition: Multiply each choice's priority weight by its corresponding criteria weight to get a composite score for each choice. The alternative with the highest total number of points is considered the cheapest option.
- f) Sensitivity analysis: Perform a sensitivity analysis to test the robustness of your results by making small changes to your input data or priorities and observing the effect on the final ranking [11].

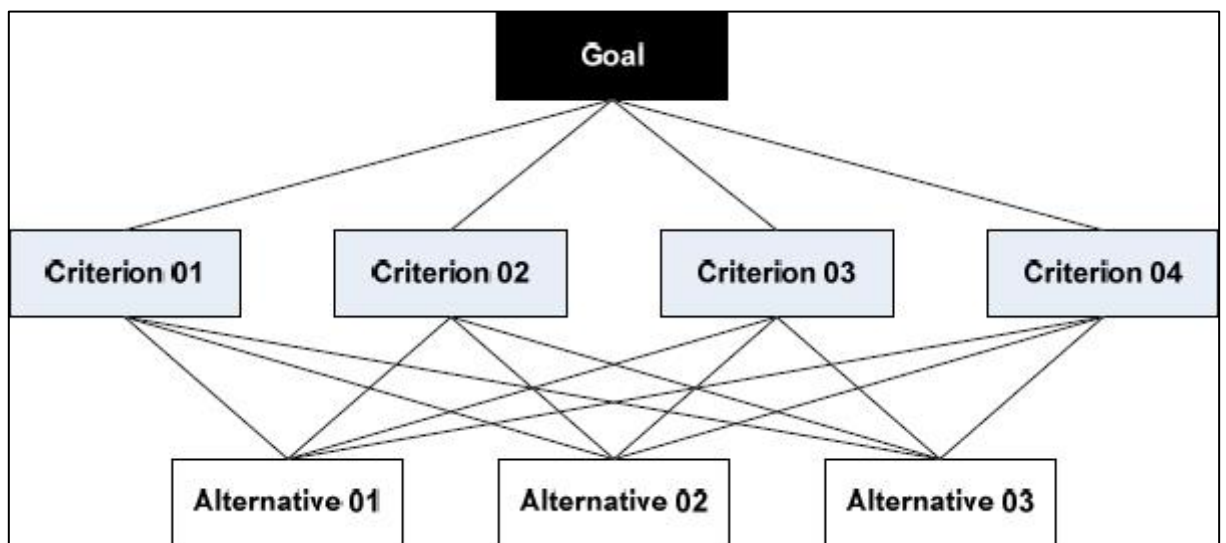


Figure 3: Analytical Hierarchy Process

[Ref: *Using the Analytic Hierarchy Process (AHP) to select and prioritize.* Available at: <https://www.pmi.org/learning/library/analytic-hierarchy-process-prioritize-projects-6608>]

4.3.2 Artificial Neural Network (ANN): Artificial Neural Networks (ANNs) are computational models inspired by the structure and function of biological neural networks such as the human brain. It is a machine learning algorithm designed to recognize patterns and relationships in data and make predictions and decisions based on those patterns. The basic building blocks of ANNs are neurons, also called nodes or perceptron. Neurons are connected to each other by weighted connections to form a network. Each neuron receives input,

performs computations and produces output, which is passed to other neurons. The computations performed by a neuron involve a weighted sum of the inputs followed by the application of an activation function that determines the neuron's output. Connections between neurons are assigned weights that determine the strength or importance of the connection. During the learning process, these weights are adjusted based on a mathematical optimization algorithm such as gradient descent to minimize the error or loss between the network's predicted and desired outputs.

- a. An ANN can contain multiple layers of neurons organized hierarchically. The first layer, called the input layer, receives the raw input data. The middle layers are called hidden layers and the last layer is called the output layer that produces the final output of the network. A deep neural network is an ANN with several hidden layers. ANNs can learn complex nonlinear relationships and are widely used for various tasks such as classification, regression, pattern recognition, and decision making. They have been successfully used in many areas such as image and speech recognition, natural language processing, recommender systems, and self-driving cars. ANNs are powerful tools for machine learning and artificial intelligence and continue to represent an active area of research and development exploring different architectures and techniques to enhance their performance and capabilities.
- b. Following a step-by-step overview of a typical methodology for working with artificial neural networks.

- i. Define your problem: Clearly define the problem you want to solve with ANN. Decide on the type of classification or pattern recognition.
- ii. Data acquisition and pre-processing: Collect a representative dataset relevant to your problem. Clean, normalize, transform and pre-process the data as required. Split the dataset into training, validation and test sets.
- iii. Network architecture design: Design the neural network architecture, including the number of layers, the number of units in each layer, and the connection pattern between layers.
- iv. Activation function: Choose an appropriate activation function for each layer unit. Common options include Sigmoid, Tanh, and ReLU (Rectified Linear Unit) functions. Activation functions introduce nonlinearities and allow neural networks to model complex relationships.
- v. Choice of loss function: Choose an appropriate loss function depending on the nature of the problem. Cross-entropy loss is commonly used for classification tasks, and mean squared error (MSE) is commonly used for regression problems. A loss function quantifies the difference between a predicted value and a target value.
- vi. Education: Use a training algorithm such as backpropagation to optimize network weights and biases based on training data. During training, the network learns to minimize the

chosen loss function by tuning the parameters using gradient descent or other optimization techniques.

- vii. Tuning hyperparameters: Tweak network hyperparameters. B. Learning rate, regularization parameter, and stack size. This process involves experimentation and validation to find the optimal combination of hyperparameters that maximizes performance.
- viii. Inspection: Monitor the performance of the network on the validation set during training. Avoid overfitting and improve generalization using techniques such as stopping early and stopping the learning rate from decaying.
- ix. Evaluation: Evaluate the trained network against the test set and evaluate its performance using unseen data. Depending on the task, calculate relevant metrics such as accuracy, precision, recall, and mean squared error.

- x. Mission: Once we are satisfied with the performance of our network, we can use it to predict new unseen data. This includes consolidating networks into larger software systems or deploying them on dedicated hardware, depending on application needs [15].

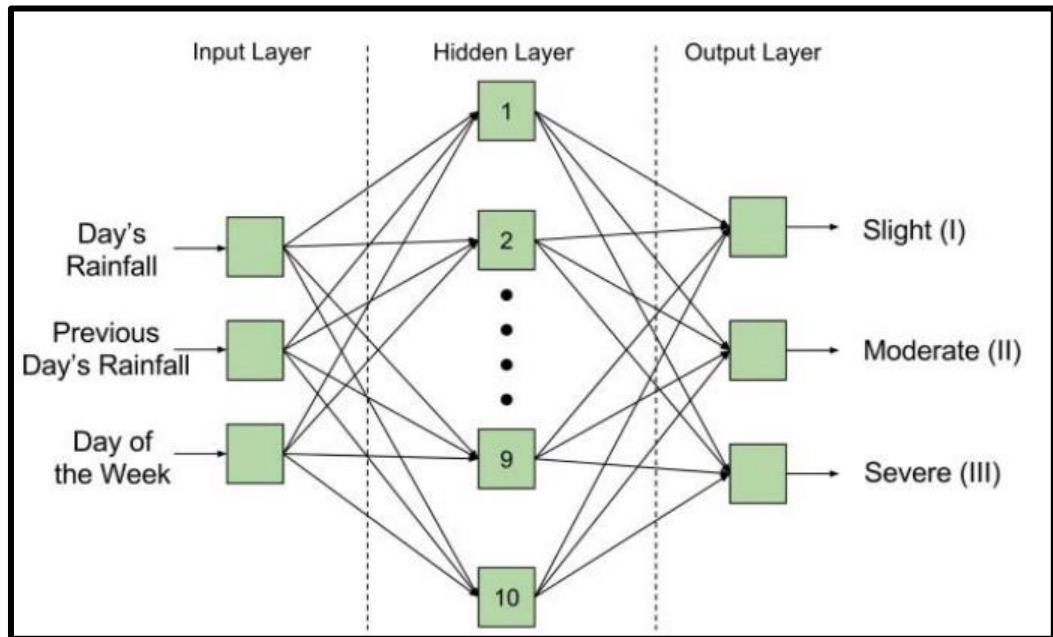


Figure 4: Artificial Neural Network

[Ref.: Gupta A. et. al. (2017)]

4.3.3 Regression Model: Regression is a statistical modelling technique used to study the relationship between a dependent variable and one or more independent variables. It is widely used in various fields such as economics, finance, social sciences, and machine learning [10].

Methods for building regression models typically involve the following steps:

- a) Define your problem: State clearly the research question or problem you want to address in your regression analysis. Identify the dependent variable (also called the response variable or target variable) that you want to predict or explain, and the independent variables (also called predictor

variables or characteristics) that you think might influence the dependent variable.

- b) Data collection: Collect data related to analytics. Make sure you have an adequate sample size and that your data are representative of the population or phenomenon you are studying. Consider potential data quality issues such as missing values, outliers, and measurement errors and fix them accordingly.
- c) Data exploration and preparation: Explore data to gain insights, identify patterns, and understand relationships between variables. Visualize your data with graphs, summary statistics, and correlation analysis. Pre-process the data by handling missing values and outliers and transforming variables if necessary. Split the model evaluation data into a training set and a test set.
- d) Model selection: Choose an appropriate regression model based on the nature of your data and your research question. Common regression models include linear regression, polynomial regression, multiple regression, logistic regression, and time series regression. Consider the prerequisites and limitations of each model and choose the model that best suits your needs.
- e) Model training: Fit the selected regression model to the training data. This involves estimating model parameters by minimizing a suitable objective function (such as ordinary least squares in linear regression) or using iterative optimization algorithms. The goal is to find the best straight line or curve that represents the relationship between the independent and dependent variables.

- f) Model evaluation: Evaluate the performance of the trained regression model using appropriate metrics. Common metrics include mean squared error (MSE), mean squared error (RMSE), mean absolute error (MAE), R-squared (decision measure), and adjusted R-squared. Compare your model's performance to the training and test data to see if there are any overfitting or underfitting issues.
- g) Model improvements: Adjust the regression model as needed. This may involve feature selection or development, regularization techniques (ridge regression, Lasso regression, etc.), or addressing issues identified during model evaluation. Iteratively refine the model until satisfactory performance is achieved.
- h) Interpretation of the model: Interpret regression model coefficients or parameters to gain insight into relationships between independent and dependent variables. Consider statistical significance, confidence intervals, and practical implications of coefficients. Visualize your results with graphs and charts to effectively communicate your results.
- i) Forecast and deployment: Once the regression model is determined to be satisfactory, it can be used to predict new, unknown data. Optionally, deploy the model into a real application and monitor its performance over time. Periodically update the model as new data becomes available or the underlying relationships change.

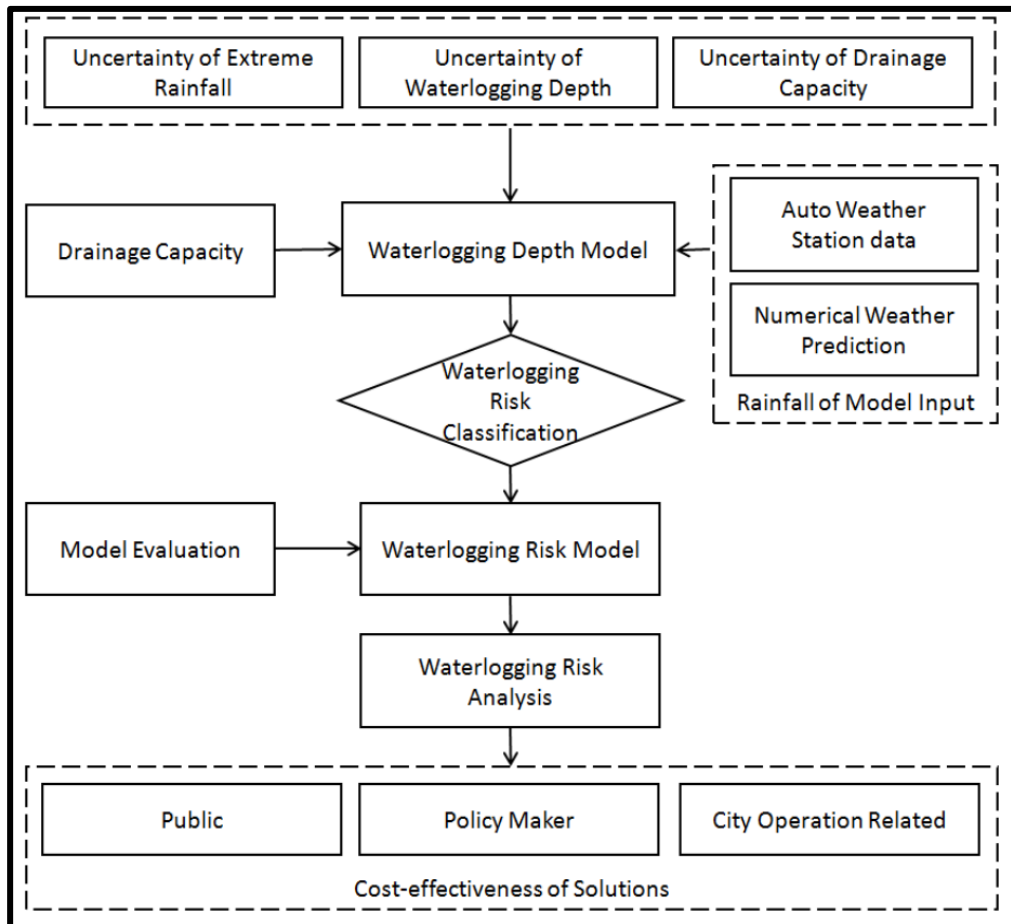


Figure 5: Regression Model

[Ref.: Zou, L. et. al. (2022)]

4.4 RESULTS

All the results from the prediction model discussed above can be summarised as follows:

AHP	ANN	Regression Model
<p>Goal:</p> <p>To predict Waterlogging Sites on National Highways</p>	<p>Input Layer 01:</p> <p>Elevation</p> <p>Input Layer 02:</p> <p>Rainfall</p> <p>Input Layer 03:</p> <p>Road</p> <p>Input Layer 04:</p> <p>Drainage System</p>	<p>Factor 01:</p> <p>Elevation</p> <p>Factor 02:</p> <p>Rainfall</p> <p>Factor 03:</p> <p>Road</p> <p>Factor 04:</p> <p>Drainage System</p>
<p>Criterion 01:</p> <p>Impervious Surface</p> <p>Criterion 02:</p> <p>Valley-like Conditions</p> <p>Criterion 03:</p> <p>Poor Drainage</p>	<p>Hidden Layer:</p> <p>Not Applicable</p>	<p>Dependent Constant 01:</p> <p>Slope</p> <p>Dependent Constant 02:</p> <p>Water Discharge</p> <p>Dependent Constant 03:</p> <p>Impervious Surface Area</p> <p>Input Layer 04:</p> <p>Flood Discharge</p>
<p>Alternative 01:</p> <p>Elevation</p> <p>Alternative 02:</p> <p>Rainfall</p>	<p>Output Layer 01:</p> <p>Digital Elevation Model</p> <p>Output Layer 02:</p> <p>Drainage System</p>	<p>Independent Constant 01:</p> <p>Surface Profile</p> <p>Independent Constant 02:</p> <p>NDVI</p>

Alternative 03: Road	Output Layer 03: Road Network	
Alternative 04: Drainage System		

Table 3: Model Comparison

These three methods have been discussed for implementation of waterlogging prediction model based on the three major factors: Impervious Surface, Valley-like conditions & Drainage System.

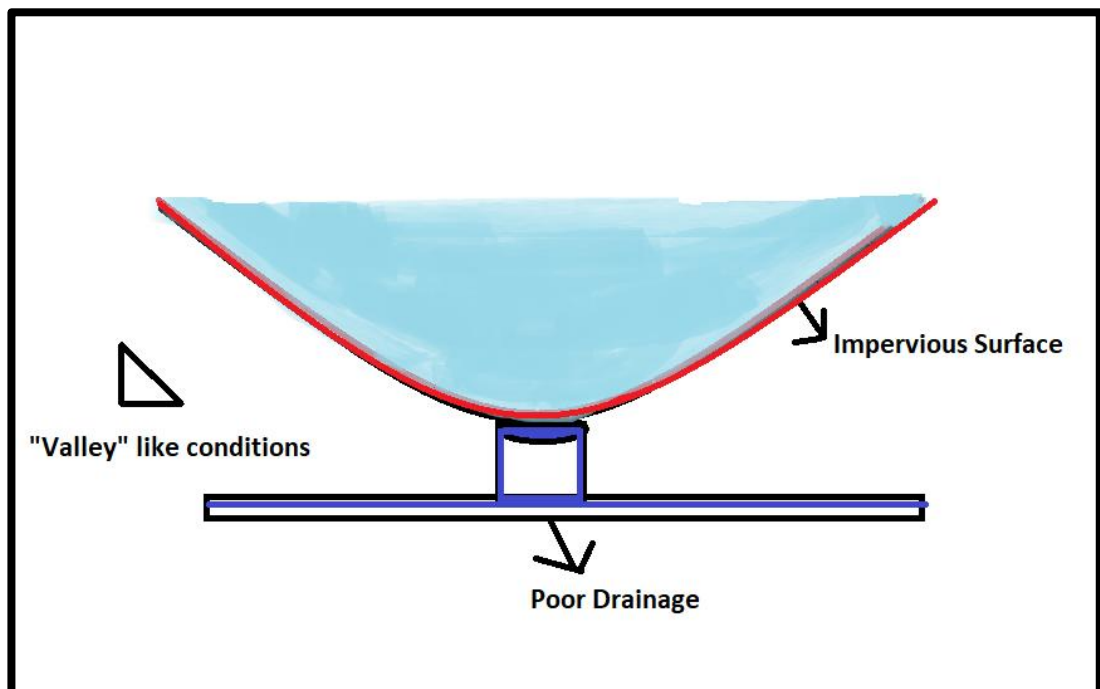


Figure 6: Prediction Model

DISCUSSIONS

5.1 GROUND TRUTHING

In today's data-driven world, accurate and reliable information is essential to making informed decisions. However, raw data alone does not always provide a complete understanding of the real world. Ground-to-routing, the process of collecting and validating data on the ground, plays a key role in bridging the gap between data and reality. By validating and improving existing data, ground-to-routing increases the reliability and applicability of information in various domains. This essay explores the concept of ground truth, its meaning, methods, and applications in various fields. Ground-to-routing is the process of gathering data directly from the physical world to validate or refine existing information. This includes making surveys, observations or measurements on the ground to verify the accuracy of data obtained from remote sensing, satellite imagery or other indirect sources. Ground truth helps you obtain reliable and comprehensive data that match the real-world conditions and characteristics of a particular area or phenomenon.

Ground Truthing verifies and corrects inaccuracies and discrepancies in existing data. By comparing collected field data with remote sensing or model-based information, errors and biases can be identified and corrected, resulting in a more accurate data set. Ground Truthing provides critical data for validating and calibrating models, simulations and algorithms. This helps us evaluate the performance and accuracy of these tools and ensure that they provide reliable results and predictions.

Ground truth produces real-world data that can influence decision-making processes in many areas. From environmental monitoring and urban planning to disaster management and resource allocation, accurate and validated data obtained through ground truth enables more informed decision-making.

Ground-to-routing involves different methods depending on the particular domain or application. Common approaches include field research, visiting specific locations and collecting data through direct observation, measurements, or interviews. This methodology is widely used in environmental, ecology, and social sciences to validate and complement existing datasets. Sampling techniques are used when collecting data from large areas. These methods involve selecting representative sample points or transects and making detailed measurements or observations at those locations. The results are then applied to the entire area using statistical methods. In some cases, Earth observation requires continuous data collection over long periods of time using sensors and instruments. This approach is often used in climate research, air quality monitoring, or geophysical research to collect real-time measurements on the ground. Ground truth is an important process of validating existing data and enriching it with real-world information. It ensures accuracy, increases credibility, and informs decision-making processes in many areas. Ground Truthing combines the power of technology with observations on the ground to bridge the gap between data and reality, allowing us to better understand and address the complex challenges we face today. As we continue to adopt data-driven approaches, ground truth practices remain essential to ensure the accuracy and applicability of information.

5.2 FUTURE SCOPE

This project has its own limitations, from the reliability of data acquisition to data analytics. Further improvements may be required to fill the gaps that may occur. The aim was to understand the possibilities associated with implementing geospatial technology for waterlogging curtailment. Conclusions drawn from the waterlogging map may provide fruitful information for application in establishing the prediction model for major highways passing through the Delhi region.

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APPENDICES

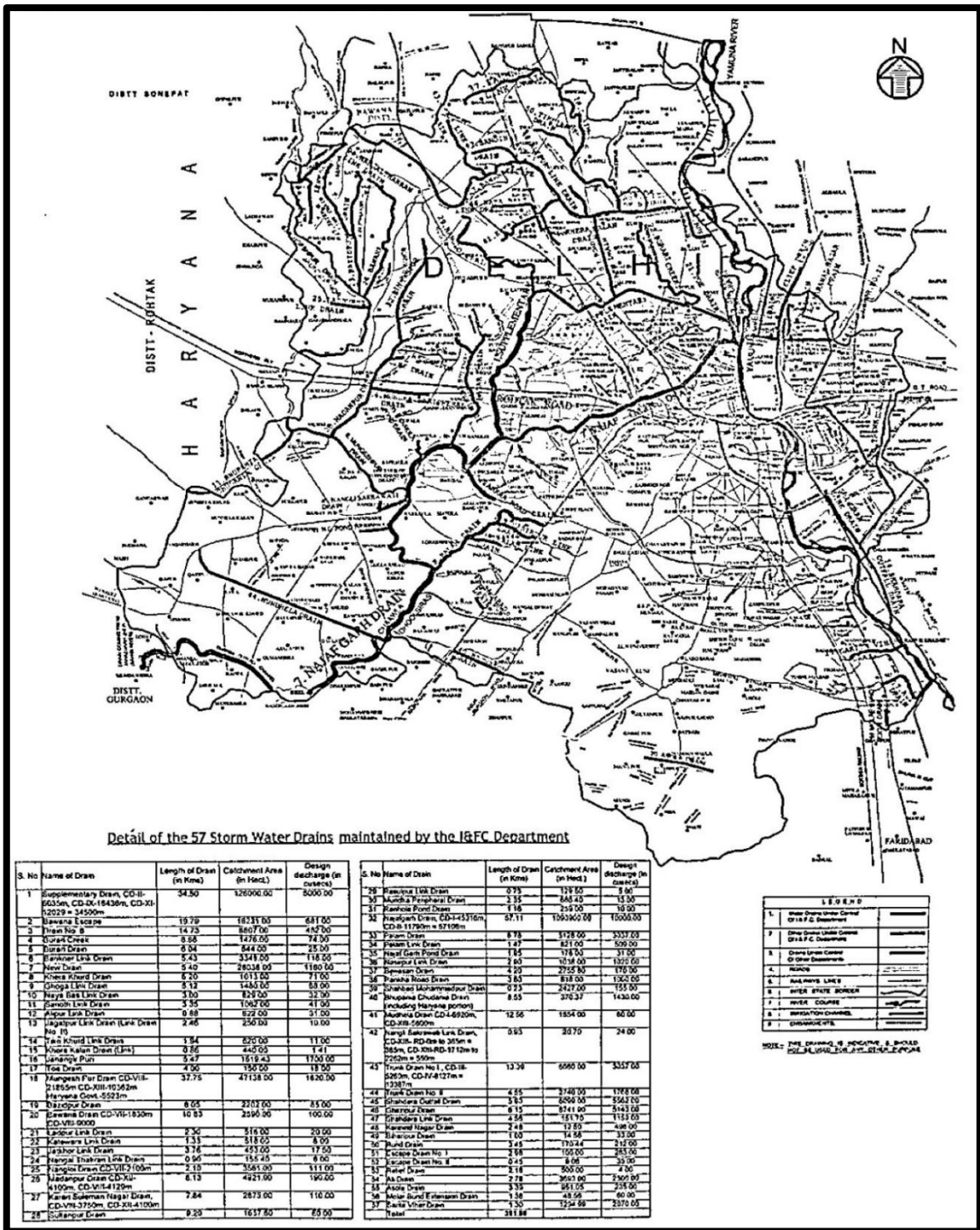


Figure 7: Delhi Drainage Map

[Ref.: Municipal Corporation of Delhi]

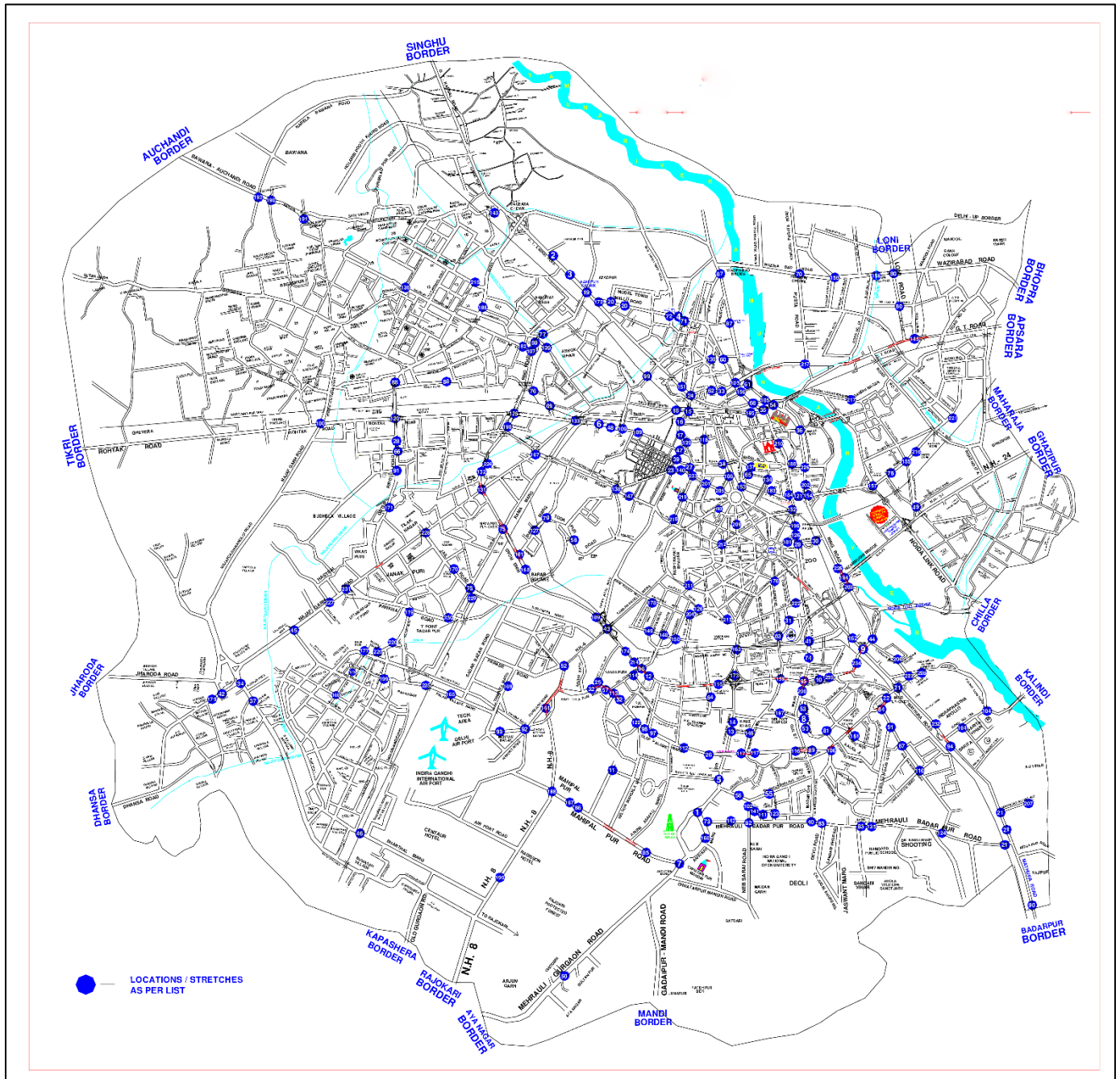


Figure 8: Detailed Waterlogging Map of Delhi

[Ref.: Delhi Traffic Police]

Date	Name
01.07.2017	Azad Market Chowk and Chowki No. 2
01.07.2017	Dabri Power House
01.07.2017	Near Baba Sahib Gurudwara
01.07.2017	PTS Malviya Nagar to Adhchini Carriageway
01.07.2017	Under Jahangir Puri Metro Station
01.07.2017	Zakhira Flyover to Anand Parbat
01.07.2017	G.T.K Depot
01.07.2017	Kapashera chowk
01.07.2017	Near Apollo Metro Station
01.07.2017	Near Harkesh Nagar Bus Stop
01.07.2017	Near Vayusenabad
01.08.2020	Infront of GTK DTC Depot
01.08.2021	Azadpur underpass
01.08.2021	Baprola Village Bus Stand
01.08.2021	Between Dharampura and Iron Bridge / near Iron Bridge
01.08.2021	Munirka Redlight
01.08.2021	Nangloi towards Mundka carriageway
01.08.2021	Near Hanuman Mandir/ Setu
01.08.2021	Near Kashmere Gate Metro Station
01.08.2021	Near Mother Diary underpass
01.08.2021	Near P.S. Timarpur (ooth carriageway) / Waziraoad Road to Mall Road
01.08.2021	Near Seelampur Flyover (Shastri Park to Shahdara carriageway) / on the foot of Seelampur Flyover (ISBT to Apsara Border carriageway)
01.08.2021	Near Water Tank
01.08.2021	Near Welcome Metro Station towards Shyam Lal College ooth carriageway / near Shyam Lal College
01.08.2021	Tikrit Border
01.08.2021	Towards Khyber Pass road
01.08.2021	Yamuna Vihar towards Khajuri Khas ooth carriageway
01.08.2021	Zakhira underpass
01.08.2021	Bhim Gali, Malkaganj
01.08.2021	Bihari Colony Railway underpass
01.08.2021	Infront of Tis Hazari Metro Station
01.08.2021	Infront of WHO Building
01.08.2021	Shahdara Mandi
01.08.2021	Shakti Nagar underpass
01.09.2017	Bhajanpura Chowk & Khajuri Chowk
01.09.2017	Jungpura Underpass
01.09.2017	Libaspur underpass
01.09.2017	Near Mazaar Bhajanpura
01.09.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
01.09.2017	Near Main Gate Humayun Ka Makbra
01.09.2018	Anand Parbat Gali No. 10 / Gali No. 13/Kama! T-Point to Zakhira in both carriageway
01.09.2018	Azad Market Filmistan upto Idgah R/A/Bada Hindu Rao to Sabzi Mandi

	/DCM Chowk Flimistan Idgah / Rani Jhansi flyover / Hati Khana Chowk/ Roshanara T-Point to Burfkhana Chowk/Sadar Bazar
01.09.2018	Behind Red Fort
01.09.2018	Bihari Colony under Railway Bridge
01.09.2018	Calcutia Gate
01.09.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
01.09.2018	Iron Bridge Kotwali
01.09.2018	Kashmere Gate Metro Station near Gate No. 3
01.09.2018	Keshav Chowk Shyam Lal College/ Railway Bridge underpass
01.09.2018	Khajoori Chowk / Khajoor! Flyover
01.09.2018	Laxmi Nagar to Vijay Chowk / Laxmi Nagar Metro Station / Near Laxmi Nagar T-Point / Mother Dairy Red light / Karkari Chowk / Under I.P. Flyover / near IP flyover
01.09.2018	Main Chowk Bhajanpura near Peer Baba Mazaar / Near Bhajanpura bus stand / Bhajanpura Market
01.09.2018	Near 11 Murti
01.09.2018	Near Aall Village Red light/Aali Gaon
01.09.2018	Near Bagga Link
01.09.2018	Near I.P. College
01.09.2018	Near Jain Mandir
01.09.2018	Near Jungpura Metro Station Gate No. 3
01.09.2018	Near Kodia Pul
01.09.2018	Near Lajpat Nagar Market
01.09.2018	Near Liberty Cinema
01.09.2018	Near Monestry Bridge
01.09.2018	Near Monkey Bridge
01.09.2018	Near P.S. Bhajanpura
01.09.2018	Near Rajghat towards Shantivan
01.09.2018	Near Sant Nagar Bus stop
01.09.2018	Near school towards SB Marg
01.09.2018	Near Sector 12, R.K. Puram
01.09.2018	Near Teliwara Qutab Chowk/Qutab Chowk to Pul Mithal
01.09.2018	Near T-Point Purana Quila / towards Shershah Road & Bhairon Road/ Red light Delhi High Court
01.09.2018	Opposite Delhi Police Headquarters
01.09.2018	Pul Prahladpur/towards Badarpur Railway underpass
01.09.2018	Rajender Prasad Road to Windsor Place Janpath
01.09.2018	Teliwara T-Point towards Police Station Timarpur
01.09.2018	Towards Moti Lal Nehru Marg Northside
01.09.2018	T-Point new Moti Nagar Flyover/T- Point Punjabi Bagh Club Road
01.09.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
01.09.2018	Under Ajmeri Gate / Pahar Ganj Flyover
01.09.2018	Under Chatta Rail
01.09.2018	Under Mayapuri Flyover both carriageway

01.09.2018	Under Minto Bridge
01.09.2018	Wazirabad Flyover / Old Yamuna Bridge
01.09.2018	Barapulla Flyover Railway Colony line
01.09.2018	Bhama Shah Chowk
01.09.2018	Civil Lines Police Station
01.09.2018	Infront of Savitri Cinema / Near Savitri Flyover
01.09.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
01.09.2018	Naraina T-Point towards Loha Mandi,near Post Office
01.09.2018	Near Chacha Nehru Hospital
01.09.2018	Near Gazipur Flyover
01.09.2018	Near Iron Bridge
01.09.2018	Near Karni Singh Shooting Range T- Point
01.09.2018	Near Pyarelal Bhawan both carriageway
01.09.2018	Rajouri Garden near ESI Hospital
01.09.2018	SDM office, Pusta Road T-Point
01.09.2018	Under Modi Mill Flyover / U turn near Modi Mill / towards Nehru Place Flyover
01.09.2019	Bhopura Border
01.09.2019	Near Mazar
01.09.2019	Swami Dayanand Hospital
01.09.2019	Tr Sahni Motors
01.09.2021	Adhchini Towards Kishanagarh
01.09.2021	Azad Market underpass
01.09.2021	Bhim Gali, Malkaganj
01.09.2021	Both carriageway Madhar Rao Schindia Marg
01.09.2021	Both side South Arenue Road
01.09.2021	Hanuman Mandir near Palam Flyorer / Towards Palam fyorer from IOC Sadar Bazar
01.09.2021	Infront of Tis Hazari Metro Station
01.09.2021	Lajwanti Chowk
01.09.2021	Mear Roundabout Patel Chowk
01.09.2021	Near Golak Dham Bijwasan
01.09.2021	Near Jain Mandir Qutuo Minar
01.09.2021	Near Lajpat Nagar Flyover
01.09.2021	Near Matka Peer & Bhagwan Dass Road
01.09.2021	Near Mayapuri Chowk
01.09.2021	Near Nangloi Metro Station
01.09.2021	Near Qutuo Minar Metro Station
01.09.2021	Near Rail Bhawan Bus Stand & Boat Cluo
01.09.2021	Near Rajdhani College to ESI Hospital
01.09.2021	Near roundabout Teen Murt
01.09.2021	Near Vishal Chowk
01.09.2021	Near ZOO

01.09.2021	Patel Nagar Road ooth carriageway
01.09.2021	R/A Samrat Hotel Chanakya Puri
01.09.2021	Ramesh Nagar towards Raja Garden ooth carriageway
01.09.2021	Road No. 224 & 210 Near Jal Board Booster pump
01.09.2021	Zakhira underpass
01.09.2021	Near 100 Foota Road
01.09.2021	Near 11 Murt
01.09.2021	Near Burkhana Chowk
01.09.2021	Near RML U-Turn
01.09.2021	Near shadipur Flyover
02.07.2017	Adhchini T-Point
02.07.2017	Azad Market Chowk and Chowki No. 2
02.07.2017	Bhartal Chowk
02.07.2017	Bijwasan Road towards Najafgarh Carriageway
02.07.2017	Kapashera chowk
02.07.2017	Near Apollo Metro Station
02.07.2017	Near Eros Hostel
02.07.2017	Near Lal Kuan
02.07.2017	Near PTS Malviya Nagar
02.07.2017	Near Vayusenabad
02.07.2017	Pushpanjali Red Light
02.07.2017	Railway Underpass Pul Prahladpur
02.07.2017	Rajdhani Park to Mundka Metro Station
02.07.2017	Under Chirag Delhi Flyover
02.07.2017	IIT to Mehrauli Carriageway
02.07.2017	Krish Vihar
02.07.2017	Near Nehru Place Metro Station
02.07.2017	Okhla Ph-1 Bus Stand
02.07.2017	Samalkha T-Point
02.07.2018	Barapulla Flyover Nehru Stadium opposite Gurudwara
02.07.2018	Chacha Nehru College to Police Station Geeta Colony
02.07.2018	Defence Colony Flyover
02.07.2018	Dhansa Stand, Nanglol Stand, Chhawla Stand & Bahadurgarh Stand, Toora Mandi
02.07.2018	Dwarka underpass towards Dwarka
02.07.2018	Entire Drain Road at different locations
02.07.2018	Lodhi Road opposite electric crematorium via Barapulla Flyover
02.07.2018	Najafgarh Drain & DJB sewage plant
02.07.2018	Near foot/landing point of Dabri flyover over, before Janak Puri Check Post, carriageway going towards Sagarpur
02.07.2018	Pant Nagar Bus Stop, Cremation ground near Lodhi Flyover, D-Block petrol pump
02.07.2018	Service lane near DTC Depot, Sector- 2, Dwarka
02.07.2018	ARSD College Dhaula Kuan

02.07.2018	IGNOU Cut & near Malviya Nagar Metro Station
02.07.2018	Just Moolchand Flyover near Metro Station
02.08.2019	Sector 22 and 23, Dwarka
02.08.2019	Under Flyover Mangolpuri B-Block
02.09.2017	Bhajanpura Chowk & Khajuri Chowk
02.09.2017	Jungpura Underpass
02.09.2017	Rajdhani Park to Mundka Metro Station
02.09.2017	TR Sahni Chowk
02.09.2018	Anand Parbat Gali No. 10 / Gali No. 13/Kama! T-Point to Zakhira in both carriageway
02.09.2018	Apsara Border
02.09.2018	Azad Market Flimistan upto Idgah R/A/Bada Hindu Rao to Sabzi Mandi /DCM Chowk Flimistan Idgah / Rani Jhansi flyover / Hati Khana Chowk/ Roshanara T-Point to Burfkhana Chowk/Sadar Bazar
02.09.2018	Bihari Colony under Railway Bridge
02.09.2018	Dhaura Kuan
02.09.2018	Kashmere Gate Metro Station near Gate No. 3
02.09.2018	Kondli to Dallupura T-Point
02.09.2018	Laxmi Nagar to Vijay Chowk / Laxmi Nagar Metro Station / Near Laxmi Nagar T-Point / Mother Dairy Red light / Karkari Chowk / Under I.P. Flyover / near IP flyover
02.09.2018	Near 11 Murti
02.09.2018	Near Geeta Colony, Ramlila Maidan
02.09.2018	Near Gym Khana Post Office
02.09.2018	Near Karni Singh Shooting Range T- Point
02.09.2018	Near Lajpat Nagar Metro Station
02.09.2018	Near Munirka Court
02.09.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light
02.09.2018	Near Raja Garden Foot over Bridge
02.09.2018	Near Shalimar Banquet Hall,Shalimar Bagh to Nathupura Road
02.09.2018	Near T-Point Purana Quila / towards Shershah Road & Bhairon Road/ Red light Delhi High Court
02.09.2018	T-Point Shershah Road / Mathura Road T-Point
02.09.2018	Under Minto Bridge
02.09.2018	Under Modi Mill Flyover at U-Tum
02.09.2018	Under Patel Nagar Metro Station
02.09.2018	Under Railway Bridge Pragati Maidan
02.09.2018	Under Railway Iron Bridge, Azad Market
02.09.2018	Guru Nanak Chowk
02.09.2018	Near Teliwara Qutab Chowk/Qutab Chowk to Pul Mithal
02.09.2018	Netaji Subhash Marg to GPO / Red Fort Red light
02.09.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
02.09.2018	Under Punjabi Bagh Flyover
02.09.2021	A-point

02.09.2021	Exit gate of Old Delhi Railway Station
02.09.2021	Infront of Gate No. 31, R.P. Bhawan
02.09.2021	Near DLF
02.09.2021	Near Hanuman Mandir/ Setu
02.09.2021	Near Nanda Hospital
02.09.2021	Near Qutuo Minar Metro Station
02.09.2021	Opposite Youth Congress Office
02.09.2021	Both carriageway
02.09.2021	Under Kodia Pul
03.07.2018	Between Tuglakabad village and Lal Kuan
03.07.2018	Gazipur Murga Mandi
03.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
03.07.2018	Khajoori Chowk / Khajoori Flyover
03.07.2021	Near Seelampur Flyover (Shastri Park to Shahdara carriageway) / on the foot of Seelampur Flyover (ISBT to Apsara Border carriageway)
03.07.2021	Between Dharampura and Iron Bridge / near Iron Bridge
03.08.2019	Mundka to Nangloi Park both carriageway
03.09.2018	Kalindi Kunj
03.09.2018	Laxmi Nagar to Vijay Chowk / Laxmi Nagar Metro Station / Near Laxmi Nagar T-Point / Mother Dairy Red light / Karkari Chowk / Under I.P. Flyover / near IP flyover
03.09.2018	M.B. Road T-Point to Hamdard Nagar-Infront of Kaya Maya Hospital Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
03.09.2018	Near Chacha Nehru Hospital
03.09.2018	Nirman Vihar Chowk to Ganesh Chowk/Ganesh Nagar Chowk towards Mother Dairy
03.09.2018	Pul Prahladpur/towards Badarpur Railway underpass
03.09.2018	SDM office, Pusta Road T-Point
03.09.2018	Somerville School Vasundhara Enclave
03.09.2018	T-Point new Moti Nagar Flyover/T- Point Punjabi Bagh Club Road
03.09.2018	Mother Dairy towards Nirman Vihar
03.09.2018	Near Ramlila Maidan/Ramlila Ground Gate No. 1 & 2 /MCD Office /Zakir Hussain College
03.09.2018	Near Yusuf Sarai Market towards AIIMS/foot over bridge
03.09.2021	Anand Paroat Redlight
03.09.2021	Near GTK DTC Depot
04.07.2018	GTB Nagar Metro Station infront of, Gate No. 2
04.07.2018	In between Pragati Maidan Gate No. 5&6
04.07.2018	Jahangir Puri to Mukarba Chowk carriageway/Jahangir Puri Metro Station/Mahindara Park/Near Adarsh Nagar, Metro Station / Saral Pipal Thala/Shalimar Bagh underpass
04.07.2018	Roundabout Punjabi Bagh / Under Punjabi Bagh Flyover/Underpass Punjabi Barh
04.07.2018	Wazirabad to Majnu Ka Tila Redlight (both carriageway)
04.08.2019	Opposite Capital Court, Munirka

04.08.2019	Power House Red light, Sector-1, Dwarka
04.09.2018	Apsara Border
04.09.2018	Swami Dayanand Hospital
05.07.2018	Badarpur to Mehrauli Underpass
05.07.2018	Bhagwan Das Road T-Point, Mathura Road Supreme Court
05.07.2018	Bharthal Chowk
05.07.2018	Kautilaya Marg towards 11 Murti
05.07.2018	Kothi No. 13
05.07.2018	Naraina T-Point towards Loha Mandi, near Post Office
05.07.2018	Near Gurudwara towards J.L.N. Stadium
05.07.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light
05.07.2018	Near T-Point Purana Quila / towards Shershah Road & Bhairon Road/ Red light Delhi High Court
05.07.2018	Roundabout Amrita Shergil Marg
05.07.2018	Under Minto Bridge
05.07.2018	Mandir Marg
05.07.2018	Mayur Vihar Phase-1
05.07.2018	Pul Prahladpur/towards Badarpur Railway underpass
05.07.2019	ARSD College Dhaula Kuan
05.09.2018	Aggarwal Chowk
05.09.2018	Khajoori Chowk / Khajoor! Flyover
05.09.2018	Raja Puri Chowk
05.09.2018	Wazirabad Flyover / Old Yamuna Bridge
06.08.2019	Gate No. 1, Tis Hazari Courts
06.08.2019	Keshav Chowk
06.08.2019	Metro Pillar No. 407 to 514
06.08.2019	Near Shiv Murti between Dhaula Kuan to
06.08.2019	Nigam Bodh Ghat
06.08.2019	T-Point Liberty Cinema
06.08.2019	Western Marg to Sainik Farm
06.08.2019	W-Point to Mandi House
06.09.2018	Anand Parbat Gali No. 10 / Gali No. 13/Kama! T-Point to Zakhira in both carriageway
06.09.2018	Apsara Border
06.09.2018	Bihari Colony under Railway Bridge
06.09.2018	Guru Nanak Chowk
06.09.2018	Infront of PS. Pul Prahladpur
06.09.2018	Infront of Savitri Cinema / Near Savitri Flyover
06.09.2018	Just Moolchand Flyover near Metro Station
06.09.2018	Laxmi Nagar to Vijay Chowk / Laxmi Nagar Metro Station / Near Laxmi Nagar T-Point / Mother Dairy Red light / Karkari Chowk / Under I.P. Flyover / near IP flyover
06.09.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
06.09.2018	M.B.Road T-Point to Hamdard Nagar-Infront of Kaya Maya Hospital

	Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
06.09.2018	Mangal Bazar near Hamdard T-Point
06.09.2018	Near Apollo bus stand and Apollo Metro Station
06.09.2018	Near Mahipal Pur Market bath carriageway/Mahipalpur Market
06.09.2018	Near Ramlila Maidan/Ramlila Ground Gate No. 1 & 2 /MCD Office /Zakir Hussain College
06.09.2018	Near SDM Office Art Block Fountain Chowk
06.09.2018	Near Teliwara Qutab Chowk/Qutab Chowk to Pul Mithal
06.09.2018	Near Yusuf Sarai Market towards AIIMS/foot over bridge
06.09.2018	Netaji Subhash Marg to GPO / Red Fort Red light
06.09.2018	Prem Badi Pul underpass
06.09.2018	Pul Prahladpur/towards Badarpur Railway underpass
06.09.2018	Sarita Vihar towards Badarpur both carriageway
06.09.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
06.09.2018	T-Point Shershah Road / Mathura Road T-Point
06.09.2018	Under Barapulla Flyover
06.09.2018	Under Chatta Rail
06.09.2018	Under Railway Bridge Pragati Maidan
06.09.2018	Durgapuri Chowk
06.09.2018	Near MTNL office
06.09.2020	Rani Jhansi Road flyover both carriageway
07.07.2017	Near Apollo Metro Station
07.07.2017	Sarai Kale Khan
07.07.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
07.08.2017	Ashram Chowk to Bhogal
07.08.2017	Azad Market Chowk and Chowki No. 2
07.08.2017	Britannia Chowk
07.08.2017	From NH-24 to Sarai Kale Khan both
07.08.2017	Guru Nanak Chowk Near Zakhir Hussain College Ramilia Ground Near Gate No.1
07.08.2017	Khajuri towards Bhopura Border carriageway
07.08.2017	Loni Gol Chakkar
07.08.2017	Moolchand to AIIMS
07.08.2017	Near Chhata Rail Flyover
07.08.2017	Near Harkesh Nagar Bus Stop
07.08.2017	Near Kela Ghat
07.08.2017	Near Lajpat Nagar Metro Station 2
07.08.2017	Near Vayusenabad
07.08.2017	Nehru Bazar
07.08.2017	Nizamuddin Khatta near I.P. Bus Stand
07.08.2017	Punjabi Bagh, New Moti Nagar crossing

07.08.2017	Sheikh Sarai towards Chirag Delhi road
07.08.2017	T-Point Mandir Marg towards R.K. Ashram Metro Station
07.08.2017	TR Sahni Chowk
07.08.2017	Under Dhaula Kuan Flyover
07.08.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
07.08.2017	Under New Delhi Railway Station Flyover
07.08.2017	Under Railway Bridge towards DDU Marg
07.08.2017	Near Apollo Metro Station
07.08.2017	Raja Garden Chowk
07.08.2017	Under Railway Bridge
07.08.2017	Under RTR Flyover
07.08.2018	IGNOU Cut & near Malviya Nagar Metro Station
07.08.2018	M.B. Road T-Point to Hamdard Nagar -Infront of Kaya Maya Hospital, Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
07.08.2018	Near Ghitorni Metro Station towards Sultanpur
07.08.2018	Near Munirka Enclave
07.08.2018	Near Sant Geroge School Alaknanda
07.08.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
07.08.2018	Infront of Savitri Cinema / Near Savitri Flyover
07.08.2018	Sainik Farm House to IGNOU Cut
07.09.2017	Azad Market Chowk and Chowki No. 2
07.09.2017	Bhajanpura Chowk & Khajuri Chowk
07.09.2017	Bhartal Chowk
07.09.2018	Kapashera Chowk / Near Fun N Food Village
07.09.2018	Khajoori Chowk / Khajoor! Flyover
07.09.2018	Main Chowk Bhajanpura near Peer Baba Mazaar / Near Bhajanpura bus stand / Bhajanpura Market
07.09.2018	Old Gurgaon Road to Rao Matadin Marg crossing
07.09.2018	Pushpanjali Redlight
07.09.2018	Raja Puri Chowk
07.09.2018	Rajokari Chowk
07.09.2018	Under Palam-Dwarka Flyover / At the foot of Dwarka Flyover
07.09.2020	Near Mundka Metro Station
08.08.2017	Rajdhani Park to Mundka Metro Station
08.08.2021	Azad Market underpass
08.08.2021	Gurudwara Bangla Sahio Bus Stand
08.08.2021	Mayapuri Flyover
08.08.2021	Near Qutuo Minar Metro Station
08.08.2021	Near roundabout Bagga Link
08.08.2021	PTS Malriya Nagar Redlight
08.08.2021	Pul Prahladpur underpass

08.08.2021	Anand Paroat Redlight
08.08.2021	Near Rajdhani Partk Metro Station ooth carriageways
08.08.2021	Roundabout Shankar Road
08.09.2018	Near Ramlila Maidan/Ramlila Ground Gate No. 1 & 2 /MCD Office /Zakir Hussain College
09.04.2018	Barwala Chowk
09.04.2018	Bhera Enclave Chowk
09.04.2018	Metro Pillar No. 506 to Mundka Red light
09.04.2018	Near Saket Metro Station
09.04.2018	Pusa to Karol Bagh
09.04.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
09.04.2018	Under Munirka Flyover
09.07.2018	Y-point Kishan Ganj Railway underpass
09.07.2021	Ip Fyorer towards Sarai Kale Khan near Petrol Pump on the carraigeway towards Ashram
09.08.2017	MCD Chowk Civil Line
09.08.2017	Near Kela Ghat
09.08.2017	Near Red light GGR - PDR (Gurgaon Road-Parade Road)
09.08.2017	Under RTR Flyover
09.08.2017	Bhajanpura Chowk & Khajuri Chowk
09.08.2017	Guru Nanak Chowk Near Zakhir Hussain College Ramlia Ground Near Gate No.1
09.08.2018	Bhairon Road under Railway Bridge
09.08.2020	A/2 Janakpuri
09.08.2020	Azadpur Underpass
09.08.2020	GT Road near Gur Mandi Rana Pratap Bagh Road
09.08.2020	Near Govt. High school Mubarakpur
09.08.2020	Near Karala village
09.08.2020	Railway line under Pul Prahladpur
09.09.2018	near Pusa Roundabout towards Moti Nagar
10.08.2018	Andrews Ganj
10.08.2018	Infront of Savitri Cinema / Near Savitri Flyover
10.08.2018	M.B. Road T-Point to Hamdard Nagar -Infront of Kaya Maya Hospital, Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
10.08.2018	Near 11 Murti
10.08.2018	Near T-Point Purana Quila / towards Shershah Road & Bhairon Road/ Red light Delhi High Court
10.08.2018	Pul Prahladpur/towards Badarpur Railway underpass
10.08.2018	Under Modi Mill Flyover / U turn near Modi Mill / towards Nehru Place Flyover
10.08.2018	Near Aall Village Red light/Aali Gaon
10.08.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light

10.08.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
11.07.2017	Bagga Link, Karol Bagh
11.07.2017	Delhi Cut
11.07.2017	In front of Police Station Defence
11.07.2017	Jungpura Underpass
11.07.2017	Karala T-point
11.07.2017	Moolchand Hospital Corner
11.07.2017	Near Power House, D-Block, Janakpuri
11.07.2017	Near PTS Malviya Nagar
11.07.2017	Near Saket Metro Station Gate No 2
11.07.2017	Near Vayusenabad
11.07.2017	Nizamuddin Khatta near I.P. Bus Stand
11.07.2017	Railway Underpass Pul Prahladpur
11.07.2017	Sainik Farm Gate No. 1
11.07.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
11.07.2017	Under Moolchand Flyover
11.07.2017	Asian Market
11.07.2017	DND Redlight
11.07.2017	Khanpur to Hamdard Nagar
11.08.2020	Near Mundka Metro Station
11.08.2020	Near Nangloi Metro Station
11.09.2021	Azad Market underpass
11.09.2021	Azadpur underpass
11.09.2021	Bihari Colony Railway underpass
11.09.2021	Dhaura Kuan Flyover Both carriage
11.09.2021	Dwarka Underpass
11.09.2021	GGR-PDR
11.09.2021	Infront of Tis Hazari Court
11.09.2021	Lampur underpass
11.09.2021	Lioaspur underpass
11.09.2021	Mahipalpur Underpass
11.09.2021	Mayapuri Metro Station
11.09.2021	Moolchand Underpass
11.09.2021	Near Adhchini Village
11.09.2021	Near Bartan Market towards Ashok Vihar
11.09.2021	Near Bhairon Mandir
11.09.2021	Near Burkhana Chowk
11.09.2021	Near DLF
11.09.2021	Near EROS Mall
11.09.2021	Near Hanuman Mandir/ Setu
11.09.2021	Near India Gate
11.09.2021	Near Indian Oil Corporation

11.09.2021	Near Jahangir Puri Metro Station
11.09.2021	Near Kashmere Gate Metro Station
11.09.2021	Near Khajuri towards Brijpuri
11.09.2021	Near Khera Village Redlight
11.09.2021	Near Malriya Nagar Metro station
11.09.2021	Near Moolchand Bus Stand
11.09.2021	Near Mot Nagar Chowk
11.09.2021	Near Mundka Village
11.09.2021	Near Munirka Village towards RTR
11.09.2021	Near Post Ofce Naraina
11.09.2021	Near Qutuo Minar Metro Station
11.09.2021	Near Rajdhani Partk Metro Station ooth carriageways
11.09.2021	Near Redlight Thimayya Marg towards Airport
11.09.2021	Near Redlioght towards Bhairon Mandir
11.09.2021	Near RML Hospital roundabout
11.09.2021	Near Sangam Vihar Redlight ooth carriageaway
11.09.2021	Near Tower
11.09.2021	Near Water Tank
11.09.2021	Near WHO Building
11.09.2021	Pul Prahladpur underpass
11.09.2021	Sarita Vihar Underpass
11.09.2021	Sector-20 Near Marole Market
11.09.2021	Under Britannia Flyover
11.09.2021	Under Tilak Bridge
11.09.2021	Zakhira underpass
11.09.2021	Hanuman Mandir near Palam Flyorer / Towards Palam fyorer from IOC Sadar Bazar
11.09.2021	INA towards AIIMS Underpass
11.09.2021	Near Bawana Village
11.09.2021	Near C-Hexagon
11.09.2021	Near CISF camp
11.09.2021	Near GTK DTC Depot
11.09.2021	Near IIT / Adhchini Redlight
11.09.2021	Sector-1, Dwarka Slip Road
12.07.2017	Defence Colony underpass
12.07.2017	Mehram Nagar Red light IOC Red Light Service Road, Delhi Cantt
12.07.2017	Near Bus Stand Dhansa
12.07.2017	Rajdhani Park to Mundka Metro Station
12.07.2017	Preet Vihar Red light
12.07.2018	Dwarka underpass
12.08.2020	Near Chirag Delhi Flyover
13.07.2018	Adhchini IIT Aurobindo Marg
13.07.2018	Airport Road crossing
13.07.2018	Anand Parbat Gali No. 10 / Gali No. 13/Kama! T-Point to Zakhira in both carriageway

13.07.2018	Apollo Hospital to Kalindi Kunj
13.07.2018	Azad Market Filmistan upto Idgah R/A/Bada Hindu Rao to Sabzi Mandi /DCM Chowk Flimistan Idgah / Rani Jhansi flyover / Hati Khana Chowk/ Roshanara T-Point to Burfkhana Chowk/Sadar Bazar
13.07.2018	Azadpur Bus Terminal
13.07.2018	Baba Khadak Singh Marg
13.07.2018	Bus stand red light near Supreme Court.
13.07.2018	Central School flyover
13.07.2018	Chattarpur Metro Station
13.07.2018	D-14 A/25 Model Town-!!
13.07.2018	Dhaura Kuan
13.07.2018	Dwarka Mode
13.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
13.07.2018	GTK bus depot
13.07.2018	Guru Nanak Chowk
13.07.2018	IGNOU Cut & near Malviya Nagar Metro Station
13.07.2018	IIT Gate to Munirika
13.07.2018	Infront of Tirath Ram Hospital
13.07.2018	Iron Bridge Dharam Pura
13.07.2018	Just Moolchand Flyover near Metro Station
13.07.2018	Kishan Garh under flyover
13.07.2018	Laxmi Nagar to Vijay Chowk / Laxmi Nagar Metro Station / Near Laxmi Nagar T-Point / Mother Dairy Red light / Karkari Chowk / Under I.P. Flyover / near IP flyover
13.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
13.07.2018	Maitreyi College red light
13.07.2018	Naraina T-Point towards Loha Mandi,near Post Office
13.07.2018	Naraina T-Point under flyover
13.07.2018	Near Arya Bhatt Institute Of Technology
13.07.2018	Near Pyarelal Bhawan both carriageway
13.07.2018	Railway underpass Inderlok
13.07.2018	Raja Puri red light
13.07.2018	Raja Ram Kohli Marg
13.07.2018	Rajghat towards ITO
13.07.2018	Ranjit Singh Flyover, under foot over Bridge
13.07.2018	Sector-1, Dwarka near Aggarsen Hospital
13.07.2018	Sultanpur Ghitorni
13.07.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
13.07.2018	Under AIIMS flyover
13.07.2018	Under Chatta Rail
13.07.2018	Under Mahipal Pur flyover
13.07.2018	Under Metro Station Peera Garhi (towards Peera Garhi carriageway)
13.07.2018	Under Minto Bridge

13.07.2018	Under Moti Nagar flyover
13.07.2018	Under Munirka Flyover
13.07.2018	Under Railway Bridge Pragati Maidan
13.07.2018	Wazirpur Industrial Area, railway underpass
13.07.2018	Y-point Kishan Ganj Railway underpass
13.07.2018	Jahangir Puri to Mukarba Chowk carriageway/Jahangir Puri Metro Station/Mahindara Park/Near Adarsh Nagar, Metro Station / Saral Pipal Thala/Shalimar Bagh underpass
13.07.2018	Lawrence Road, Industrial area
13.07.2018	M.B. Road T-Point to Hamdard Nagar -Infront of Kaya Maya Hospital, Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
13.07.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light
13.07.2018	Near Shadipur Metro Station
13.07.2018	Near T-Point Purana Quila / towards Shershah Road & Bhairon Road/ Red light Delhi High Court
13.07.2018	PTS Malviya Nagar
13.07.2018	Shubhash Nagar Chowk
13.07.2021	Andheria Mor to M.G. Road
13.07.2021	Descending Point of the Loop of Daori Flyover commng from Utam Nagar side Near Janak Cinema
13.07.2021	Drain Road at rarious locatons between Power House and Daori roundabout
13.07.2021	Dwarka Underpass
13.07.2021	GGR-PDR
13.07.2021	IIT towards Mother Internatonal School
13.07.2021	Lado Sarai towards city Hospital
13.07.2021	Near IIT / Adhchini Redlight
13.07.2021	Near Lodhi Flyorer ooth sido
13.07.2021	Near Peeragarhi Chowk
13.07.2021	Nera Amar Shahid Genu T-Point
13.07.2021	On the loop of the fyorer coming from Daori side
13.07.2021	PTS towards Adhchini
13.07.2021	Pul Prahladpur underpass
13.07.2021	Redlight Sardar Patel Marg towards Ram Manohar Lohia Hospital
13.07.2021	Sainik Farm Gali No. 1 Cariappa Marg
13.07.2021	Sector-13, R.K. Puram near Satya Niketan
13.07.2021	W-Point
13.07.2021	Azadpur underpass
13.07.2021	Hanuman Mandir near Palam Flyorer / Towards Palam fyorer from IOC Sadar Bazar
13.07.2021	Near Hyat Hotel
13.07.2021	Near Rajapuri Bus Stand
13.07.2021	Near Rajdhani Partk Metro Station ooth carriageways
13.07.2021	Under Biwasan Flyover

13.08.2018	Khajoori Chowk / Khajoor! Flyover
13.08.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
13.08.2020	Before Singhu Border Red light towards Kundli Village
13.08.2020	CRPF near Gurudwara Vikaspuri
13.08.2020	Dwarka mor to Sector-39 Red light Rajapuri
13.08.2020	Gate No. 1 & 2 Buddha Garden
13.08.2020	Infront of GTK DTC Depot
13.08.2020	Mandoli Red Light
13.08.2020	Mool Chand underpass
13.08.2020	Near Ansari Road
13.08.2020	Near Bakoli Khanpur Village
13.08.2020	Near Dinpur Village towards BDO
13.08.2020	Near JJ Colony Haiderpur
13.08.2020	Near Karala Road Shiv Vihar
13.08.2020	Near Loha Mandi
13.08.2020	Near Mundka Metro Station
13.08.2020	Near P.S. Subzi Mandi towards Malka Ganj
13.08.2020	Near Panchwati Red light Azadpur
13.08.2020	Near Prem Nagar
13.08.2020	Pooth Khurd near Bawana School
13.08.2020	Under I.P. Flyover
13.08.2020	Under Loni Flyover
13.08.2020	Under Mayapuri Flyover
13.08.2020	Under Pul Prahadpur
13.08.2020	Under Railway Bridge
13.08.2020	Under Raja Garden Flyover both carriageway
13.08.2020	Under Zakhira Flyover
13.08.2020	Vasant Kunj D-2 Road
13.08.2020	Loni Roundabout
13.08.2020	Rohini Sector-4 colony
13.09.2021	Asain Market Khanpur M.B. Road
13.09.2021	Khanpur T-Point to Hamdard T-Point ooth carriageway / near RPS colony khanpur towards Badarpur carriageway/ Vayusenaoad and Tigri on Khanpur to Badarpur carriageway
13.09.2021	Near Batra Hospital
13.09.2021	Near Kanjhawala Chowk
13.09.2021	Near Qutuo Minar Metro Station
14.07.2018	After Zakhira flyover towards Karol Bagh
14.07.2018	Jahangir Puri to Mukarba Chowk carriageway/Jahangir Puri Metro Station/Mahindara Park/Near Adarsh Nagar, Metro Station / Saral Pipal Thala/Shalimar Bagh underpass
14.07.2018	Near Shadipur Metro Station
14.07.2018	Prem Badi Pul underpass

14.07.2018	Under Chhata Rall
14.07.2018	Saral Pipal Thala
14.07.2021	Azad Market underpass
14.07.2021	Azadpur underpass
14.07.2021	Between Dharampura and Iron Bridge / near Iron Bridge
14.07.2021	Jahangirpuri ooth carriageway
14.07.2021	Near Batra Cinema
14.07.2021	Near Gate No.3 Kashmere Gate Metro Station
14.07.2021	Near Hanuman Mandir/ Setu
14.07.2021	Near Kela Ghat
14.07.2021	Near Pillar No. 450 Mundka
14.07.2021	Near Redlight B-Block Mangolpuri
14.07.2021	Shakt Nagar Chowk
14.07.2021	Shastri Park to Shahdara carriageway
14.07.2021	Towards Timarpur
14.07.2021	Zakhira underpass
14.07.2021	Near Bhajanpura Mazar
14.07.2021	Near Chhata Rail
14.08.2019	Near Ganda Nala
14.08.2019	Gate No. 1, Tis Hazari Courts
15.05.2019	Azad Market Railway Crossing
15.05.2019	Loni Gol Chakkar
15.05.2019	carriageway
15.05.2019	Near Gate No. 6, Kashmere Gate Metro Station
15.08.2018	Bhairon Road under Railway Bridge
15.08.2019	Chandgi Ram Akhara T-Point
15.08.2019	Chhata Rail both carriageway
15.08.2019	Mundka towards Bahadurgarh Carriageway
15.08.2019	Near Gate No. 6, Kashmere Gate Metro Station
15.08.2019	Saleemgarh Underpass
16.07,2018	Zakhira Underpass
16.07.2018	Azad Market Filmistan upto Idgah R/A/Bada Hindu Rao to Sabzi Mandi /DCM Chowk Flimistan Idgah / Rani Jhansi flyover / Hati Khana Chowk/ Roshanara T-Point to Burfkhana Chowk/Sadar Bazar
16.07.2018	Beneath Peeragarhi Flyover both side /Peeragarhi Chowk
16.07.2018	Bhera Enclave Chowk
16.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
16.07.2018	Infront of Maharaja Agrasen Hospital, Punjabi Bagh
16.07.2018	Lajwanti Chowk
16.07.2018	Maya Puri Chowk
16.07.2018	Meer Dard Chowk, Foot of Ranjit Singh Flyover
16.07.2018	Near Kali Mata Mandir
16.07.2018	Near New Moti Nagar Flyover

16.07.2018	Near Ramlila Maidan/Ramlila Ground Gate No. 1 & 2 /MCD Office /Zakir Hussain College
16.07.2018	New Delhi Railway Station towards Pahar Ganj
16.07.2018	Pant Nagar Bus Stop, Cremation ground near Lodhi Flyover, D-Block petrol pump
16.07.2018	R.K. Ashram Metro Station to Jhandewalan
16.07.2018	Shubhash Nagar Chowk
16.07.2018	Under Chatta Rail
16.07.2018	Under Minto Bridge
16.07.2018	Under Moti Nagar flyover
16.07.2018	Y-point Kishan Ganj Railway underpass
16.07.2018	Near Teliwara Qutab Chowk/Qutab Chowk to Pul Mithal
16.07.2018	Ranjit Singh Flyover, under foot over Bridge
16.07.2018	Under Ajmeri Gate / Pahar Ganj Flyover
16.08.2019	Tikri Border Metro Station
17.07.2017	Carriageway leading from Moti Bagh to IGIA
17.07.2017	DCM Chowk
17.07.2017	Khyber Pass near Red Light and both Carriageway on P.S Civil Lines Bus Stand
17.07.2017	Near Munirka Flyover
17.07.2017	Near Sector-8, R.K. Puram on Vasant Vihar to Moti Bagh Carriageway
17.07.2017	Under Defence Colony Flyover
17.07.2017	Under Moolchand Flyover
17.07.2017	Bhairon Mandir, ITO
17.07.2017	Near Red light GGR - PDR (Gurgaon Road-Parade Road)
17.07.2018	Nirman Vihar Chowk to Ganesh Chowk/Ganesh Nagar Chowk towards Mother Dairy
17.07.2019	Ashok Vihar T-Point
17.07.2019	At the foot of Moti Bagh Flyover
17.07.2019	Chhata Rail both carriageway
17.07.2019	Gali No. 4 Anand Parbat
17.07.2019	Gali No. 6 Anand Parbat
17.07.2019	In front Safdarjung Hospital
17.07.2019	Libaspur underpass
17.07.2019	Manekshaw Red Light
17.07.2019	Moti Nagar, Najafgarh Nala Road
17.07.2019	Near CNG Petrol Pump
17.07.2019	Near Red Light Mahindra Park
17.07.2019	Near Ryan Public School, Munirka
17.08.2019	Ghevra Mor
17.08.2020	I.P. Park Gate No. 2
17.08.2020	Lajpat Nagar Metro Station
17.08.2020	Loni Roundabout

17.08.2020	Mandoli Red Light
17.08.2020	Near Adhchini Village
17.08.2020	Near Ashok Nagar Wazirabad Road
17.08.2020	Near Batra Hospital
17.08.2020	Near Karala village
17.08.2020	Near Maharani Bagh
17.08.2020	Near Mata Mandir Sarai Jullena
17.08.2020	Near Paras Chowk Flyover
17.08.2020	Near Rajdhani Park Metro Station
17.08.2020	Near Savitri Cinema
17.08.2020	Near SPA Building
17.08.2020	Near Tilak Bridge
17.08.2020	Supreme Court of India to ITO
17.08.2020	Under I.P. Flyover
17.08.2020	Under Minto Bridge
17.08.2020	Under Railway Bridge
17.08.2020	Near Okhla Mandi
18.08.2018	Before Seelampur Flyover
18.08.2018	Bihari Colony under Railway Bridge
18.08.2018	Gate No. 3, ISBT Metro Station
18.08.2018	Jhilmil Colony Industrial area near Kasturba Nagar underpass
18.08.2018	Kanti Nagar Underpass
18.08.2018	Khajoori Chowk / Khajoor! Flyover
18.08.2018	Krishna Nagar Bus Stand towards Shahdara
18.08.2018	Main Chowk Bhajanpura near Peer Baba Mazaar / Near Bhajanpura bus stand / Bhajanpura Market
18.08.2018	Near Dharendra Singh Akhara
18.08.2018	Near Pul Bangash towards Tis Hazari
18.08.2018	Near Shaitan Chowk
18.08.2018	Near Welcome Metro Station
18.08.2018	Old Delhi Railway Station towards Hanuman Setu
18.08.2018	Seemapuri Gol Chakkar
18.08.2018	Sonia Hospital to Rajdhani Park
18.08.2018	Under Chatta Rail
18.08.2018	Vivek Vihar Underpass
18.08.2018	Keshav Chowk Shyam Lal College/ Railway Bridge underpass
18.08.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
18.08.2018	Near P.S. Bhajanpura
18.08.2018	Near Satyabhama Hospital / Water tank
18.08.2019	Azad Market Railway Crossing
18.08.2019	Maandi Village, Mehrauli
18.08.2019	Mundka to Nangloi Park both carriageway

18.08.2019	Near Mazar
18.08.2019	Swami Dayanand Hospital
19.05.2021	Near Rajdhani Partk Metro Station ooth carriageways
19.05.2021	R/A Samrat Hotel Chanakya Puri
19.05.2021	Roundabout Bagga Link near Hanuman Murt Karol Bagh
19.05.2021	Under Dhaula Kuan Flyover towards Naraina
19.06.2017	Bhairon Enclave to Peeragahri
19.06.2017	Bhairon Mandir to Zoo
19.06.2017	Gate No. 2, Pragati Maidan
19.06.2017	Jungpura Underpass
19.06.2017	Munirka to Airport carriageway
19.06.2017	Near Vayusenabad
19.06.2017	RTR to Airport
19.06.2017	Carriageway leading from Moti Bagh to IGIA
19.06.2017	Tigiri To Bhatra Hospital
19.06.2017	Under Moolchand Flyover
19.07.2017	Near Munirka Flyover
19.07.2017	Under Railway Bridge
19.07.2017	Under RTR Flyover
19.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
19.07.2018	Raja Garden Chowk Red light
19.07.2020	Dhula Kuan under Flyover
19.07.2020	GGR/PDR
19.07.2020	In front of New Delhi Railway Station
19.07.2020	Infront of GTK DTC Depot
19.07.2020	Loni Roundabout
19.07.2020	Mool Chand underpass
19.07.2020	Near Apsara Border
19.07.2020	Near Mayapuri Chowk
19.07.2020	Near Mundka Metro Station
19.07.2020	Near South Avenue
19.07.2020	Near UPSC Building
19.07.2020	Near Village Begumpur
19.07.2020	Railway line under Pul Prahladpur
19.07.2020	Supreme Court of India to ITO
19.07.2020	Under I.P. Flyover
19.07.2020	Under Minto Bridge
19.07.2020	Under Railway Bridge
19.07.2020	Under Railway Bridge
19.07.2020	W-Point
19.07.2020	Azadpur Underpass
19.07.2020	Guru Nanak Chowk

19.07.2020	Near Batra Hospital
19.07.2020	Near Lala Lajpat Rai Market
19.07.2020	Near Mandoli Chungi
19.07.2020	Near Pipal Chowk
19.07.2020	Near U-turn Apollo towards Ashram)
19.07.2020	Near Yashwant Place
19.07.2020	Under Ranjit Singh Flyover
19.07.2020	Underpass Prem Bari Pul
19.07.2021	Between Dharampura and Iron Bridge / near Iron Bridge
19.07.2021	Cygnus Hospital to Karala Chowk
19.07.2021	Dharampura Seelampur
19.07.2021	Firni Road
19.07.2021	From Firni Road Najafgarh upto PTS Jharoda Kalan
19.07.2021	GGR-PDR
19.07.2021	Hanuman Mandir near Palam Flyover / Towards Palam flyover from IOC Sadar Bazar
19.07.2021	Ip Flyover towards Sarai Kale Khan near Petrol Pump on the carriageway towards Ashram
19.07.2021	Kirari Village to Nareen Public School
19.07.2021	Kirol Place
19.07.2021	Nangloi Railway Phatak to Muoarakpur Village
19.07.2021	Near Bhajanpura Mazar
19.07.2021	Near IIT / Adhchini Redlight
19.07.2021	Near Rajdhani Partk Metro Station ooth carriageways
19.07.2021	Near Seelampur Flyover (Shastri Park to Shahdara carriageway) / on the foot of Seelampur Flyover (ISBT to Apsara Border carriageway)
19.07.2021	Near Water Tank
19.07.2021	Pul Prahladpur underpass
19.07.2021	Roundabout Rail Bhawan
19.07.2021	Tikri Border
19.07.2021	Asain Market Khanpur M.B. Road
19.07.2021	Dwarka Underpass
19.08.2017	Carriageway leading from Moti Bagh to IGIA
19.08.2017	Near Jungpura Metro Station
19.08.2017	Near Moti Bagh Metro Station
19.08.2017	Near Red light GGR - PDR (Gurgaon Road-Parade Road)
19.08.2017	Nizamuddin Khatta near I.P. Bus Stand
19.08.2017	Service road near Pant Institute Okhla, Phase-III
19.08.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
19.08.2017	Under RTR Flyover
19.08.2017	Near Munirka Flyover
19.08.2017	Near Peer Baba Mazaar
19.08.2018	Infront of Savitri Cinema / Near Savitri Flyover
19.08.2018	M.B. Road T-Point to Hamdard Nagar -Infront of Kaya Maya Hospital, Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad

	/ Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
19.08.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light
19.08.2018	Near Satyabhama Hospital / Water tank
19.08.2018	Opposite Qutab Minar Metro Station
19.08.2018	Sainik Farm House to IGNOU Cut
19.08.2018	Near Tivoli Garden
19.08.2020	Anuvrat Marg T-Point
19.08.2020	Badarpur towards Ashram
19.08.2020	Chhata Rail both carriageway
19.08.2020	I.P. Park Gate No. 2
19.08.2020	Khoda Chowk Murga Mandi
19.08.2020	Loni Roundabout
19.08.2020	Matka Peer T-Point
19.08.2020	Mayur Vihar Phase-2 underpass
19.08.2020	Mudiya Chowk Rani Jhansi Road
19.08.2020	Near Apsara Border
19.08.2020	Near Batra Hospital
19.08.2020	Near Harkesh Nagar
19.08.2020	Near Maidan Garhi
19.08.2020	Near Munirka Metro Station, Gate No. 1
19.08.2020	Near P.S. Civil Lines
19.08.2020	Near roundabout Pusa
19.08.2020	Near Shashi Garden towards Patparganj Road
19.08.2020	office Najafgarh Near Central School
19.08.2020	Sanjay T-Point
19.08.2020	Sarai Kale Khan towards DND both carriageway
19.08.2020	Satyam Nagar towards Kasturba Nagar both carriageway
19.08.2020	Seemapuri towards Dilshad Garden both carriageway
19.08.2020	Under Badarpur flyover
19.08.2020	Under Mother Dairy Flyover
19.08.2020	Under Moti Bagh Flyover
19.08.2020	Under Palam-Dwarka Flyover both carriageway
19.08.2020	Under Pul Prahadpur
19.08.2020	Under Railway Bridge
19.08.2020	Under Sarita Vihar underpass
19.08.2020	Underpass Vasant Kunj towards Airport
19.08.2020	Near Sultanpur Metro Station
19.08.2020	Timarpur T-Point
20.06.2017	Airport to Daula Khan
20.06.2017	Apollo to Ashram
20.06.2017	Apollo to CRRI Carriageway

20.06.2017	Ashram to Neela Gumbad
20.06.2017	Azad Market Chowk and Chowki No. 2
20.06.2017	Bhajanpura Bus Stand
20.06.2017	Guru Teg Bahadur Hospital (GTB Hospital)
20.06.2017	Hanuman Setu
20.06.2017	IGNOU, Gate No. 2
20.06.2017	ISBT Kashmere Gate
20.06.2017	ISBT to Nigam Bodh Ghat
20.06.2017	Janakpuri to Peeragarhi Flyover
20.06.2017	Jungpura Underpass
20.06.2017	K.N Katju Marg
20.06.2017	Mahipal Pur to Vasant Vihar
20.06.2017	Mathura Road
20.06.2017	Mundka Village to NH-10
20.06.2017	Near Power House, D-Block, Janakpuri
20.06.2017	Near PTS Malviya Nagar
20.06.2017	Near Saket Metro Station Gate No 2
20.06.2017	Near Vayusenabad
20.06.2017	Near Wazirabad Chowk
20.06.2017	Nirman Vihar to Laxmi Nagar
20.06.2017	Nitin Public School, B-5, Paschim Vihar
20.06.2017	P.S Mayapuri to Lajwanti
20.06.2017	Peeragahri to MangolPuri
20.06.2017	Rajapuri Bus Stand - Tiranga Chowk (Rajapuri Intersection) on the carriageway going towards Madhu Vihar
20.06.2017	RTR to Airport
20.06.2017	Under Dhaula Kuan Flyover
20.06.2017	Under Lodhi Flyover
20.06.2017	Under Mahipal Pur Flyover, Mahipal Pur Chowk
20.06.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
20.06.2017	Under Moti Bagh Flyover
20.06.2017	Under Rajouri Garden Metro Station
20.06.2017	Under RTR Flyover
20.06.2017	Under Zakhira Flyover
20.06.2017	Zakhira Flyover to Anand Parbat
20.06.2017	Burari to Wazirabad
20.06.2017	DCM Chowk
20.06.2017	Hyatt Hotel
20.06.2017	Sarai Julena
20.06.2017	Shanti Marg
20.07.2017	Apsara Chowk
20.07.2017	Asian Market
20.07.2017	Badarpur Border

20.07.2017	Bhajanpura Chowk & Khajuri Chowk
20.07.2017	Bhartal Chowk
20.07.2017	Chatta Rail
20.07.2017	DND Redlight
20.07.2017	Durgapuri Chowk
20.07.2017	Jungpura Underpass
20.07.2017	Khanpur to Hamdard Nagar
20.07.2017	Loni Gol Chakkar
20.07.2017	Near Apollo Metro Station
20.07.2017	Near Hanuman Mandir, Jhandewalan . Metro Station
20.07.2017	Near Harkesh Nagar Bus Stop
20.07.2017	Near Red Light Mahendra Park
20.07.2017	Near Vayusenabad
20.07.2017	Sainik Farm Gate No. 1
20.07.2017	Samalkha T-Point
20.07.2017	Seemapuri Underpass
20.07.2017	Under Jahangir Puri Metro Station
20.07.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
20.07.2017	Under RTR Flyover
20.07.2017	Under Zakhira Flyover
20.07.2017	Underpass Sarita Vihar Flyover
20.07.2017	U-Turn towards Apollo
20.07.2017	Ashram Chowk to Bhogal
20.07.2017	Azad Market Chowk and Chowki No. 2
20.07.2017	Carriageway leading from Moti Bagh to IGIA
20.07.2017	Hanuman Setu
20.07.2017	Near I.P Flyover
20.07.2017	Nizamuddin Khatta near I.P. Bus Stand
20.07.2017	Okhla Mor
20.07.2017	Railway Underpass Pul Prahladpur
20.07.2017	TR Sahni Chowk
20.07.2018	Anand Parbat Gali No. 10 / Gali No. 13/Kama! T-Point to Zakhira in both carriageway
20.07.2018	Gazipur Border near Toll Tax
20.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
20.07.2018	Khajoori Chowk / Khajoor! Flyover
20.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
20.07.2018	Main Chowk Bhajanpura near Peer Baba Mazaar / Near Bhajanpura bus stand / Bhajanpura Market
20.07.2018	Near T-Point Purana Quila / towards Shershah Road & Bhairon Road/ Red light Delhi High Court
20.07.2018	Under Railway Iron Bridge, Azad Market
20.07.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light

20.07.2019	At the foot of Moti Bagh Flyover
20.07.2019	Punjabi Bagh Roundabout
20.07.2019	Satya Niketan Bus Stand
20.07.2019	Shadipur Flyover both side
20.07.2019	T-Point Ramnath Vii marg
20.08.2020	I.P. Park Gate No. 2
20.08.2020	Infront of GTK DTC Depot
20.08.2020	Near Andrew Ganj Central School
20.08.2020	Near Ashram Chowk
20.08.2020	Near DD Metro
20.08.2020	Near Jahangirpuri Metro Station both carriageway
20.08.2020	Near Jhandewalan Mandir
20.08.2020	Near La! Kuan
20.08.2020	Near Mazar Bhajanpura
20.08.2020	Near Okhla Mandi
20.08.2020	Near Old Police Chowki
20.08.2020	Near Outer Gate Azadpur Subzi Mandi
20.08.2020	Near Sultanpur Metro Station
20.08.2020	Near WHO office
20.08.2020	Sanjay T-Point
20.08.2020	Singhu Border near DSIDC Red Light
20.08.2020	Under Pul Prahadpur
20.08.2020	Under Raja Garden Flyover both carriageway
20.08.2020	Burf Khana Chowk
20.08.2020	Gate No. 1 & 2 Buddha Garden
20.08.2020	Jhilmil Under Pass
20.08.2020	Near Gate No.7 Pragati Maidan
20.08.2020	Sarai Pipal Thala
21.06.2017	Under Jahangir Puri Metro Station
21.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
21.07.2018	Jahangir Puri to Mukarba Chowk carriageway/Jahangir Puri Metro Station/Mahindara Park/Near Adarsh Nagar, Metro Station/Saral Pipal Thala/Shalimar Bagh underpass
21.07.2018	Mundka Metro Pillar No. 510 to 514
21.07.2018	Near Liberty Cinema
21.07.2018	Near Teliwara Qutab Chowk/Qutab Chowk to Pul Mithal
21.07.2018	Under Mayapuri Flyover both carriageway
21.07.2018	Under Railway Iron Bridge, Azad Market
21.07.2018	Azad Market Flimistan upto Idgah R/A/Bada Hindu Rao to Sabzi Mandi /DCM Chowk Flimistan Idgah / Rani Jhansi flyover / Hati Khana Chowk/ Roshanara T-Point to Burfkhana Chowk/Sadar Bazar
21.07.2018	Azadpur underpass both carriageway
21.07.2019	Burfkhana Chowk
21.07.2019	Central Market Punjabi Bagh

21.07.2019	Chhata Rail both carriageway
21.07.2019	Chhatarpur
21.07.2019	Hanuman Mandir
21.07.2019	Katwariya Sarai
21.07.2019	Mandi House
21.07.2019	Mother International School, Adhchini
21.07.2019	Near Fortis Hospital
21.07.2019	Near Pyare Lal Bhawan
21.07.2019	Near W.H.O Building
21.07.2019	Old Iron Bridge to Geeta Colony
21.07.2019	Punjabi Bagh Roundabout
21.07.2019	Red Light Lado Sarai
21.07.2019	Tikri Border Metro Station
21.07.2019	Tilak Bridge
21.07.2019	Wazirpur to Madhuban Chowk
21.07.2019	W-Point to Mandi House
21.07.2019	Y-Point Bhati Mines
21.07.2019	At Bakkarwala mor
21.07.2019	Between Madhuban Chowk to Rithala
21.07.2019	Ranikhera to Mundka
21.07.2020	In front of WHO building
21.07.2020	Loni Roundabout
21.07.2020	Munirka Market
21.07.2020	Near Okhla Mandi
21.07.2020	Rafi Marg and complete Outer Circle
21.07.2020	Shershah Road crossing
21.07.2020	Infront of Central School
21.07.2020	Infront of GTK DTC Depot
21.07.2020	RP Bhawan carriageway
21.07.2020	Sansad Marg and Jantar Mantar
21.08.2021	Rohtak Road
21.08.2021	Azad Market underpass
21.08.2021	Bakkarwala
21.08.2021	Baoar Chowk
21.08.2021	Central School Andrewz Ganj
21.08.2021	CISF Cut
21.08.2021	Ghazipur
21.08.2021	INA towards AIIMS Underpass
21.08.2021	ITO Chowk
21.08.2021	J.B. Tito Marg
21.08.2021	Jungpura Metro Station
21.08.2021	Kasturoa Nagar Underpass
21.08.2021	Main market Khajuri

21.08.2021	Mayapuri Metro Station
21.08.2021	Mehram Nagar Underpass
21.08.2021	Mohan Estate
21.08.2021	Monkey Bridge Saleemgarh
21.08.2021	Near Chhata Rail
21.08.2021	Near Hyat Hotel
21.08.2021	Near IIT / Adhchini Redlight
21.08.2021	Near Mundka Metro Station
21.08.2021	Near Qutuo Minar Metro Station
21.08.2021	Near Water Tank
21.08.2021	Okhla Mandi
21.08.2021	Pul Prahladpur underpass
21.08.2021	Rithala Metro Station
21.08.2021	Sanjay T-point
21.08.2021	Spinal Injury
21.08.2021	Chintamani Flyover
21.08.2021	Lajpat Nagar Metro Station
21.08.2021	Munirka Redlight
21.08.2021	Near Hanuman Mandir/ Setu
21.08.2021	Near WHO Building
21.08.2021	Rajokari Underpass
21.08.2021	Sarita Vihar Underpass
21.09.2019	Chhata Rail both carriageway
21.09.2019	Devli Road and Tigri Road
21.09.2019	Gate No. 1, Tis Hazari Courts
21.09.2019	Gurugram carriageway
21.09.2019	Kapashera Chowk Red Light both
21.09.2019	Near DC office
21.09.2019	T-Point IGNOU Road
21.09.2019	Wazirabad Flyover
21.09.2019	Turn on Khyber Pass
22.06.2020	Near Andrews Ganj Flyover
22.06.2020	Near ITBP Camp Khanpur
22.06.2020	Near Jahangirpuri Metro Station both carriageway
22.06.2020	Near Mundka Metro Station
22.06.2020	Near Parmeshwari wala Bagh
22.06.2020	Near Pipal Chowk
22.06.2020	Near Ramlila Ground gate
22.06.2020	Near Red light Chirag Delhi
22.06.2020	Near T-Point Jahangirpuri, Mahendra Park
22.06.2020	Near Yusuf Sarai Market
22.06.2020	Roundabout Shamshan Ghat Pahar Ganj
22.06.2020	Sarai Pipal Thala

22.06.2020	Under Mayapuri Flyover
22.06.2020	Under Mool Chand Flyover
22.06.2020	Near Rajdhani Park Metro Station
22.06.2020	Near roundabout Pusa
22.06.2020	Under Pul Prahadpur
22.07.2018	Dhansa Stand, Nanglol Stand, Chhawla Stand & Bahadurgarh Stand, Toora Mandi
22.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
22.07.2018	K.M. Chowk to Ashirwad Chowk,Dwarka, Sector-12
22.07.2018	Khajoori Chowk / Khajoor! Flyover
22.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
22.07.2018	M.B. Road T-Point to Hamdard Nagar -Infront of Kaya Maya Hospital, Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
22.07.2018	Mahipal Pur Chowk towards Gurugram
22.07.2018	Nanglol Flyover to Mundka Red light both side
22.07.2018	Vasant Kunj service road near Vasant Kunj Mall/DLF Mall
22.07.2018	Near Mahipal Pur Market bath carriageway/Mahipalpur Market
22.07.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
22.08.2018	Azad Market Flimistan upto Idgah R/A/Bada Hindu Rao to Sabzi Mandi /DCM Chowk Flimistan Idgah / Rani Jhansi flyover / Hati Khana Chowk/ Roshanara T-Point to Burfkhana Chowk/Sadar Bazar
22.08.2018	ESI Hospital to Punjabi Bagh Flyover
22.08.2018	Madhuban Chowk
22.08.2018	Near Satyabhama Hospital / Water tank
22.08.2018	Rani Bagh to Punjabi Bagh underpass
22.08.2018	T-Point new Moti Nagar Flyover/T- Point Punjabi Bagh Club Road
22.08.2018	Under Moti Nagar flyover
22.08.2018	Y-Point Kishan Ganj towards Azad Market
22.08.2018	Zakhira Flyover to Anand Parbat
22.08.2018	Kashmere Gate Metro Station near Gate No. 3
22.08.2018	Under Chatta Rail
22.09.2017	Ashram Chowk to Bhogal
22.09.2017	Durgapuri Chowk
22.09.2017	Infront of Sangam Vihar Hospital
22.09.2017	Mata Chowk Mahipal Pur
22.09.2017	Near Fortis Hospital
22.09.2017	Near Maharani Bagh Bus Stand
22.09.2017	Near Majeedia Hospital, Hamdard Nagar
22.09.2017	Near Nehru Place Metro Station
22.09.2017	Near Vayusenabad
22.09.2017	Opposite Okhla Sabzi Mandi

22.09.2017	Rajdhani Park to Mundka Metro Station
22.09.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
22.09.2017	Under Paras Cinema flyover U Turn
22.09.2017	Under RTR Flyover
22.09.2017	Nizamuddin Khatta near I.P. Bus Stand
22.09.2017	Peeragahri to MangolPuri
23.07.2017	Laxmi Nagar Market to Laxmi Nagar Metro Station
23.07.2017	Near Delhi Jal Board Office
23.07.2017	Near Harkesh Nagar Bus Stop
23.07.2017	Near Vayusenabad
23.07.2017	Rajapuri Bus Stand - Tiranga Chowk (Rajapuri Intersection) on the carriageway going towards Madhu Vihar
23.07.2017	Under Jahangir Puri Metro Station
23.08.2017	Bhairi Enclave to Peeragahri
23.08.2017	Dabri Power House
23.08.2017	Ganga Ram Hospital Red Light
23.08.2017	Guru Teg Bahadur Hospital (GTB Hospital)
23.08.2017	Mehram Nagar Red light IOC Red Light Service Road, Delhi Cantt
23.08.2017	Naraina towards Loha Mandi
23.08.2017	Near Distrcit Centre, Janakpuri
23.08.2017	Neat Post Office, Naraina
23.08.2017	Opposite Okhla Sabzi Mandi
23.08.2017	Peeragahri to MangolPuri
23.08.2017	Raja Garden Chowk
23.08.2017	Sadiq Nagar Red light
23.08.2017	TR Sahni Motor to Bhopura Border
23.08.2017	Under Chirag Delhi Flyover
23.08.2017	Under Mayapuri Flyover
23.08.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
23.08.2017	Under Moti Bagh Flyover
23.08.2017	Under Rajouri Garden Metro Station
23.08.2017	Under Hyatt Flyover
23.08.2018	Bihari Colony under Railway Bridge
23.08.2018	Gandhi Nagar SDM office / nala road
23.08.2018	Jasola towards Okhla underpass near CNG Pump
23.08.2018	Keshav Chowk Shyam Lal College/ Railway Bridge underpass
23.08.2018	Khajoori Chowk / Khajoor! Flyover
23.08.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
23.08.2018	Near Satyabhama Hospital / Water tank
23.08.2018	Okhla Phase-1 both carriageway Sarita Vihar underpass
23.08.2018	Pul Prahladpur/towards Badarpur Railway underpass
23.08.2018	Roundabout Punjabi Bagh / Under Punjabi Bagh Flyover/Underpass Punjabi Barh

23.08.2018	Sarai Kale Khan
23.08.2018	Under Chatta Rail
23.08.2018	Under Lon! Flyover towards Nand Nagri carriageway
23.08.2018	Under Modi Mill Flyover / U turn near Modi Mill / towards Nehru Place Flyover
23.08.2018	Vivek Vihar KG Marg / Vivek Vihar underpass
23.08.2018	Wazirabad Flyover / Old Yamuna Bridge
23.08.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
23.08.2018	M.B. Road T-Point to Hamdard Nagar -Infront of Kaya Maya Hospital, Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
23.08.2018	Maharaja Surajmal Marg Underpass
23.08.2018	Near Geeta Colony, Ramlila Maidan
23.09.2017	Ambedkar Nagar T-Point
23.09.2017	Ashram towards Bhogal carriageway
23.09.2017	Bhartal Chowk
23.09.2017	G.T.K Depot
23.09.2017	Hakikat Nagar Red light
23.09.2017	Infront of New Delhi Railway Station (NDRS) Towards Paharganj
23.09.2017	Jungpura Underpass
23.09.2017	Near Khanpur Depot
23.09.2017	Near Lajpat Nagar Metro Station 2
23.09.2017	Near PTS Malviya Nagar
23.09.2017	Near Punjabi Bagh Metro Station
23.09.2017	Near Saket Metro Station Gate No 2
23.09.2017	Near Vayusenabad
23.09.2017	Nizamuddin Khatta near I.P. Bus Stand
23.09.2017	Pipal Chowk
23.09.2017	Rajapuri Chowk
23.09.2017	Rajdhani Park to Mundka Metro Station
23.09.2017	Sainik Farm Gate No. 1
23.09.2017	T-Point Mother Diary
23.09.2017	Under Jahangir Puri Metro Station
23.09.2017	Wazirabad T-Point
23.09.2017	Zakhira Flyover to Anand Parbat
23.09.2017	GTB Nagar Metro Station Gate No. 2
23.09.2017	Infront of Batra Hospital
23.09.2017	Rampura Underpass
23.09.2017	Under RTR Flyover
23.09.2018	Dhansa Stand, Nanglol Stand, Chhawla Stand & Bahadurgarh Stand, Toora Mandi
23.09.2018	Fatehpuri Chowk
23.09.2018	Najafgarh Drain & DJB sewage plant
23.09.2018	Netaji Subhash Marg to GPO / Red Fort Red light

24.07.2017	Jungpura Underpass
24.07.2017	Rangpuri Under Metro Station
24.09.2017	Under Defence Colony Flyover
24.09.2018	Fatehpuri Chowk
24.09.2018	Netaji Subhash Marg to GPO / Red Fort Red light
24.09.2018	M.B.Road T-Point to Hamdard Nagar-Infront of Kaya Maya Hospital Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar/Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
25.07.2018	Mundka Rallway Station/Rajdhani Park Metro Station
25.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
25.08.2017	Bhartal Chowk
25.08.2017	Near Munirka Flyover
25.08.2017	Near Red light GGR - PDR (Gurgaon Road-Parade Road)
25.08.2017	Palam Airport T-Point
25.08.2017	Peeragahri to MangolPuri
25.08.2017	Under Mahipal Pur Flyover, Mahipal Pur Chowk
25.08.2017	Under RTR Flyover
26.07.2018	Aali Gaon carriageway
26.07.2018	Anand Parbat Gali No. 10 / Gali No. 13/Kama! T-Point to Zakhira in both carriageway
26.07.2018	Apsara Border, Loni Border towards Nand Nagri Depot
26.07.2018	Dhansa Stand, Nanglol Stand, Chhawla Stand & Bahadurgarh Stand, Toora Mandi
26.07.2018	Dwarka Mor
26.07.2018	Gandhi Nagar SDM office / nala road
26.07.2018	Ganesh Nagar Chowk
26.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
26.07.2018	Jagat Puri Red light
26.07.2018	Kasturba Nagar underpass
26.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
26.07.2018	Maya Puri Chowk
26.07.2018	Naraina T-Point towards Loha Mandi,near Post Office
26.07.2018	Near 11 Murti
26.07.2018	Near Delhi Gate
26.07.2018	Near Geeta Colony, Ramlila Maidan
26.07.2018	Near Ramlila Maidan/Ramlila Ground Gate No. 1 & 2 /MCD Office /Zakir Hussain College
26.07.2018	Near SDN Hospital
26.07.2018	Rajdhani Park to Chotu Ram foot over bridge
26.07.2018	Saral Kale Khan towards Nizamuddin Railway Station
26.07.2018	Sarita Vihar underpass
26.07.2018	Seema Puri underpass near Apsara Border
26.07.2018	Suraj Kund towards Prahladpur roundabout

26.07.2018	Under Gazipur Flyover
26.07.2018	Under Minto Bridge
26.07.2018	Under Modi Mill Flyover / U turn near Modi Mill / towards Nehru Place Flyover
26.07.2018	Vivek Vihar KG Marg / Vivek Vihar underpass
26.07.2018	Aati Red light service lane
26.07.2018	Badarpur to Mehrauli Underpass
26.07.2018	Dwarka underpass towards Dwarka
26.07.2018	Khajoori Chowk / Khajoor! Flyover
26.07.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
26.07.2018	Under Chatta Rail
26.07.2020	Chhata Rail both carriageway
26.07.2020	Under Minto Bridge
26.08.2017	Under RTR Flyover
27.06.2018	Both carriageway Le. Dhaula Kuan side and Karol Bagh side
27.06.2018	Dhaulta Kuan to Gurgaon near GGR- PDR beneath Metro line
27.06.2018	Red light Brar Square towards Dhaulta Kuan
27.06.2018	Talkatora Roundabout towards Rajinder Nagar Roundabout
27.06.2018	Under Munirka Flyover
27.06.2018	Y-Point Kishan Ganj towards Azad Market
27.06.2018	Dhaulta Kuan
27.06.2018	Naraina T-Point towards Loha Mandi,near Post Office
27.06.2018	Near Rattan Puri Chowk
27.06.2018	Pant Nagar Bus Stop, Cremation ground near Lodhi Flyover, D-Block petrol pump
27.07.2018	At Mehrauli Bypass crossing
27.07.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
27.07.2018	Guru Nanak Chowk
27.07.2018	Laxmi Nagar to Vijay Chowk / Laxmi Nagar Metro Station / Near Laxmi Nagar T-Point / Mother Dairy Red light / Karkari Chowk / Under I.P. Flyover / near IP flyover
27.07.2018	Near Okhla Mandi, Infront of Gate No. 1, 2 Okhla Mandi, Okhla Mandi Red Light
27.07.2018	Near Ramlila Maidan/Ramlila Ground Gate No. 1 & 2 /MCD Office /Zakir Hussain College
27.07.2018	Near Satyabhama Hospital / Water tank
27.07.2018	Pul Prahladpur/towards Badarpur Railway underpass
27.07.2018	Raja Puri Chowk
27.07.2018	Rajdhani Park to Mundka
27.07.2018	Sarita Vihar underpass
27.07.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
27.07.2018	Loni Gol Chakkar / towards Gagan Cinema / towards Harsh Vihar / Near Gagan Cinema / near Meet Nagar
27.07.2018	Under Modi Mill Flyover

27.07.2021	Metro Pillar No. 505, Mundka
27.07.2021	Near Mathura Road Redlight
27.07.2021	Sunheri Maszid
27.07.2021	CNG Pump R.K. Puram
27.07.2021	Entre Raf Marg
27.07.2021	Mohan Estate
27.08.2017	Hanuman Mandir, Near ISBT
27.08.2017	Karol Bagh Metro Station to Jhandewalan
28.06.2017	Aali Gaon X-ing
28.06.2017	Adhchini T-Point
28.06.2017	Andrews Ganj Red Light
28.06.2017	Ashram Chowk to Bhogal
28.06.2017	Colony
28.06.2017	Guru Nanak Chowk Near Zakhir Hussain College Ramilia Ground Near Gate No.1
28.06.2017	Inderlok
28.06.2017	Near PTS Malviya Nagar
28.06.2017	Near Saket Metro Station Gate No 2
28.06.2017	Near Shani Mandir Munirka
28.06.2017	Near Vayusenabad
28.06.2017	Peeragahri to MangolPuri
28.06.2017	Sainik Farm Gate No. 4
28.06.2017	Under Dhaula Kuan Flyover
28.06.2017	Under I.P Flyover towards A- Point Carriageway
28.06.2017	Under Khajuri Flyover
28.06.2017	Zandhu Singh Marg Red Light
28.06.2017	Near Water Tank
28.06.2017	Under Railway Bridge
28.06.2017	Under RTR Flyover
28.06.2017	Zakhira Flyover to Anand Parbat
28.06.2018	Apsara Border Gole Chakkar towards Anand Vihar
28.06.2018	At the end of Barapulla Flyover towards Maharani Bagh
28.06.2018	Entire Drain Road at different locations
28.06.2018	Gazipur Murga Mandi, Mayur Vihar, Phase-II/Underpass/flyover
28.06.2018	Infront of Savitri Cinema / Near Savitri Flyover
28.06.2018	Jasola towards Okhla underpass near CNG Pump
28.06.2018	Jasola towards Sarita Vihar Underpass slip road.
28.06.2018	Main Chowk Bhajanpura near Peer Baba Mazaar / Near Bhajanpura bus stand / Bhajanpura Market
28.06.2018	Near Gazipur Dairy Farm
28.06.2018	Near Kalkaji Mandir Flyover
28.06.2018	Near SDM Office Art Block Fountain Chowk
28.06.2018	Near Shastri Park Metro Station

28.06.2018	Raja Puri Chowk
28.06.2018	Sainik Farm House to IGNOU Cut
28.06.2018	T-Point new Moti Nagar Flyover/T- Point Punjabi Bagh Club Road
28.06.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
28.06.2018	Under Lon! Flyover towards Nand Nagri carriageway
28.06.2018	Under Modi Mill Flyover / U turn near Modi Mill / towards Nehru Place Flyover
28.06.2018	Wazirabad Flyover / Old Yamuna Bridge
28.06.2018	Near foot/landing point of Dabri flyover over, before Janak Puri Check Post, carriageway going towards Sagarpur
28.06.2018	Near Lok Kalyan Marg Metro Station
28.06.2018	Near Subway NDSE Part-II
28.06.2018	Y-Point Kishan Ganj towards Azad Market
28.07.2018	Bus Stand, South Extension, Part-II
28.07.2018	Raja Puri Chowk
28.07.2018	Rajdhani Park towards Mundka Pilar No. 505 to 530
28.07.2021	Bhagwan Das T-Point Mathura Road
28.07.2021	Bhajanpura main market towards Waziraoad
28.07.2021	Dharampura Seelampur
28.07.2021	Near Rajdhani Partk Metro Station ooth carriageways
28.07.2021	Near Seelampur Flyorer (Shastri Park to Shahdara carriageway) / on the foot of Seelampur Flyorer (ISBT to Apsara Border carriageway)
28.07.2021	Near Singhu Village
28.07.2021	Zakhira towards Anand Paroat
28.07.2021	C-Hexagon, Akoar Road
28.07.2021	Near Bhajanpura Mazar
28.08.2018	Adarsh Nagar and Mahendra Park, Azadpur Subzi Mandi
28.08.2018	Andheria Mor towards Vasant Kunj
28.08.2018	Beneath Peeragarhi Flyover both side /Peeragarhi Chowk
28.08.2018	Dhansa Stand, Nanglol Stand, Chhawla Stand & Bahadurgarh Stand, Toora Mandi
28.08.2018	Dhaura Kuan to Gurgaon near GGR- PDR beneath Metro line
28.08.2018	Dwarka underpass towards Dwarka
28.08.2018	ESI Hospital Rajouri Garden towards Punjabi Bagh
28.08.2018	Inderlok Chowk to Zakhira Flyover
28.08.2018	Kanjhawala T-Point towards Ghevra
28.08.2018	Kirti Nagar Rama Road both carriageway
28.08.2018	M.B. Road T-Point to Hamdard Nagar-Infront of Kaya Maya Hospital Kaya Maya Mandir, Near Lal Kuan/ towards Tuglakabad / Lal Kuan towards Hamdard Nagar / Devii cut /Mor/Devlinear Vayusenabad and Sangam Vihar Police Station / Near
28.08.2018	Najafgarh Drain & DJB sewage plant
28.08.2018	Naraina T-Point under flyover
28.08.2018	Near Mahipal Pur Market bath carriageway/Mahipalpur Market
28.08.2018	Roundabout Punjabi Bagh / Under Punjabi Bagh Flyover/Underpass Punjabi Barh

28.08.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
28.08.2018	Under new Moti Nagar flyover to Punjabi Bagh
28.08.2018	Maya Puri Chowk
28.08.2018	Raja Garden Chowk Red light
28.08.2018	Rajender Prasad Road to Windsor Place Janpath
28.08.2018	T-Point new Moti Nagar Flyover/T- Point Punjabi Bagh Club Road
28.08.2018	Under Punjabi Bagh Flyover
28.08.2018	Under Rajokari Flyover
28.08.2020	From Mukundpur to Azadpur carriageway
28.08.2020	Gali No. 10, Anand Parbat
28.08.2020	Near BDO Office Najafgarh both carriageway
28.08.2020	Near Nepal Embassy
28.08.2020	Near Patrol Pump Majnu Ka Tila
28.08.2020	Near Pipal Chowk
28.08.2020	Near PS Timarpur
28.08.2020	Near RML Hospital
28.08.2020	Near Savitri Cinema
28.08.2020	Near Vayusenabad
28.08.2020	Under I.P. Flyover
29.06.2017	Near Apollo Metro Station
29.06.2017	Near Harkesh Nagar Bus Stop
29.06.2017	Near Vayusenabad
29.06.2017	On Ashram to Apollo carriageway near Harkesh Nagar.
29.06.2017	Tigiri To Bhatra Hospital
29.06.2017	Near Okhla Tank
29.06.2017	Under Defence Colony Flyover
29.07.2021	AIIMS towards Barapulla flyover
29.07.2021	Between Dharampura and Iron Bridge / near Iron Bridge
29.07.2021	C-Hexagon Tilak Bridge
29.07.2021	Infront of WHO Building
29.07.2021	Near Bhajanpura Bus Stand
29.07.2021	Near P.S. Timarpur (ooth carriageway) / Waziraoad Road to Mall Road
29.07.2021	Noar Central School Greater Kallash
29.07.2021	INA towards AIIMS Underpass
29.07.2021	Near Mundka Metro Station
29.08.2018	Near Mahipal Pur Market bath carriageway/Mahipalpur Market
29.08.2018	Opposite Police Station Civil Lines
29.08.2018	T-Point RTR towards Airport/ near RTR flyover/near Shani Mandir / Near Vasant Valley School
29.08.2018	Under Palam-Dwarka Flyover / At the foot of Dwarka Flyover
30.06.2017	Ajmeri Gate
30.06.2017	Andrews Ganj

30.06.2017	Azad Market Chowk and Chowki No. 2
30.06.2017	Bhairon Road Mathura Road T-Point
30.06.2017	Carriageway leading from Moti Bagh to IGIA
30.06.2017	D-Block, Mangolpuri
30.06.2017	DCM Chowk
30.06.2017	Infront of ESI Hospital, Ring Road near Rajouri Garden
30.06.2017	Kalindi Kunj to Apollo Flyover
30.06.2017	Karol Bagh
30.06.2017	Khanpur to Hamdard Nagar
30.06.2017	Madhuban Chowk, Outer Ring Road - Bhagwan Balmiki Marg
30.06.2017	Mehram Nagar Red light IOC Red Light Service Road, Delhi Cantt
30.06.2017	Near Munirka Flyover
30.06.2017	Near PTS Malviya Nagar
30.06.2017	Near Saket Metro Station Gate No 2
30.06.2017	Near Water Tank
30.06.2017	Neat Post Office, Naraina
30.06.2017	P.S Mayapuri to Lajwanti
30.06.2017	Rajdhani Park to Mundka Metro Station
30.06.2017	Roundabout Tuglak Road
30.06.2017	Under Chirag Delhi Flyover
30.06.2017	Under Defence Colony Flyover
30.06.2017	Under Dhaula Kuan Flyover
30.06.2017	Under Jahangir Puri Metro Station
30.06.2017	Under Panchsheel Flyover
30.06.2017	Under RTR Flyover
30.06.2017	Under Savitri flyover
30.06.2017	Kapashera chowk
30.06.2018	Dhaull Pyaau near West Janakpur! Metro Station / Distt. Centre Janakpuri
30.06.2018	Near Agrasen Hospital
30.07.2021	Near P.S. Ciril Lines
30.07.2021	Near Seelampur Flyover (Shastri Park to Shahdara carriageway) / on the foot of Seelampur Flyover (ISBT to Apsara Border carriageway)
30.07.2021	Pul Prahladpur underpass
30.07.2021	Towards Khyoas Pass road
30.09.2021	Madhuoan Chowk
31.07.2017	Bhajanpura Chowk & Khajuri Chowk
31.07.2017	Loni Gol Chakkar
31.07.2017	Madanpur Khadar infront of Hyundai Showroom
31.07.2017	Near Batla House
31.07.2017	Near Wazirabad Chowk
31.07.2017	Nizamuddin Khatta near I.P. Bus Stand
31.07.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
31.07.2017	Infront of Batra Hospital

31.07.2017	Near Jungpura Metro Station
31.07.2017	Near Vayusenabad
31.07.2017	Opposite Okhla Sabzi Mandi
31.07.2020	Before Moti Bagh Flyover on the carriageway Dhaula Kuan towards AIIMS
31.07.2020	Infront of GTK DTC Depot
31.08.2017	Badarpur Red Light Carriageway
31.08.2017	Bhartal Chowk
31.08.2017	Carriageway leading from Moti Bagh to IGIA
31.08.2017	Near IGNOU cut
31.08.2017	Near Old Police Station building Badarpur
31.08.2017	Near PTS Malviya Nagar
31.08.2017	Near Red light GGR - PDR (Gurgaon Road-Parade Road)
31.08.2017	Rajdhani Park to Mundka Metro Station
31.08.2017	T-Point Arjun Nagar towards Green Park
31.08.2017	Under Modi Mill Flyover & Near Modi Mil U-Turn
31.08.2017	Under Narula Flyover'
31.08.2017	Under RTR Flyover
31.08.2017	Under Savitri flyover
31.08.2017	Underpass Sarita Vihar Flyover
31.08.2017	Zandhu Singh Marg Red Light
31.08.2017	Near Kela Ghat
31.08.2017	Near Saket Metro Station Gate No 2
31.08.2017	Near Vayusenabad
31.08.2019	Opposite Tis Hazari Courts
31.08.2021	A-Block
31.08.2021	Hanuman Mandir near Palam Flyover / Towards Palam flyover from IOC Sadar Bazar
31.08.2021	IIT towards Mother International School
31.08.2021	Infront of Vigyan Bhawan
31.08.2021	Moolchand Underpass
31.08.2021	Near 11 Murt towards RML Hospital
31.08.2021	Near Adhchini towards MMTC
31.08.2021	Near AIIMS
31.08.2021	Near Bhisim Pitamah crossing
31.08.2021	Near Chhata Rail
31.08.2021	Near Moolchand Hospital
31.08.2021	Near Rajdhani Partk Metro Station ooth carriageways
31.08.2021	Near Saket Metro Staton
31.08.2021	Noar GPO
31.08.2021	Pul Prahladpur underpass
31.08.2021	Q-Point Mot Lal Nehru Marg
31.08.2021	Shahjahan Road Shankar Road
31.08.2021	Sunheri Bagh towards Rai Bhawan
31.08.2021	W-Point

31.08.2021	Zakhira Railway Track
31.08.2021	Zakhira underpass
31.08.2021	Anand Paroat Gali No. 10
31.08.2021	Buta Singh Roundabout
31.08.2021	Near Nizammunddin Khata
31.08.2021	Near Roundabout Pusa
31.08.2021	Near Water Tank
31.08.2021	Towards Akhar Road
31.08.2021	Tamil Sangam Marg

Table 4: Waterlogging Data [2017-2021]