



DISTRICT ENVIRONMENT PLAN FOR SRI GANGANAGAR

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PREFACE

Growing concerns about the environmental and ecological implications of population growth, industrialization, and other developmental processes and the impact of energy resource utilization are fostering increasing interest in environmental and ecological protection. Such understanding has become essential to advancing the quest for a cleaner environment and sustainability. New approaches to ecology and the environment that provide an engineering perspective and a scientific basis to activities are of particular interest. However, such initiatives can be achieved if we formulate appropriate action plans supported by sound scientific information, all necessary data, societal preferences, and the availability of funds.

As directed by the Honorable National Green Tribunal (NGT), District Environment Plan has been prepared for the Sri Ganganagar district by taking into consideration of the current status of various environmental concerns and potential environmental issues required to be addressed keeping in view of desirable planned developmental activities in future. The District Environmental Plan for Sri Ganganagar District is in line with the model District Environment Plan of CPCB, New Delhi. This District Environment Management Plan would play an important role in implementing mitigation measures to minimize adverse environmental impacts associated with different activities.

We are in the 21st century. The population is expanding, the demand for resources is increasing, the climate is changing and the impact of humanity on the earth is increasing day by day. There would be daunting challenges for human society and the environment in coming times to facilitate safe, sufficient, and secured resources for all dimensions of life. We have to achieve a better quality of life for our growing population sustainably, without compromising the requirements of future generations to achieve the same.

The District Environment Plan is ambitious, though very necessary. The challenges ahead are considerable. We must achieve a permanently better standard of living for our growing population without compromising the needs of generations to come. I am sure the “District Environment Plan for Sri Ganganagar District” presented here will be useful in planning and executing various development schemes of the district without compromising environmental quality and will prove an invaluable asset for associated departments/agencies.

I am thankful to the entire team members who have actively participated for their invaluable contribution. I am happy to appreciate the co-operation of the entire District Administration and request that all concerned district officials must act to achieve the targets for maintaining a clean, safe, and secured environment in their respective domains to make this plan a success.

I wish to thank Sri Ashutosh Ojha, DCF, Sri Ganganagar and Nodal Officer & Member Secretary, District Environment Committee, Sri Ganganagar and his team for his active participation, necessary support and overall coordination during preparation of this district environment plan.

I wish to extend our special thanks to Prof. Ajit Pratap Singh, Professor and Dean, BITS Pilani, and his team for accepting the task of preparing the district environment plan for the Sri Ganganagar district. His consistent efforts throughout for preparation of this report are highly appreciated. The plan shall surely prove most fruitful to the people of Sri Ganganagar district.

Sri Ganganagar
September 20, 2021

Shri Zakir Hussain, IAS
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ABOUT THE REPORT

Since the beginning of civilization, human beings have been utilizing natural resources and the environment to fulfil their requirements. Progress towards different sectors, viz., agriculture, manufacturing, mining, infrastructure, transportation, industrialization, and energy production have extremely improved standards of living. However, this has been achieved at a cost to natural resources and environmental systems. Human impacts on the environment accelerated with the advent of the Industrial Age and the subsequent rapid growth of the human population, creating significant areas of resistance between humans and the environment. The quality of the environment has been degrading day by day, forests are replaced with sprawling development; water resources, viz., groundwater aquifers, rivers, lakes, and soil have been contaminating with harmful chemicals; endangered species are becoming extinct.

As the human population increases, so the demand for natural resources increases, and natural systems experience more pressure. These effects will appear in different areas in different ways. By 2050, at least two-thirds of the population will live in cities, putting pressure on urban systems that provide clean water, food, energy, and sanitation. As a result, rapid economic and population growth would threaten to dominate infrastructure and would lead to a sharp increase in pollution as was experienced by the developed world in the early 20th century. We will face new types of challenges - those driven by climate change - that are not equipped to handle existing policies, technologies, and infrastructure.

There is a need to support human and environmental needs while mitigating adverse impacts associated with human activities. Driven by public sentiment in support of protecting natural resources and human health and due to the execution of by-laws aimed at implementing some of the most powerful forms of environmental protection, we have achieved notable successes over the past few decades. However, solutions to the past will not be sufficient to overcome future problems. As humanity faces increasing and diverse challenges, a comprehensive plan needs to be developed at the district level to cover all issues related to the environment of the district.

Such an environment plan at the district level should deal with environmental conservation planning, pollution mitigation, management of wastes, conservation of natural resources including surface water and groundwater, and necessary measures for ecological balance in a sustainable manner. This plan is also required to restore the ecological balance of all the cities/districts through smart planning for waste minimization, control of different types of pollution,

and intense drive for tree plantation so that we can build a better tomorrow with its unique strengths, inspire and implement visionary solutions, and continue to evolve in order to serve the best interests of people of the district of Sri Ganganagar and the planet.

As directed by the Hon'ble National Green Tribunal (NGT), District Environment Plan has been developed for the Sri Ganganagar district by taking into consideration of the current status of various environmental attributes and probable future environmental issues required to be addressed for future planned developmental activities.

The Environmental Management Plan plays an important role in implementing mitigation measures to minimize adverse environmental impacts on various developmental activities. We hope that the “District Environment Plan of Sri Ganganagar district” will be useful in planning and executing various development schemes by keeping in view of pressing challenges of different environmental problems of the 21st century and will prove an invaluable asset for different agencies working in this field for the betterment of the Sri Ganganagar district.

Sh. Zakir Hussain, IAS, District Collector Sri Ganganagar took special interest to help and guide us to develop district environment plan along with his team of ADMs and Sh. Ashutosh Ojha (IFS), DCF, Shri Amit Soni, Regional Officer, RSPCB, Sri Ganganagar, Commissioner-Municipal Council, and all Executive Officers of nine Nagarpalika/Municipal Board, Chief Executive Officer, Zilla Parishad Sri Ganganagar, Regional Manager, RIICO, Sri Ganganagar, Executive and Assistant Engineers of all concerned Departments, SDMs, Tehsildars, and BDOs. All of them have provided us their full support whole-heartedly with excellent cooperation. Executive Engineers, AENs & Chemist PHED, Executive Engineers & AENs Irrigation, Deputy Director & AENs Deputy Director & -Assistant Director Agriculture, Senior Hydrogeologist Groundwater, Engineer in Charge, Mining Department, District Statistical Officer, Public Relation Officer, and several officials, agencies personnel have also provided us needed data and extreme support.

We express our extreme gratitude to Shri Zakir Hussain, IAS, District Collector, Sri Ganganagar for his keen interest, guidance, and district-level support. Special thanks to the entire team of district administration including Additional District Magistrates, CEO, ACEO, SDMs, Commissioner-Municipal Council, and all E.O.s, Tehsildars, and BDOs, for their continued excellent support and guidance.

Our most sincere gratitude to Sh. Ashutosh Ojha (IFS), DCF and Member Secretary, District Environment Committee (District Nodal Officer) and his entire team for their continued support and necessary help. We are also thankful to Shri Amit Soni, Regional Officer, RSPCB, Sri Ganganagar for sharing important information.

Thanks are due to all Irrigation Engineers, PHED - Engineers Watershed Engineers and Zila Parishad/DRDA Engineers, District Senior Hydrogeologist, Deputy Directors Watershed & Agriculture, District Statistical Officer, and Public Relation Officer who cooperated extremely well and provided us the enormous data freely & happily all through the study period.

We wish to extend our thanks to those who have helped to prepare this report directly or indirectly.

Last but not least we are thankful to the entire team especially Dr. Harish Pupalla, Assistant Professor, BML University, and my friend who has continuously given his consistent efforts and support throughout for preparation of this report.

The report on 'District Environment Plan of Sri Ganganagar district' has been compiled in fourteen Chapters which are described as given below:

Chapter 1 on 'Introduction' addresses background information and aims & objectives of the study. This chapter covers the background of preparation of district environment plan along with the aim, objective & scope of the district environment plan. It also discusses the information on the constitution of the District Environment Committee / District Specific Task Forces for Environment management in context to the Sri Ganganagar district of Rajasthan.

Chapter 2 on 'Brief Profile of the District ' reveals the position of district towns/Nagarpalika along with population statistics.

Chapter 3 on 'Solid Waste Management' covers the present scenario of solid waste management of Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials as provided by CPCB for Model DEPs. Finally, it emphasizes the details of action plans along with the actionable points, the present status of implementation, gap to be addressed, and proposed timeline for completion with the financial cost required. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks.

Chapter 4 on 'Plastic Waste Management' deals with the present scenario of plastic waste management of Sri Ganganagar district in general and its status in different urban local bodies

(ULBs) particularly. Finally, it emphasizes the details of action plans along with the actionable points, the present status of implementation, gap to be addressed, and proposed timeline for completion with the financial cost required. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks.

Chapter 5 on Construction and Demolition Waste Management' covers the present scenario of construction and demolition waste management of Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks.

Chapter 6 on 'Bio-Medical Waste Management' deals with the current status of bio-medical waste management in Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials has been presented as per the format prescribed by CPCB for Model DEPs. Finally, it emphasizes the details of action plans along with the actionable points, the present status of implementation, the gap to be addressed. The activities are suggested by keeping in view of the future generation of wastes etc.

Chapter 7 on 'E-Waste Management' mainly deals with the current status of E-waste management in Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials has been presented as per the format prescribed by CPCB for Model DEPs. The details of action plans along with the actionable points, the present status of implementation, gap to be addressed, and proposed timeline for completion with the financial cost required are also discussed.

Chapter 8 on 'Hazardous Waste Management' has dealt with the current status of the production of hazardous waste in the district. From the collated information, it is observed that no potential hazardous waste is noticed, essential resources might be required to assess its quantity in appropriate manner so that the mitigations activities can be performed.

Chapter 9 on 'Water Quality Management Plan' deals with the current status of water management in Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Finally, it emphasizes the details of action plans along with the actionable points, the present status of implementation, gap to be addressed, and proposed timeline for completion. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks embodies, in short, the water policy matters and litigation factors.

Chapter 10 on 'Domestic Sewage Management Plan' & Industrial Waste Management Plan' is a comprehensive account of 'Domestic Sewage & Industrial Waste Management in Sri Ganganagar district. It includes the details of ULB-wise sewage generation, treatment capacity available and treatment capacity utilization, sewerage connectivity, the gap of treatment. The details of action plans along with the actionable points, the present status of implementation, gap to be addressed, and the proposed timeline for completion of the relevant tasks are also discussed.

Chapter 11 on 'Air Quality Management Plan' deals with the Status and Inventory of Air Quality Management in the Sri Ganganagar District along with a brief insight on each of the air pollutants. From the collected information, it has been identified that Small Scale units especially stone crushers and mining activities along with Brick Kilns are the major sources of air pollution in the Sri Ganganagar district. However, emissions from the majority of the industries have been found within the permissible limits.

Chapter 12 discusses on 'Mining Activity Management Plan'. Sri Ganganagar district is rich in mineral resources. Sri Ganganagar is fairly endowed with various minerals whose industrial use has immensely contributed to the economy of the district.

Chapter 13 on 'Noise Management Plan' deals with the Status and Inventory of noise pollution in Sri Ganganagar District. Though the study found that the noise level in all the measured locations is within the acceptable limits i.e., 85dBA, drawing conclusive remarks regarding the noise level in the Sri Ganganagar district may not be credible. Therefore, there is a need to conduct studies at multiple critical locations in the Sri Ganganagar district.

Chapter 14 on 'Forest Conservation Practices' covers the general information regarding types of forest found in Sri Ganganagar district, forest land, the current management practices being adopted. The threats to forest/forest land in context to this district have also been identified and discussed. Finally, different afforestation activities proposed in forest land, as well as city/town area, are listed along with brief action plans.

September 20, 2021



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Chapter 1: Introduction

This Chapter covers the background of preparation of district environment plan along with its aim, objective & scope of the district environment plan. It also discusses about the information on constitution of District Environment Committee / District Specific Task Forces for Environment management in context to **Sri Ganganagar district of Rajasthan**.

1.1 Background of Preparation of District Environment Plan:

Hon'ble National Green Tribunal, New Delhi has passed an order on 15-07-2019 in O.A. No. 710/2017 titled as Shailesh Singh Versus Sheela Hospital and Trauma Centre Shahjahanpur that it is necessary to have a District Environment Plan to be operated by the District Committee and further vide order dated 26-09-2019 in O.A. No. 360 of 2018 filed by Shree Nath Sharma Vs Union of India and others directed that CPCB shall facilitate the District Magistrates in preparation of District Environmental Plan by placing Model plan on its website. This model plan may be adopted as per local requirements by all District under supervision of District Magistrate.

In the above said order, it is stated that among others

“Chief Secretaries may personally monitor compliance of environmental norms (including BMW Rules) with the District Magistrate once every month. The District Magistrates may conduct such monitoring twice every month.

“We find it necessary to add that in view of Constitutional provisions under Articles 243 G, 243 W, 243 ZD read with Schedules 11 and 12 and Rule 15 of the Solid Waste Management Rules, 2016, it is necessary to have a District Environment Plan to be operated by a District Committee (as a part of District Planning Committee under Article 243 ZD) with representatives from Panchayats, Local Bodies, Regional Officers, State PCB and a suitable officer representing the administration, which may in turn be chaired and monitored by the District Magistrate. Such District Environment Plans and Constitution of District Committee may be placed on the website of Districts concerned. The monthly report of monitoring by the District Magistrate may be furnished to the Chief Secretary and may be placed on the website of the District and kept on such websites for a period of one year. This may be made operative from 1.08.2019. Compliance of this direction may also be seen by the Chief Secretaries of the States/UTs. This may not only comply with mandate of law but provide an institutional mechanism for effective monitoring of environment norms.”

Keeping in view of above facts, it has been planned to prepare the Environment Development Plan of **Sri Ganganagar District** in such a way so that District environment plan not only outline the present status and gaps in implementation but also identify agencies responsible, requirement of infrastructure facilities for sewage treatment, waste management, monitoring environmental quality etc. It should also provide timelines for implementation; identify local issues, constraints in implementation, priority action areas and issues requiring more attention.

Based on the District Environment Plans, State Environment Plans and National Environment Plan shall be prepared. It is required to ensure that information pertaining to all District Environment Plans is captured into State Environment Plans and National Environment Plan.

1.2 Aim, Objective & Scope of the District Environment Plan

The aims and objectives of this District Environment Plan (DEP) are set as given below:

- To ensure conservation of environment and natural resources at district level.
- Restore ecological balance.
- To achieve the Sustainable Development Goals (SDGs) and district level targets within the prescribed timeline.
- To ensure sustainability at district level following the principles of resource efficiency.
- To ensure decentralized micro level planning, execution and monitoring regarding environment conservation.
- To incorporate all facets of environmental conservation in micro level planning.
- To harness active participation of all stakeholders in planned environment conservation actions.
- Assess, Mitigate and monitor adverse impacts of various pollution sources at district level.
- Capacity building of stakeholder, department, agencies, organizations and individuals at district level to understand and implement micro level environmental conservation actions.

- To harness inter-departmental coordination for implementation of action plans.
- To develop local knowledge centres and expertise for developing environmental conservation strategies at district level.
- To develop and implement micro monitoring system at district level.

1.3 Honourable N.G.T. Directions (Important NGT/Supreme Court/ High Court Cases on Environment Management (e.g., OA 673/2018; OA 681/2018/ OA 606/2018, etc.)

- a. Hon'ble NGT in the last one year has issued several directions in various matters which have been based on status brought out by the CPCB on their website and status reports filed before the Tribunal.
- b. As per honorable NGT order dated 15.07.2019 in O. A. No 710-713/2017, O.A. No. 606/2018, it is the duties and responsibilities of various stakeholders to make the solid waste management plan a successful and implementable action.
- c. Thereafter, vide order dated 26.09.2019 in the present matter, it was observed: -
 - (i)“This Tribunal in O.A. No. 606/2018, while dealing with the compliance of Municipal Solid Waste Management Rules, 2016 also flagged other issues and required monitoring at the level of the Chief Secretaries and the District Magistrates. The Chief Secretaries of all the States/UTs have appeared before this Tribunal, including the Chief Secretary of State of Rajasthan and directions have been issued for continuous monitoring and filing of further reports. (ii) Vide order dated 12.09.2019, while fixing a schedule for further appearance of the Chief Secretaries of all the States/UTs, direction has been issued to compile information with reference to the following specific thematic areas viz.:

- Compliance to Solid waste rules including legacy waste.
- Compliance to bio-medical waste rules.
- Compliance to construction & demolition Waste.
- Compliance to hazardous waste rules.
- Compliance to E-waste rules.
- 351 Polluter stretches in the country.
- 122 Non-attainment cities.
- 100 industrial clusters.
- Status of STPs and re-use of treated water.
- Status of CETPs/ETPs including performance.

- Ground water extraction/contamination and re-charge.
 - Air pollution including noise pollution.
 - Illegal sand mining.
 - Rejuvenation of water bodies.
- d. Hon'ble National Green Tribunal (NGT) has ordered Pan-India Directions on various issues relating to environment management and these are to be executed by the Central and State Governments and concerned institutions. Further, the directions are required to be executed at District Level covering all cities, towns and villages.
- e. The role and responsibilities of enforcement are with District Collectors/Magistrates, Pollution Control Boards, Municipal Bodies, Public Health Engineering Departments and others.
- f. The present state level execution and monitoring mechanism on various State and Central Government's Schemes are monitored by Chief Ministers/ Chief Secretaries with DMs/DCs.
- g. Various Directions of NGT to be covered in District Environment Management Plan (DEMP).
- h. Information about any District Specific case (if any) and Committee/Task Force constituted has also been discussed.

1.4 Information about Constitution of District Environment Committee / District Specific Task Forces for Environment management

In view of these directions, District collector of Sri Ganganagar letter no. 40(33)() General/EC/2016/3507-28 dated 10.10.2020 and Letter no. 40(33) () General/EC/2021/2985- 3013 dated 17.05.2019 constituted District Environment Committee with representatives from Village Panchayats, Municipal Councils, Regional Offices, Rajasthan State Pollution Control Board, Department of Environment and an officer representing the administration for preparing District Environment plan. Prof. Ajit Pratap Singh, BITS Pilani has been given the work of preparation of the District Environment Plan in association with Sri Ashutosh Ojha (IFS), DCF, Sri Ganganagar and R.O., RSPCB, Sri Ganganagar and Executive Officers of respective Nagar Palika, etc.

As per the OA no. 360/2018 titled as Shree Nath Sharma V/s Union of India, the Hon'ble NGT vide order dated 26.09.2019 has directed to constitute District Environment Committee for preparation and monitoring of District Environment Plan. Accordingly,

District Environment Committee was constituted with representatives from Panchayats, Local Bodies, Regional Officer, Rajasthan State PCB and all concerned officials representing the district administration, in compliance to the said orders of the Hon'ble NGT. This District Committee has been chaired and monitored by the **Sri Ganganagar District Magistrate**. The District Level Environment Committee constituted by the District Collector, Sri Ganganagar, which is given in **Table 1.1**:

Table 1.1. District Environment Committee – Sri Ganganagar District

S. No.	Name	Designation
1.	Sri Zakir Hussain, IAS, District Collector and District Magistrate, Sri Ganganagar	Chairperson
2.	Sri Rajan Dushyant, Superintendent of Police, Sri Ganganagar	Member
3.	Sri Ashok Meena Chief Executive Officer, Zilla Parishad, Sri Ganganagar	Member
4.	Sri Baldev Singh Chohan Chief Medical Officer, SriGanganagar	Member
5.	Dr Haritima Commissioner, Nagar Parishad Sri Ganganagar	Member
6.	Sri Amit Soni Regional Officer, RSPCB, Sri Ganganagar	Member
7.	Sr Vinod Kumar Regional Manager, RIICO, Sri Ganganagar	Member
8.	Sri Harish Mittal General manager, District Industries Center, Sri Ganganagar	Member
9.	Sri Dhiraj Chawla Deputy Director, Agriculture, SriGanganagar	Member
10.	Sri Brander Balana Superintending Engineer, Water Resources Department, Sri Ganganagar	Member
11.	Sri Ashok Kumar Gupta Superintending Engineer, Public Health Engineering Department, Sri Ganganagar	Member
12.	Sri Barkat Ali Scientist, Groundwater Department, SriGanganagar	Member
13.	Sri Vinod Legha District Transport Officer, Sri Ganganagar	Member
14.	Sri Ranjeet Singh Bath District Education Officer, Primary and Secondary Education, Sri Ganganagar	Member
15.	Sri Dinesh Sharma Inspector, factory and boilers department, Sri Ganganagar	Member
16.	Sri Chaggan Lal, Mining Engineer, Sri Ganganagar	Member
17.	All Executive Officers, Municipal Boards	Member
18.	Sri Ashutosh Ojha (IFS), DCF, Sri Ganganagar	Member Secretary and Nodal Officer

Different meetings of the District Environment Committee were held from time to time to formulate the District Environment Plan for Sri Ganganagar District. The responsibility of

all respective officials and every Municipal councils/Nagarpalika or Village panchayat was fixed. The details regarding various functions of the DEC, powers of the DEC and reports to be submitted by the DEC have also been notified. Subsequently, questionnaire forms have been prepared to get authentic data in line with the model District Environment Plan (DEP) of CPCB and floated among all concerned representatives at various levels. They have been asked fill the questionnaire by providing their response for specific data covering following seven thematic areas.

- Waste Management Plan
 - Solid Waste Management Plan
 - Plastic Waste Management
 - C&D Waste Management
 - Biomedical Waste Management
 - Hazardous Waste Management
 - E-Waste Waste Management
- Water Quality Management Plan
- Domestic Sewage Management Plan
- Industrial Wastewater Management Plan
- Air Quality Management Plan
- Mining Activity Management plan
- Noise Pollution Management Plan
- Conservation of Water Bodies
- Prevention of Illegal Sand Mining
- Environment Threats
- Soil and Agriculture Land

The awareness about preparation of District Environment Plans among the stakeholders of each department was created in a time bound manner and action plans formulated to implement it.

Chapter 2: Brief Profile of the District

2.1 Administrative Profile of District

Ganganagar district is located in the northernmost part of Rajasthan State and extends between latitudes 28°42'30'' and 30°12'00'' N and longitudes 72°39'15'' and 74°18'30''E. Occupying an area of around 11154.66 sq km, the district is surrounded by Bikaner and Hanumangarh districts of Rajasthan, Ferozpur district of Punjab and International border of Pakistan in the south, east, north and west respectively. For administrative convenience, the district is divided into 10 development blocks viz. Anupgarh, Sri Ganganagar, Gharsana, Karanpur, Padampur, Raisinghnagar, Rawla mandi, Sadulshahar, Suratgarh, Vijaynagar. It has a total population of 1969168 as per 2011 Census. The district has 3014 villages and 12 cities and towns. Rural and urban population of the district is 14.34 lakh and 5.36 lakh respectively.

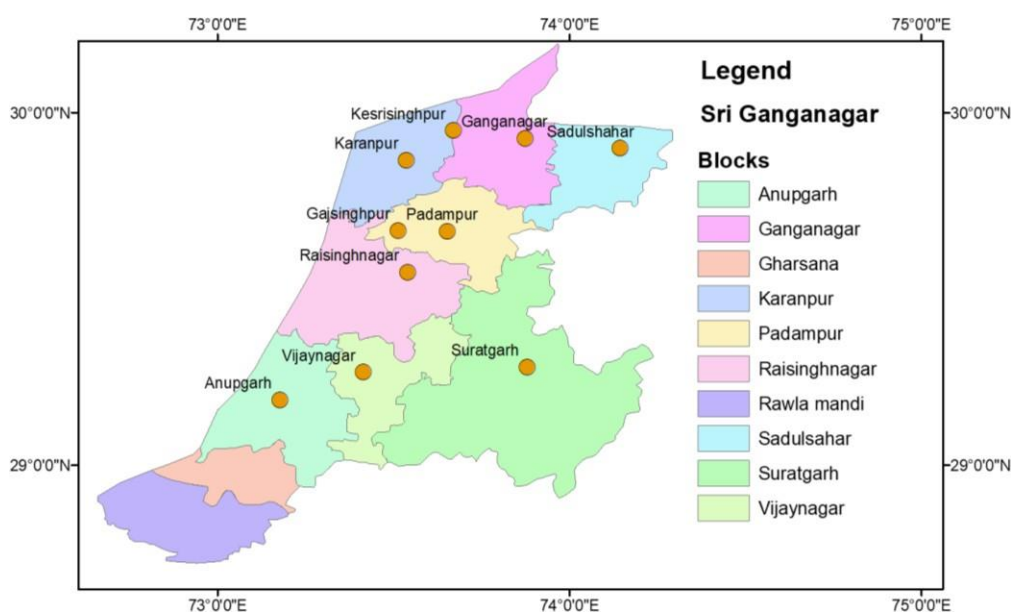


Figure 2.1. District map of Sri Ganganagar

2.2. Topography

The district is a part of the Great Thar Desert. The district generally has undulating topography in the northern and northeast part, while the dune complex occupies the southwestern part of the district. Ganganagar falls under ‘Outside Basin’. The Ghaggar River is the only major river in the district, also locally known as ‘Ghaggar Nala’. The general topographic elevation in the district is between 125 m to 150 m above mean sea level in most of the blocks. Elevation ranges from a minimum of 104.8 m above mean sea level in Anupgarh block in the SW part of the district to a maximum of 230.2 m above mean sea level. In Suratgarh, in the south-eastern part of the district.

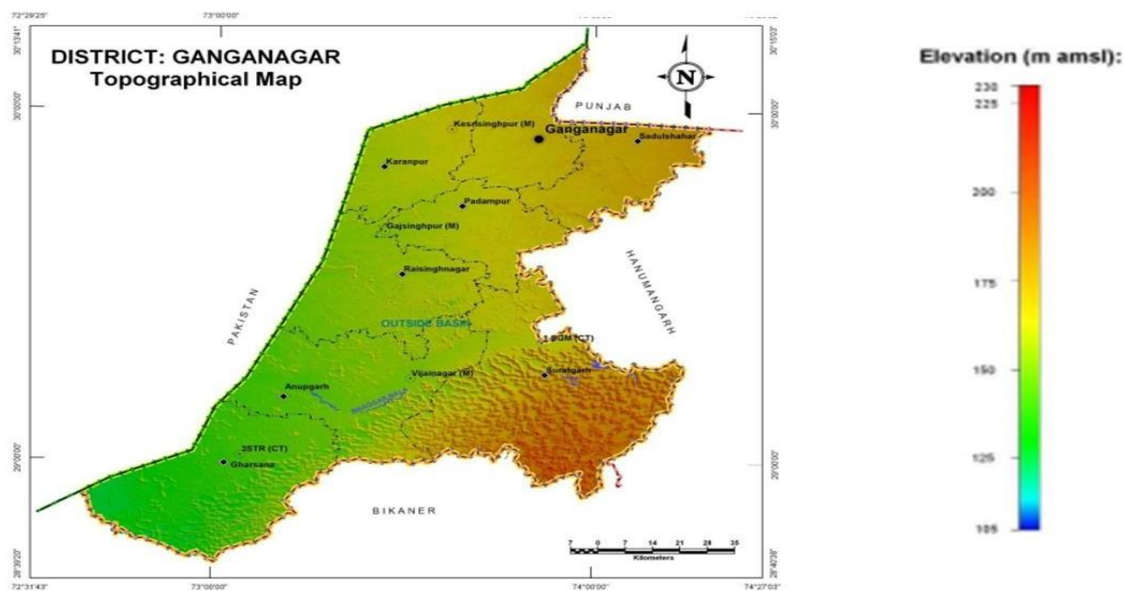


Figure 2.2. Spatial variation of elevation in the Sri Ganganagar district The highest and lowest elevation in a few of the blocks are presented in **Table 2.1**.

Table 2.1. Block wise minimum and maximum elevation

S. No.	Block name	Minimum Elevation	Maximum Elevation
1.	Anupgarh	104.8	204.7
2.	Ganganagar	166.2	190.8
3.	Gharshana	124.4	186.4
4.	Karanpur	149.4	180.9
5.	Padampur	153.4	186.3
6.	Raisinghnagar	145.3	190.0
7	Sadulshahar	164.3	197.7
8	Suratgarh	155.1	230.2

2.3. Climate and Rainfall

The arid type of climate prevails in major parts of the district. It is characterized by hot summer and cold winter. The mean daily minimum temperature is 4.7°C, and the mean daily maximum temperature is 42.1°C. Southwest monsoon season prevails from June to mid-September, followed by the post-monsoon period until November. The winter season sets by the middle of November. January is the coldest month, with mean daily maximum and minimum being the lowest at 20.5°C and 4.7°C, respectively. At the end of February, the temperature starts rising until June, the hottest month, with a mean daily maximum temperature of 42.1°C. The mean daily minimum temperature is the highest, which is nearly 28.1°C, during July. The district, on average, receives 293.2 mm of rainfall.

2.4. Geomorphology

The district is a part of the Thar desert and is covered by a thick layer of alluvium and wind-blown sand. The northern part of the district is nearly plain and is underlain by alluvium. South of this alluvial plain is middle sandy plains which are somewhat affected by sand dunes. The central part is characterized by E-W trending longitudinal alluvial belt, the Ghaggar flood plains varying in width from 3 to 12 km. The southern part of the district lies under a thick blanket of wind-blown sand which forms sand dunes varying in height from 5 to 50 m. The district is also characterised by a number of natural depressions bounded by sand dunes of variable geometry. There is only one marked surface drainage feature viz. Ghaggar river, which traverses from northeast to southwest and finally enters Pakistan. It is an ephemeral river that flows in response to rainfall. Sometimes, the river is flooded during the monsoon period. As a flood control measure, excess water from the Ghaggar river is diverted through a diversion channel into the natural depressions in the southeast of Suratgarh.

The district is drained by canals of (1) the Bhakra canal system, (2) Indira Gandhi Nahar Pariyojana, and (3) the Gang canal system. Bhakra canal system: Bhakra canal draws water from Govind Sagar, which is fed by Sutlej and Beas rivers. Rajasthan's share in Sutlej water is 2096 million cubic metres (mcm)/year. It provides irrigation to 372,000 hectares (ha) area through a total of 1,949 km of the canal network. Branches of the Bhakra canal irrigate northern and northeastern parts of the Ganganagar district. Indira Gandhi Nahar Pariyojana: Indira Gandhi Nahar Pariyojana is a multidisciplinary irrigation project conceived to use 10.69 billion cubic metres (bcm) of water available from the Ravi and Beas rivers annually to cultivate 1087 million hectares (mha) of land in the Thar desert of

western Rajasthan. The IGNP Stage-I includes Anupgarh and Suratgarh branches/ distributaries in the Ganganagar district. Gang Canal System: Gang canal begins at Hussainiwala head works in Punjab. The upper section of this canal is lined and is known as the Bikaner canal. It enters Rajasthan from the north and is known by the name Gang canal. It is unlined and irrigates a significant part of the Sri Ganganagar district.

The description of the geomorphological units that are encountered in the district is given in **Table 2.2**, and the spatial distribution of these geomorphological units is presented in **Figure 2.3**.

Table 2.2. Description of geomorphological units of Sri Ganganagar district

Origin	Landform Unit	Description
Aeolian	Dune Complex	An undulating plain composed of number of sand dunes of crescent shape.
	Dune Complex Valley	The cluster of dunes and interdunal spaces with undulating topography formed due to wind-blown activity, comprising of unconsolidated sand and silt.
	Eolian (Reclaimed) Plain	Gently sloping with a sheet of sand or sand dunes, scattered xerophytic vegetation.
	Interdunal Depression	Slightly depressed area in between the dunal complex showing moisture and fine sediments.
	Sandy Plain	Formed of aeolian activity, wind-blown sand with gentle sloping to undulating plain, comprising of coarse sand, fine sand, silt and clay.
Denudational	Pediplain	Coalescence and extensive occurrence of pediment
Fluvial	Alluvial (Sandy) Plain	Flat to gentle undulating plain formed due to fluvial activity, mainly consists of gravels, sand, silt and clay with unconsolidated material of varying lithology, predominantly sand along the river.

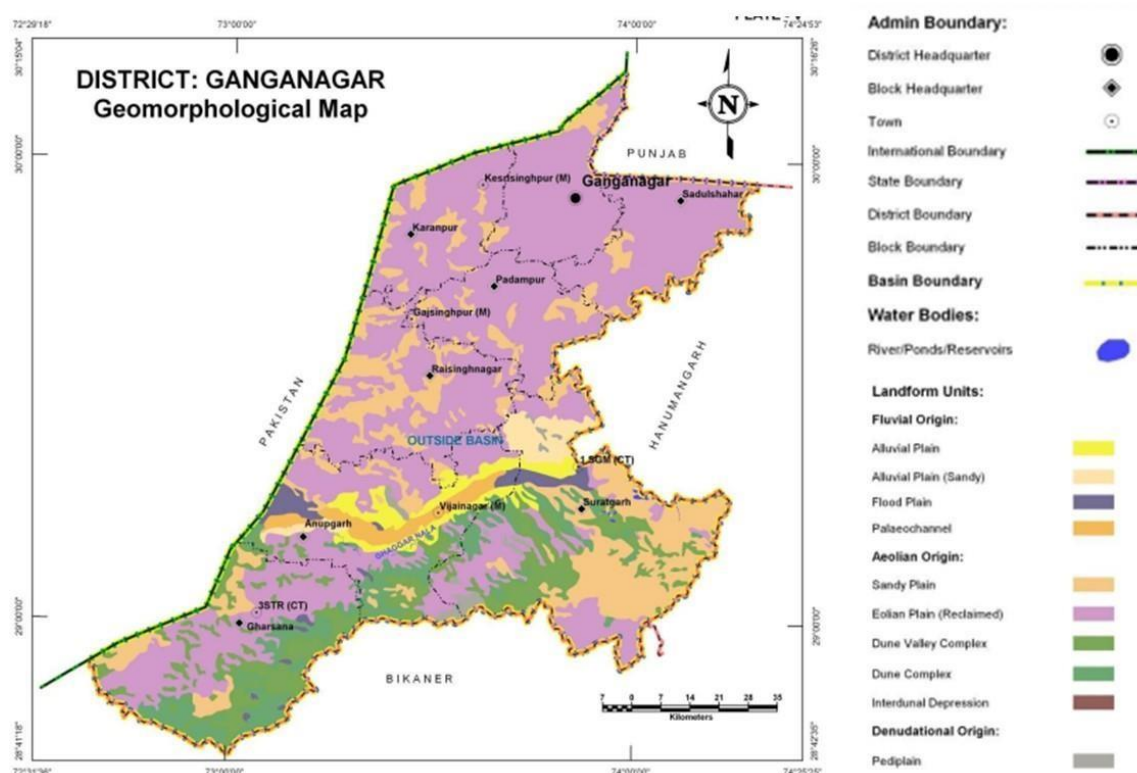


Figure 2.3. Spatial variation of Geomorphological units in the Sri Ganganagar district

2.5. Soil Types and Irrigation Practices

The northern part of the district is characterised by sierozems or arid soils, which are light yellowish-brown to pale in colour. The presence of the kankar layer (calcareous concretions) has been noticed in the depth range of 75 to 100 cm. Soils are deep and moderately drained. Permeability is moderate to moderately slow, and water holding capacity and natural fertility are generally poor. Loamy sand and sandy loam are the predominant types of soil met within this soil group. At places, patches of sand also occur. The southern portion of the district is characterized by desert soils, which are very pale brown to yellowish-brown in colour and are generally devoid of lime concretions. Soils are generally well-drained to excessively drained and have a low moisture-holding capacity and high permeability. The principal means of irrigation in the district is through canals, though wells/ tube wells irrigate some areas. A detailed insight on the tube wells and the variation in water quality is presented in the subsequent chapters.

2.6. Aquifers

There are no hard rock aquifers mapped in the area as all of the water till explored depth occurs in alluvium only. The alluvium is of two types viz., younger alluvium which predominantly is wind-blown sand, whereas the older alluvium is more of fluvial origin. More than 90% of the aquifer area is younger alluvium, and the rest is older alluvium

Table 2.3.

Table 2.3. Description of aquifer units encountered in Sri Gangangar district

Aquifer in Potential Zone	Area (sq km)	% age of district	Description of the unit/Occurrence
Younger Alluvium	9705.8	90.8	It is largely constituted of Aeolian and Fluvial sand, silt, clay, gravel and pebbles in varying proportions.
Older Alluvium	978.2	9.2	This litho unit comprises of a mixture of heterogeneous fine to medium- grained sand, silt, and Kankar.

2.7. Stage of ground water development

All the blocks within the district fall within the ‘Safe’ category from a groundwater development perspective, although a significant part of the district does not contain good quality water for domestic purposes.

More insight on the groundwater quantity and quality based on the water samples collected in the borewells of the district is expounded in **Chapter 9**. For better visualization of the variation, thematic maps have been developed and presented, further used in drawing the conclusion and the management plans.

2.8. Closure

As per Hon’ble NGT Order dated 26/09/2018 in O.A. 360/2018, inventories have been generated for ten ULB’s of the Sri Ganganagar District, format developed by CPCB “O.A. 360/NGT District information plan.xlsx”. The data used for preparing District Environment Plan is based on the data provided by all representatives of ULB’s in the format given by CPCB, as well as data accessed from relevant state web portals, i.e., Department of Mines and Geology, Central Ground Water Board, Ministry of micro small and medium enterprises, Environment

Department of Rajasthan, Rajasthan State Pollution Control board (RSPCB), Rajasthan State Industrial Development & Investment Corporation, Sri Ganganagar District Collectorate, Ministry of Water Resources, River Development and Ganga Rejuvenation.

Documents referred for the preparation of DEP include state sewerage and wastewater policy, Reports of MSME-Development Institute, Hydrological atlas of Rajasthan, Reports of the industrial potential survey, reports of aquifer mapping and groundwater management by CGWB Rajasthan, Groundwater brochure of the Sri Ganganagar district.

The representatives of each urban local body (ULB) have been contacted for the information related to seven thematic areas such as Waste Management Plan, Water Quality Management Plan, Domestic Sewage Management Plan, Industrial Wastewater Management Plan, Air Quality Management Plan, Mining Activity Management plan, Noise Pollution Management Plan. Besides the attributes of each ULB, population details as per the 2011 census are also collected. Because of urbanization, each ULB is projected and used in preparing the action plans.

The questionnaire floated, and the duly filled formats from all the ten ULB's are appended, and the outcomes of the inventory are discussed in the subsequent Chapters.

Chapter 3: Solid Waste Management

This chapter covers the present scenario of solid waste management of Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials as provided by CPCB for Model DEPs. Finally, it emphasises the details of action plans along with the actionable points, the present status of implementation, gap to be addressed, and proposed timeline for completion.

3.1 Present status of solid waste management

Solid waste management is one of the most important services for maintaining the quality of life in urban as well as rural areas and for ensuring better standards of health and sanitation. Due to the rapid growth in the population of India, this service falls short of the desired level as the systems adopted are inefficient. Institutional weakness, shortage of human and financial resources, improper choice of technology, inadequate coverage, and lack of short- and long-term planning are responsible for the inadequacy of services.

Solid wastes, which include bio-medical, municipal and hazardous wastes is a major concern and an eyesore in urban areas. The unregulated disposal of wastes may affect the quality of groundwater in the area through the infiltration of water-soluble substances.

Rajasthan solid waste management policy has been notified by the Government of Rajasthan in the year 2019. The proposed policy on Solid Waste Management (SWM) in Rajasthan is in line with the SWM Rules, 2016 and provides a comprehensive vision for SWM, enabling frameworks and strategies to manage the challenges of SWM in Rajasthan. The policy provides a stimulus to the waste management economy, and promotes environmental up-gradation.

This policy acts as a key instrument in highlighting the vision and strategic goals of the State Government for the development of solid waste management in a sustainable manner. It lays down a detailed roadmap of reduction, reuse, and recycling of waste through innovative technology, consumer service, and education for envisioning the environmental, social, cultural, economic, and technological, and public health concerns. Management of solid waste is a larger challenge not only because of its adverse health and environmental impacts but also due to huge quantities of waste generated. Most Urban Local Bodies (ULBs) lack the capability to handle such huge quantities of solid waste due to financial and institutional frailty. Local authorities struggle from insufficient funds, resources, infrastructure, and

appropriate strategies to improve solid waste management. The Government of Rajasthan intends to adopt the 5R approach (Reduce, Reuse, Recycle, Recover and Remove) by imparting thrust on collection, segregation, improving data and analytics, minimizing environmental impacts, creating a market for recyclable products, and aiming towards sustainable development. The SWM plan should consider a long-term planning horizon of 20–25 years. Short-term implementation plans covering 5 years each should be slotted within the long-term plan for ease of implementation. The short-term plan should be reviewed and updated once every year for any midcourse correction as required. Local bodies should ensure that the short-term plan is aligned with long-term planning and implementation. The SWM plan should be according to the SWM Rules 2016.

As per the Solid Waste Management Rules, 2016, the urban local authorities themselves have responsibilities in managing solid waste in their jurisdictions. Sri Ganganagar comprises 10 urban local bodies (ULB's) where the generation of solid waste is predominant. These are Ganganagar, Anupgarh, Gajsinghpur, Karanpur, Kesrisinghpur, Padampur, Raisinghnagar, Sadulshahar, Suratgarh, and Vijaynagar. Relevant data were collected from these ULBs in the model format in MS Excel. Data were authenticated and were analyzed. The data obtained from the local municipalities is shown in **Table 3.1** below:

Table 3.1: Quantity of solid waste generated by each ULB in Sri Ganganagar

ULB	Name	Population as per 2021	Quantity in [MT/day]	As per the standards [MT/day]
ULB1	Ganganagar	263349	90	105.34
ULB2	Anupgarh	33964	9.26	11.89
ULB3	Gajsinghpur	11375	3.98	3.41
ULB4	Karanpur	23737	7.71	7.12
ULB5	Kesrisinghpur	15513	5.55	4.65
ULB6	Padampur	21754	7.61	6.53
ULB7	Raisinghnagar	32669	11.98	11.43
ULB8	Sadulshahar	29318	10.26	10.26
ULB9	Suratgarh	85071	22.92	34.03
ULB10	Srivijaynagar	20532	6.44	6.16

Note: Population of 2021 is obtained by projecting the historic trends

3.1.1. Status of solid waste management in the Sri Ganganagar district

As per the data provided by the representatives of each ULB, it is observed that a total of 149.65 metric tons of solid waste is generated every day. On average, the typical composition of wet waste is around 64% and dry waste is 36%. Further, the average per capita waste generation is around 354 grams per day. This observation is in line with the conclusion i.e., it is estimated that solid waste generated in small, medium, and large cities/towns are 0.1 Kg, 0.3-0.4 Kg, and 0.5 Kg per capita per day respectively as specified by the Central Pollution Control Board (CPCB) New Delhi. An interesting observation has been made from the data interpretation. As evident from **Table 3.1**, the actual total solid waste that is being generated is close to the typical observation by CPCB. However, a substantial deviation is observed in the case of Anupgarh, Raisinghnagar, Sadulshahar, and Suratgarh.

Besides solid waste generation, notable quantities of waste are being generated through street sweeping in Ganganagar (ULB-1). Additionally, notable quantity is being generated in all other ULB's.

Authorities of Sri Ganganagar have strictly adhered to the guidelines of Rajasthan Solid Waste Management Policy and Strategy, 2019 and have been attempting to collect the waste. The door- to-door waste collection system is efficiently operational in all the ULB's of Sri Ganganagar. In rural areas, the collection is expected to be achieved between 45 to 60%.

As per the guidelines of Rajasthan solid waste management policy and strategy, 2019 waste segregation is in practice. Attempts have been made to collect wastes by segregating wet and dry waste separately. The wastes have been collected twice a week. However, segregation at the source is quite challenging and it has to be practice in a much more effective and efficient way. The frequency of door-to-door collection among the ULB is strongly correlated with the density of population, collection system, and climatic conditions. The waste thus collected is finally transferred to the solid waste dumping sites. A geotagged image of the solid waste dumping site of Suratgarh is shown in **Figure 3.1**. For a better understanding of the correlation between the population and solid waste generated, transient images have been accessed from Google earth as shown in **Figure 3.1**. From **Figure 3.1**, it is evident that the dumping site is constructed recently and it is anticipated that the generation of solid waste is increasing over the years which is obvious. The temporal images also infer that a water body is encroached and transformed as a

dumpsite.

However, the concern to be noted here is the need to identify the localities for dumping the waste strategically as the population of each ULB is expected to grow over the years. Few additional details of existing facilities at Suratgarh is presented in Figures 3.2 and Figure 3.3.



Figure 3.1(a). Field view of solid waste site of **Suratgarh**, Sri Ganganagar on 09-07-2021,
(b) Satellite view of a landfill site in the year 2011,
(c) Satellite view of a landfill site in the year 2021.



Figure 3.2. (a) Field view of solid waste site of Suratgarh (Near RCP Play Ground), Sriganganagar on 09-07-2021, (b) Satellite view of landfill site in the year 2002, (c) Satellite view of landfill site in the year 2021.



Figure 3.3. Field view of MRF Facility at Suratgarh (Near Adarsh Kalyan Bhoomi), (b) Satellite view of MRF facility at Suratgarh

The geotagged images of the solid waste dumping sites located in all other remaining ULBs are shown in **Figure 3.4**.



Figure 3.4. (a) Field view of solid waste site of Anupgarh (Chak 18 A-A, total 0.37 Hectare), Sriganganagar on 03-08-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satellite view of landfill site in the year 2021.



Figure 3.4. (b) Field view of solid waste site of Gajsinghpur, Sriganganagar on 27-08-2021,



Figure 3.4. (d) Field view of solid waste site of Srikananpur, Sriganganagar on 12-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satellite view of landfill site in the year 2021.

Figure 3.4. (e) Field view of Material Recovery Facility (MRF) site of Srikananpur, Sriganganagar on 12-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satelliteview of landfill site in the year 2021.



Figure 3.4. (f) Field view of solid waste dumping site of Kesrisinghpur (Chak 4 U Murba No.6, 9, 55/9 total 0.519 Hectare), Sriganganagar on 27-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satellite view of landfill site in the year 2021.



Figure 3.4. (g) Field view of Material Recovery Facility (MRF) site of Kesrisinghpur (Chak 4 U Murba No. 6, 9, 55/9 total 0.519 Hectare), Sriganganagar on 27-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satellite view of landfill site in the year 2021.



Figure 3.4. (h) Field view of solid waste dumping site of Raisinghnagar (Chak 32), Sriganganagar on 10-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satelliterview of landfill site in the year 2021.



Figure 3.4. (i) Field view of Material Recovery Facility (MRF) site of Raisinghnagar (Chak 32), Sriganganagar on 10-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satellite view of landfill site in the year 2021.

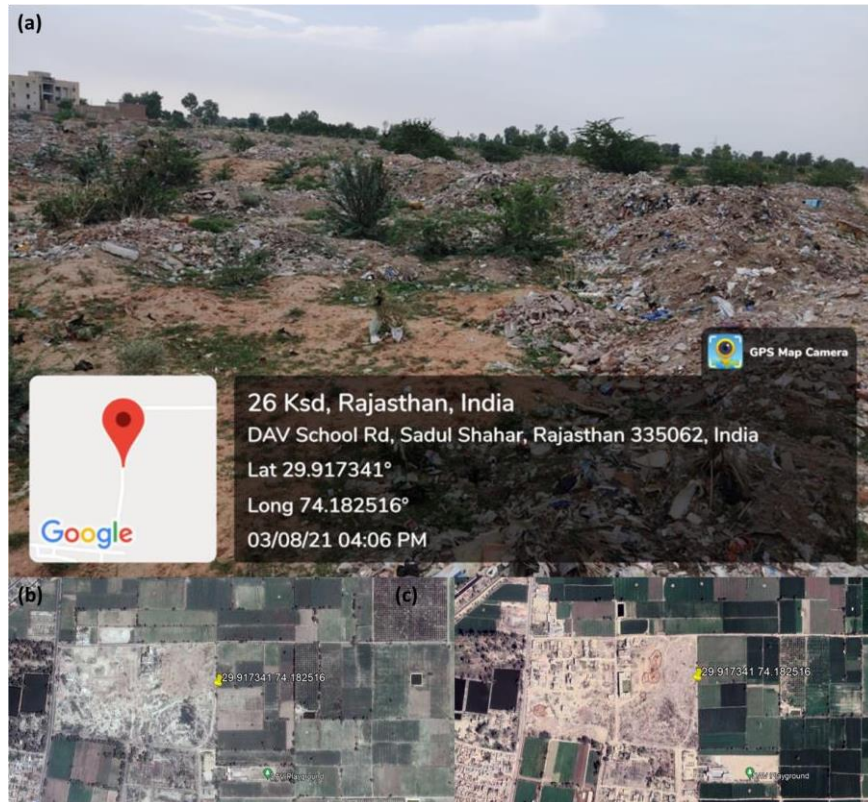


Figure 3.4. (j) Field view of solid waste dumping site of Sadulsahar (DAV School Road), Sriganganagar on 10-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satelliteview of landfill site in the year 2021.

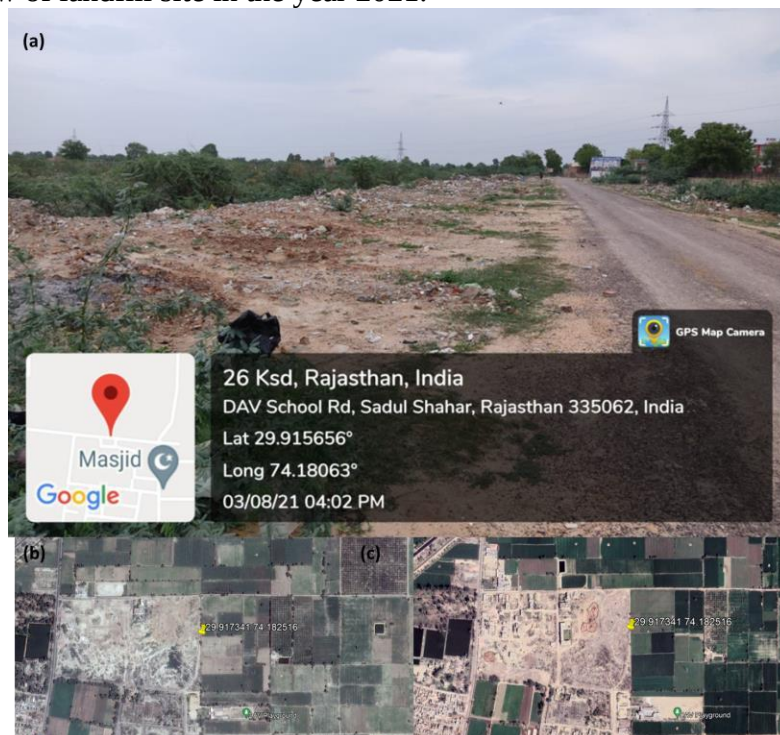


Figure 3.4. (k) Field view of solid waste dumping site of Sadulsahar (DAV School Road), Sriganganagar on 10-07-2021, **(b)** Satellite view of landfill site in the year 2012, **(c)** Satelliteview of landfill site in the year 2021.



Figure 3.4. (l) Field view of Material Recovery Facility (MRF) site of Sriganganagar (Lat29.919659, Long 73.855674)



Figure 3.4. (m) Field view of solid waste dumping site of Padampur, Sriganganagar
(b) Satellite view of landfill site in the year 2012,
(c) Satellite view of landfill site in the year 2021.

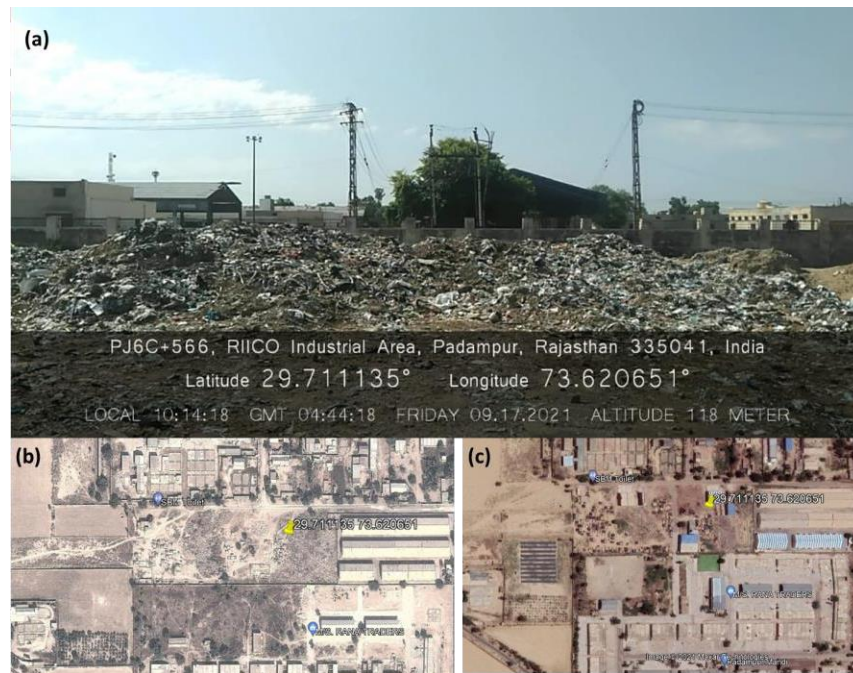


Figure 3.4. (a) Field view of solid waste dumping site of Padampur, Sriganganagar
(b) Satellite view of landfill site in the year 2012,
(c) Satellite view of landfill site in the year 2021.

Auto tippers, tractors, mini vehicles are the primary collection vehicles used for the collection of household wastes, which are loaded at a predesignated nodal point in the wards of MCs. The Compactor/ mini trucks collect the waste from the hotels, restaurants, and marriage halls directly. From the responses obtained from each ULB, it is noticed that there is no uniform system followed across all the ULB for the collection of solid waste. As per the guidelines of SWM, 2016, it is imperative to switch to electric vehicles for the collection of waste.

For the effective utilization of solid waste, MRF (material recycling facilities) are recommended in SWM 2016. MRF at Suratgarh is installed and is partially operational. The field image of MRF at Suratgarh is shown in **Figure 3.3** along with the satellite view of the location to monitor the temporal changes that has occurred. As per the details obtained from the survey, six ULBs in Sri Ganganagar have not installed the MRF facility. Gajsinghpur, Srikanpur, Kesrisinghpur, and Suratgarh municipal boards have installed MRF facilities. Raisinghnagar has also initiated installing MRF facilities, but due to the non-availability of the L1 contractor, work could not be mobilized. The tendering process is again initiated, and a work order shall be issued to the contractor. From the collected data, it is observed that ULBs that are the major contributors of solid waste do not have an existing MRF facility for example Sri Ganganagar, which is a need for the hour. The baseline data pertaining to different environmental attributes for a solid waste management plan under the present scenario are given in **Tables 3.2 to 3.5**.

3.1.2 Management Options for Solid waste

Legacy Waste

As can be seen from the photographs shown above, a large quantity of waste exists as the legacy waste in different dumpsites. The top states that dump waste unprocessed in dumpsites are Uttar Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Karnataka, and Delhi. Out of the total solid waste generated in India, 5% is recycled, 18% is composted and the rest 77% is in dumpsites. The number of dumpsites and quantity of waste dumped annually in tonnes in Rajasthan is 195 and 2,133,564 respectively which should be a concern for all of us including Sri Ganganagar.

The recent increase of the waste dumped can be owed to many factors like the growth of the e-commerce industry from shopping to ordering food. Many brand owners have shifted from larger stock-keeping unit size to smaller stock-keeping unit size due to changing market scenario.

Shifting of public consumer preferences to daily use plastic products like bottles, and food containers. GST on recyclables makes it uneconomical for waste-pickers and to collect low-value waste. The main technologies for reclaiming land sites in India are bio capping and biomining. Biomining is the process of using microorganisms (microbes) to extract metals of economic interest from rock ores or mine waste. This biological decomposition of the waste decreases the volume of the waste by 40%. This is a low-cost solution compared to capping to remove the garbage hills and their lingering ill effects. The major issues of bio capping are subsidence, leachate and water contamination, soil waterlogging, and the release of toxic gases like methane. It achieves permanent near-zero emission of harmful gases (such as methane and ammonia) and leachate. Biomining also helps to recover soil from decomposed mixed waste.

Constraints and Motivating factors for at Source Segregation

Household attitude: The way households co-operate and respond to waste management issues is influenced by their education; therefore, the public's education is an essential element of the success of any waste management program.

- **Technical/Educational:** Knowledge is important to predict waste segregation behaviour. Basically, increasing knowledge will translate into a change in

behaviour. Knowledge of household segregation is about where, what, when, and how to practice in a real life.

- **Environmental:** The surroundings in which people dwell play a major part in nurturing their mindset whether to practice source segregation or not. A locality near to landfill will never practice the same but instead, have an adverse impact altogether by dumping their waste untreated.
- **Financial:** Financial background plays an important factor in source segregation. It has been observed that people who are not practicing source segregation, face the difficulty of the lack of facility.
- **Institution:** Factors such as lack of implementation, weak enforcement, uncertainty over roles and responsibilities amongst governing authorities and limited stakeholder coordination have all contributed towards this disconnect between policy and practice.
- **Legal:** Enforcement of legal attributes in such sensitive issues tends to force the individual into waste segregation with the fear of penalties or legal actions to be taken upon him.

Duplication of effort: It has been noticed on numerous occasions we tend to deal more in terms of paperwork and less output on the field and this in return leads to duplication of effort where more than one project or intervention is needlessly implementing similar activities. This leads to wastage of available resources as well as their underutilization.

Unsustainability of Municipal Solid Waste Management: The major sources of dumping of solid waste are landfills and these often end as producing a legacy of wastes because the major part of this waste is unsegregated and untreated.

Lack of legislation: Poor implementation of laws often leads to inefficiencies in society. There is inadequate governance, or the absence of clearly defined processes, roles, and decision-making responsibilities.

No pre-defined roles: Developed countries like Germany have pre-defined roles when they deal with waste management with testing of even leachate released but this is absent in developing countries.

Motivating factors for source segregation:

- **Infrastructure:** Effective solid waste management is a major challenge in cities with high population density. Achieving sustainable development within a country experiencing rapid population growth and improvements in living standards is made more difficult in many countries because it is a diverse country with many different religious groups, cultures and traditions and all these problems can be easily dealt with by solid infrastructure.
- **Awareness:** Public awareness and attitudes to waste can affect the population's willingness to cooperate and participate in waste segregation practices. General awareness and information on the social, economic and environmental benefits of the successful practice are important factors that need to be continuously communicated to all sectors of the population.
- **Workshops:** Lack of knowledge is one of the main reasons why households did not separate their household waste and there should be an ongoing effort to educate those that are not separating at their residents and also reinforce the lessons to those separating at their house.
- **Regular collection:** Discipline creates an environment among people where people engage themselves on a regular basis and if policies are implemented on regular basis people tend to show active participation.
- **Incentives:** Incentive-driven drives gain huge attention among people even in a short period and thus create a sense of motivation for any work among the masses.
- **Enforced legislation:** Effective enforcement of environmental laws and regulations is crucial for proper environmental management; this drives fear of penalty or legal action and thus forces people to take the particular action as desired by policies.

3.1.3 Baseline Data for District Environment Plan

The baseline data has been collected from the district officials. The population of the district for the years 2021, 2036 and 2051 has been predicted by taking into consideration of the population growth from the last 5 decennial censuses starting from the years 1971 to 2011. Accordingly, District Environment Management Plan (DEMP) has been prepared for the years 2036 & 2051 as given **Table 3.2A**. As the developmental activities in any area depend upon the overall vision and mission of the district, hence the proposed DEMP shall have to be updated after every 5 years depending on the overall growth and requirements

of the district.

3.1.4. Projected quantity of solid waste generation in Sri Ganganagar district

From the collected information, a positive correlation of 0.98 is observed between population and the quantity of solid waste generated. With urbanization, it is expected that the population of Sri Ganganagar district is likely to increase which will consequently increase the quantity of solid waste generation. Considering the increase in population, the probable solid waste that may be generated is also estimated. A linear mathematical relation is proposed by considering the standards mentioned in CPCB to determine solid waste generation. The proposed equation is shown in Eq. (3.1).

$$W = 0.075 RP + 0.45 UP \quad \text{Eq. (3.1)}$$

Where, W is the waste generated in kg per day; RP is the rural population; UP is the urban population. An inventory of probable solid waste that is going to be generated for the coming years is projected for the years 2036 and 2051 as shown in **Figure 3.5**. These estimates aid in procuring the essential infrastructure to meet the future demand.

Table 3.2A: Population Information

S. No	Year	ULB-1 Ganganagar Pop.	ULB-2 Anupgarh Pop.	ULB-3 Gajsinghpur Pop.	ULB-4 Karanpur Pop.	ULB-5 Kesrisinghpur Pop.	ULB-6 Padampur Pop.	ULB-7 Raisinghnagar Pop.	ULB-8 Sadulshahar Pop.	ULB-9 Suratgarh Pop.	ULB-10 Vijaynagar Pop.	Urban Total Population	Rural Population	Total District Population
1	1971	90042	4571	4475	11538	-	6359	10977	7648	17843	-	153453	643955	797408
2	1981	123692	12997	6573	15252	9738	10734	17069	12668	29815	11674	250212	917975	1168187
3	1991	161482	21194	7884	18231	11751	13368	22894	17702	45870	13813	334189	1068255	1402444
4	2001	210713	29565	9507	20694	13155	16956	27736	22326	61639	17873	430164	1359259	1789423
5	2011	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425	461402	1507766	1969168
6	2021	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532	540772	1770627	2313016
8	2036	331314	47320	13445	27397	17768	27351	39178	35835	109425	23693	672726	2252872	2925598
9	2051	410964	57185	15575	31057	20022	33664	45686	42362	136843	26853	820211	2840658	3660869

Table- 3.2B: Report on inventory of total solid waste Generation

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Total solid waste Generation	MT/Day	90	9.26	3.98	7.71	5.55	7.61	11.98	10.26	22.92	6.44
Qty. of Dry Waste generated	MT/Day	06	4.98	1.99	3.763	2.53	3.81	6.50	5.13	11.46	3.89
Qty. of Wet Waste generated	MT/Day	77	4.28	1.59	3.337	3.02	3.04	4.75	4.10	9.16	2.55
Qty. of C&D Waste segregated	MT/Day	7	0.028	0.0	0.50	1.00	0.0	0.73	1.0	2.29	0.63
Qty. of Street Sweeping	MT/Day	70	0.0	0.01	0.25	0.25	0.02	0.0	0.05	0.50	0.02
Qty. of Drain Silt	MT/Day	13	0.0	0.01	0.80	0.75	0.01	0.0	0.02	0.10	0.01
Qty. of Domestic Hazardous Waste(DHW) collected	MT/Day	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Qty. of Other Waste (Horticulture, sanitary waste, etc.)	MT/Day	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.0
No of Old dump sites	Nos or None	7	1	1	1	1	2	1	1	2	1
Qty stored in dumpsites	[MT] or [Not estimated]	10	NA	1573.47	1988.56	660.58	3906.55	NA	11894.17	10	3.2
No of Sanitary landfills	Nos or None	None	None	1	None	None	None	None	None	None	None
No of wards	Nos	65	35	20	25	20	25	35	25	45	25

Table 3.2C: Compliance by Bulk Waste Generators

Attributes	Unit	ULB-1-Gangana gar	ULB-2 Anupgar h	ULB-3 Gajsingh pur	ULB-4 Karanpur	ULB-5 Kesrisonghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
No of BW Generators	Nos.	12	0.0	0.0	0.0	0.0	0.0	3	0.0	0.0	0.0

Table 3.2D: Compliance in segregated waste Collection of SW

Attributes	Unit	ULB-1-Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisonghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Total generation	MT/Day	90	9.26	3.98	7.71	5.55	7.61	11.98	10.26	22.92	6.44
Wet Waste	MT/Day	6	4.28	1.59	3.337	3.02	3.04	4.75	4.13	9.16	2.55
Dry Waste	MT/Day	77	4.98	1.99	3.763	2.53	3.81	6.50	5.13	11.46	3.89

Table 3.3: Status and Recommendations related to Waste Management Operations

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Door to Door Collection	percentage	100	100%	100%	100%	100%	100	100%	100	100%	100
Mechanical Road Sweeping	percentage	0	0%	Not Initiated	0	0	Not initiated	0%	Not initiated	Not initiated	Not initiated
Manual Sweeping	percentage	100	100%	100%	100%	100%	100	100%	100	100%	100
Segregated Waste Transport	percentage	50	0%	0	100%	100%	0	0%		30%	100
Digesters (Bio-methanation)	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	0	0	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Composting operation	percentage	0	NA	Not Initiated	0	0	Not initiated	NA	Not initiated	Not initiated	Not initiated
MRF Operation		Nil	NA	Not Initiated	No	No	Not initiated	Under Construction	Not initiated	Not initiated	Not initiated
Use of Sanitary Landfill	percentage	0	NA	0	0	0	0	NA	0	NO SLF	100
Reclamation of old dumpsites	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Linkage with Waste to Energy Boilers / Cement Plants	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Linkage with Recyclers	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Authorization of waste pickers	Initiated /Not Initiated	Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Linkage with TSDF / CBMWTF	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Involvement of NGOs	Initiated /Not Initiated	Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Linkage with Producers / Brand Owners	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Issuance of ID Cards	Initiated /Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not Initiated	Not initiated	Not Initiated	Not initiated	Not initiated	Not initiated
Available	Not Available	Partially Available				Work is in under process					

Table 3.4A: Status of Waste Management Operations

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Waste Collection Trolleys	Nos.	68	6	2	3	3	3	4	2	9	0
Mini Collection Trucks	Nos.	24	0	3 (Auto Tipper)	4 (Auto Tipper)	4 (Auto Tippers)	7 (Auto Tipper)	0	0	13	0
Segregated Transport	percentage	100	0%	0	100%	100%	0	0%	0	YES (30%)	Yes/100
Bulk Waste Trucks	Nos.	2	0	0	0	0	0	0	0	0	0
Waste Transfer points	Nos.	1	0	0	0	0	0	0	0	0	0
Bio-methanation units	Nos. & Capacity	0	0	0	0	0	0	0	0	0/0	1 Nos Required
Composting units	Nos. & capacity	0	0	1/ 0.5 TPD	0	0	1/ 0.5 TPD	0	0	1/1 TPD	1 Nos Required
Material Recovery Facilities	Nos. & capacity (TPD)	0	0	1 / 2.0 TPD	01 (Not working)	01 (Not working)	Not Available	11 TPD	Not Available	1/5 TPD	Not Available
Waste to Energy (if applicable)	Nos.	0	0	0	0	0	0	0	0	0	Required
Waste to RDF	Nos.	0	0	0	0	0	0	0	0	0	Required
Sanitary Land fills	Nos.	0	0	0	0	0	0	0	0	0	0
Capacity of sanitary landfills	MT/Day	0	0	0	0	0	0	0	0	0	0
Waste Deposit Centers (DHW)	Nos. & capacity	0	0	0	0	0	0	0	0	0	0
Other facilities	Nos.	0	0	0	0	0	0	0	0	0	0
Available	Not Available	Partially Available	Work is in under process								

Table 3.5A. Notification and Implementation of By-Laws

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Notification of By-laws	[done] / [in progress] / [not initiated]	Done	Not Initiated	Done	In Progress	In Progress	Done	Not Initiated	Done	done	Done
Implementation of by-laws	[done] / [in progress] / [not initiated]	Done	Not Initiated	In Progress	In Progress	In Progress	In Progress	Not Initiated	In Progress	In Progress	In Progress

Table 3.5B: Status and Recommendations on Adequacy of Financial Status of ULB for MSW Management

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
CAPEX (Capital Cost) Required	[INR] / [Not required]	Not required	NA	Not Estimated	Not required	Not required	5.0 Crore	NA	5.0 Crore	Not required	0
OPEX (operation and maintenance cost) required	[INR per Year] / [% of requirement]	No	NA	11 lac /month	0	0	2.5 Crore	NA	2.5 Crore	0	0
Adequacy of OPEX	[Yes] / [No]	No	No	No	No	No	No	No	No	No	0

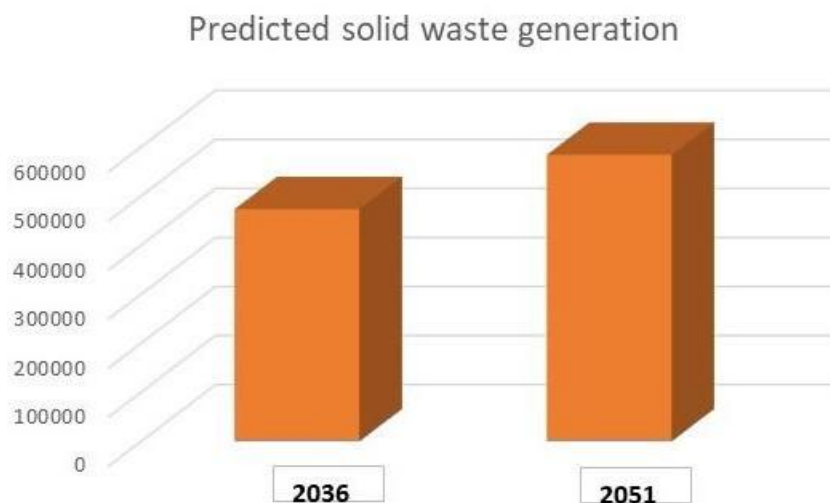


Figure 3.5: Estimated solid waste generation for the year 2036 and 2051

As per honorable NGT order dated 15.07.2019 in O. A. No 710-713/2017, O.A. No. 606/2018, it is the duties and responsibilities of various stakeholders to make the solid waste management plan a successful and implementable action. For the effective utilization of solid waste management in the Sri Ganganagar district, the following plan is proposed as shown in **Figure 3.6**.

Step-1: From the collected information, it is observed that the door to door collection is not in practice in all the rural areas. It is recommended that all the municipal councils, Nagar Palika, and village panchayats should enforce the implementation of door to door collection.

Step-2: The practice of waste segregation should be implemented at the household level. All the bulk generators should be identified and necessary infrastructure such as dustbins should be provided within the vicinity to ensure the proposed disposal of waste.

Step-3: Separate collection of Wet Waste (+ Sanitary Waste), Dry Waste (+ Domestic Hazardous waste) and Street Sweeping should be ensured in all parts of the district.

Step-4: Since it is a well-established fact that solid waste generation depends on the income levels, unlike following a fixed frequency throughout the district, deciding the frequency based on the quantum of waste generated should be considered to plan the activities. Wet waste should be collected on a daily basis.

Step-5: Adopting the cluster-based approach helps in the effective management of solid waste disposal. To optimize the resources and infrastructure, the transfer points and treatment facilities can be installed in each cluster. It is recommended to form clusters that will consequently help in the effective management of solid waste collection and disposal in rural areas of the Sri Ganganagar district.

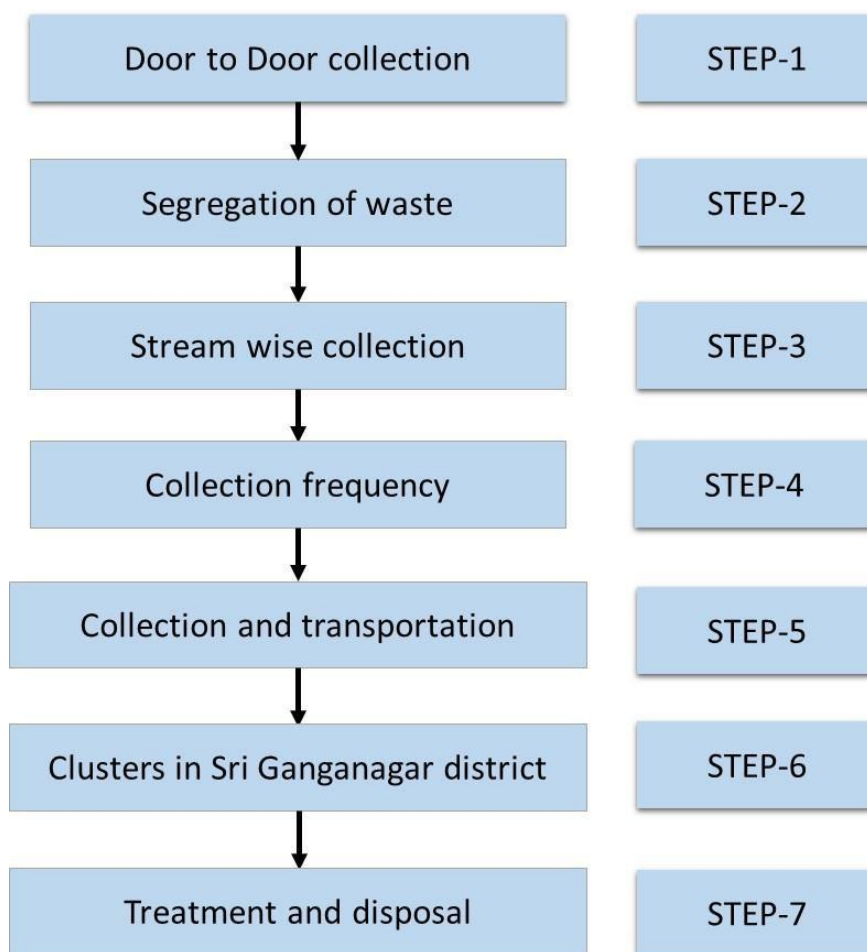


Figure 3.6: Framework for the effective solid waste management in Sri Ganganagar

A brief overview of the existing practices for solid waste management in all the ULB's of Sri Ganganagar are presented in **Table 3.2 to Table 3.5**.

The details of measurable and quantifiable targets, responsibilities of various departments with timelines for completing the tasks considering the next 10-year projections are made as presented in **Table 3.6**.

Table 3.6: Status and Recommendations on Adequacy of Financial Status of ULB for MSW Management

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
1.	Door to Door Collection of Solid Waste	It is implemented in all ULBs. All ULBs have achieved the target of 100% collection of solid waste.	Efforts should be made to implement the same in the rural areas of Sri Ganganagar	It can be attained within one year from the date of receiving the orders.	LSG Department (Municipal Bodies)
2.	Segregated waste transport	It is achieved completely in ULB-4, ULB-5 and ULB-10. It is partially achieved in ULB-1, ULB-9.	100% should be achieved in all the ULB's. This includes additional efforts in a few of the ULB's and needs to kick start in a few ULB's.	The identified gap should be fulfilled in 9 months of duration. Solid waste management to be done in accordance with the prevailing laws. The land is to be identified and acquired within 2 years to meet the 2036 requirement. Facilities are to be developed within the next two years to meet the present requirement.	LSG Department (Municipal Bodies)
3.	Segregation at Source	As per the data collected, it is apparent that all ULB's have created awareness to segregate dry and wet waste at the source.	Segregation of wastes should be done in a much more effective way. Also, only segregating the waste at source will not serve the purpose if it is not transported, processed and disposed properly. There is a lot of scope to adopt integrated way of handling the waste by each ULB. It should be extended to all the rural parts of the districts.	It should be achieved to implement it in the next one year.	LSG Department (Municipal Bodies)
4.	Road Sweeping and Disposal of Waste Collected	Road sweeping is a common practice and is implemented in two different ways i.e. mechanical sweeping and	Infrastructure for mechanical sweeping may be procured to all the	2 years	LSG Department (Municipal Bodies)

		manual sweeping. The technology of mechanical sweeping is not initiated in any of the ULBs.	ULBs. This will enhance the efficiency and frequency of waste collection. Also, each road sweeping person must be equipped with masks while sweeping the roads.		
5.	Material Recover Facility	As per the details obtained from the survey, six ULBs in Sri Ganganagar have not installed the MRF facility. Gajsinghpur, Srikanpur, Kesrisinghpur, and Suratgarh municipal boards have installed MRF facilities. Raisinghnagar has also initiated installing MRF facilities, but due to the non-availability of the L1 contractor, work could not be mobilized.	All ULB's has to take immediate action to install an MRF facility by choosing an appropriate location.	1.5 years	LSG Department (Municipal Bodies)
6.	Recycling of materials	Not effective	Recycling of wastes should be done through a systematic process that is currently missing in most of the ULBs.	It should be achieved to implement in the next two years (i.e. by June 2023).	LSG Department (Municipal Bodies)
7.	Composting & Utilisation of Compost	As per the inventory collected, it is noticed that this technique is not well harnessed in any of the ULBs. Only ULB-3, ULB-6, and ULB-9 has an operational units.	All ULB's has to plan for the installation of compost pits. They should also develop business model of utilization of compost to sustain themselves	9 months	LSG Department (Municipal Bodies)
8.	Waste to Energy Plant or Linkage	It is not initiated by any of the ULB	All the ULB's has to take necessary actions in promoting the waste to energy or to initiate a linkage with an existing plant	3 years	LSG Department (Municipal Bodies)
9.	Landfill Availability	Record should be maintained properly and should ensure	There are no proper plans available	Techniques like Bio mining and/or bio capping should be	LSG Department (Municipal Bodies)

		consistency. As per the records collected, there are no sanitary landfills in any of the ULB.	currently with ULBs to handle the legacy waste.	explored to reduce the volume of waste at landfill sites. It should be achieved to implement in the next five years (i.e. by June 2026). Also, the provision of sanitary landfills in each ULB has to be explored in the next 5 years.	
10.	Reclamation of old dumpsite (If available)	It is not in practice in any of the ULB's	All ULB's should initiate the process of reclamation of old dumpsites.	The main technologies for reclaiming land sites such as bioremediation, bio capping and bio-mining are to be explored within the next two years.	LSG Department (Municipal Bodies)
11.	Strengthening of Manpower as required in ULBs	The number of manpower is not sufficient. They are also not aware of recent best practices applicable in the field.	The gap between best practices to be adopted.	All concerned staff members to be trained to impart adequate knowledge for proper implementation of sustainable SWM within the next two years. Also, logistic infrastructure to be made available from the financial budget by the Government to conduct training programs/workshops starting from Financial Years 2021-22 onwards.	LSG Department (Municipal Bodies)/ Village Panchayat
12.	Authorisation of Waste Pickers (Issuance of ID cards)	It is not initiated in any of the ULB's of Sri Ganganagar	All ULBs has to initiate the process of authorization of waster picker immediately.	It is should be started within the next 6 months by involving NGOs and self-help groups by providing incentives to them.	LSG Department (Municipal Bodies)

13.	IEC Activity	Information Education Communication (IEC) has been practiced by all ULBs to generate awareness among the masses.	Awareness programmes should be organised at a given interval of time by each ULB.	It means the process of working with individuals, communities & societies to develop communication strategies to promote positive behaviour such IEC activity should be followed continuously through various means.	LSG Department (Municipal Bodies), NGOs, Educational Institutes, etc.
14.	Training of staff	Staff learns the process in a traditional way.	Programs are not being conducted currently in a methodical manner.	A systematic training program/workshop should be organised once in a two year to share the best practices to be adopted by ULBs in handling solid waste management.	LSG Department (Municipal Bodies)/ Village Panchayat, University
15.	Monitoring and Review	District Administration under the guidance of the District Collector has been monitoring the progress of solid waste management regularly on monthly basis.	Time-bound delivery of the outcomes	The district collector has been monitoring/reviewing the performance of their respective ULB/ Panchayats on solid waste management. However, He/she may constitute a district-level expert committee for suggestions and better implementation. People should also be made accountable if they do not perform.	District Collector or his/her representative, District administration, RSPCB, LSG Department (Municipal Bodies)/ Village Panchayat

Chapter 4. Plastic Waste Management

This chapter covers the present scenario of plastic waste management of the Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials has been analysed. Finally, it emphasises the details of action plans along with the actionable points, present status of implementation, gap to be addressed, and proposed time line for completion. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks.

4.1 Present scenario in the district

As per the report of Local Self Government Department, Rajasthan published in the year 2019, on an average, the total plastic waste being generated in Rajasthan is about 4% of the solid waste that is generated. It is becoming increasingly clear that plastics are posing significant environmental and health challenges in communities. Plastics are disturbing local ecological balances as they are easily admixed in water and land as micro-plastics. In their macro-form, they act as physical barriers that degrade soil quality and even ingested by livestock and other fauna to find its way in the human food chain. Plastics cause blockages in drains and streams resulting in severe floods and obstruction to runoffs.

According to the Rule 12 of Plastic Waste Management (Amendment) Rules, 2018 prescribed by Ministry of Environment, Forest and Climate Change (MoEF&CC), the enforcing authorities for plastic waste management shall be as given below:

1. The State Pollution Control Board in respect of a Union territory shall be the authority for enforcement of the provisions of these rules relating to registration, manufacture of plastic products and multi-layered packaging, processing and disposal of plastic wastes.
2. The concerned Secretary-in-charge of LSG shall be the authority for enforcement of the provisions of these rules relating to waste management by waste generator, use of plastic carry bags, plastic sheets or like, covers made of plastic sheets.
3. The concerned Gram Panchayat shall be the authority for enforcement of the provisions of these rules relating to waste management by the waste generator, use of plastic carry bags, plastic sheets or like, covers made of plastic sheets in the rural area of the State or a Union

Territory.

4. The authorities referred to in sub-rules (1) to (3) shall take the assistance of the District Magistrate or the Deputy Commissioner within the territorial limits of the jurisdiction of the concerned district in the enforcement of the provisions of these rules.

Plastic waste disposal methods are often basic and uninformed that further exacerbate the challenge. The open burning of plastics generates toxic emissions such as carbon monoxide, dioxins, and nitrides. Low-quality plastics that are common in rural areas also leach out toxic additives and substances. Policy measures are focused on segregation, collection, and in certain cases banning the use of certain categories of plastics altogether. However, most of this had traditionally been focused on urban India. In 2016, the plastic waste rules were extended for rural areas for the first time, with specific duties demarcated for Gram Panchayats. The lack of segregation of plastic waste, the absence of organized systems of collection and efficient aggregation, poor economic value in low-grade (thin) plastics and the livelihoods associated with plastic production have been the key categories of challenges.

Technically, plastics are divided into two categories as shown in **Figure 4.1**. Typically, plastic waste to be managed in accordance with the Plastic Waste Management (Amendment) Rules, 2018 with an emphasis on the 3R /4R principles of Reduce, Reuse, Recycle and Recovery. Segregated dry waste from all Municipal Councils should typically be dispatched to MRF centers that are installed in a few of the ULB's of the Sri Ganganagar district. Subsequently, the collected waste is further segregated manually into multiple categories such as plastic, paper, glass, coconut shell, clothes, and metal. Recyclable plastic waste is baled and sold to vendors through an auctioning process. The non-recyclable plastic waste is baled and transported to cement factories. Unfortunately, this is not in practice in majority of the ULB.

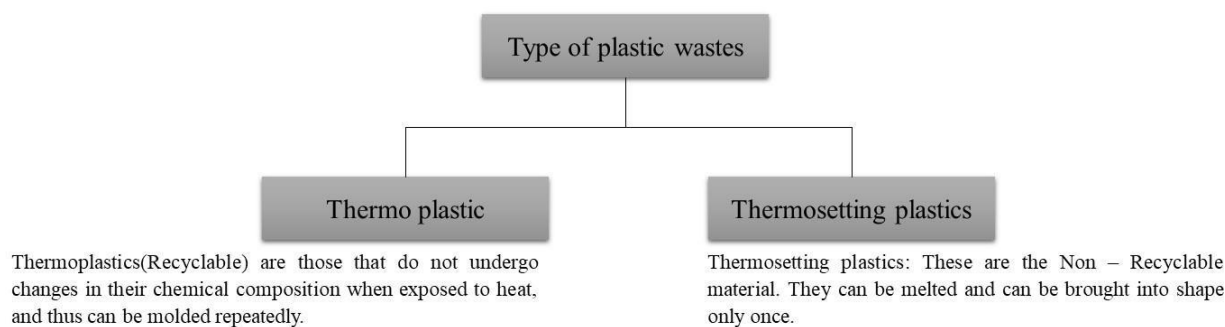


Figure 4.1. Types of plastic wastes

A study has been conducted in some selected parts of Rajasthan and it is noticed that the solid waste generation of all categories with different communities is 48179.1gm/month. Among this quantity of waste, the share of waste refuse and garbage category is 3112.2gm/months for papers and products, while for plastics it is 3832.8gm/month, glass content comprises waste is 1262.1gm/month and quantity of garbage category as kitchen waste is 39972gm/month (Anil, 2015). This observation is in line with the conclusions drawn in the report of Local Self Government Department, Rajasthan report published in 2019. Owing to this, the percentage of plastic in the generated solid waste can be treated to be lying between 4% to 7%. To minimize the percent of plastic waste that is being generated in Sri Ganganagar, various actions have been enforced in all the ULB's. The list of actions taken in each of the ULB's is collated with the help of a survey and telephonic conversations with the representatives of each ULB as shown in **Tables 4.1 to 4.6**.

Table- 4.1: Implementation of PW Management Rules, 2016

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesri singh pur	ULB-6 Padampur	ULB-7 Raising hnagar	ULB-8 Sadulshah ar	ULB-9 Suratga rh	ULB-10 Vijayna gar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Sealing of units producing < 50-micron plastic	[All sealed] / [Partial] / [no action]	No action	Partial	No action	No action	No action	No action	Partial	No action	Partial	Partial
Prohibiting sale of carry bags < 50 micron	[Prohibited] / [Partial] / [no action]	Partial	Partial	Partial	Prohibited	Prohibited	No action	Partial	No action	Partial	Partial
Ban on Carry bags and other single use plastics as notified by State Government	[Implemented] / [Partial] / [no action] / [No Ban]	Partial	Implemented	Implemented	Implemented	Implemented	Implemented	Implemented	Implemented	Implemented	Implemented

Table- 4.2: Implementation of Extended Producers Responsibility (EPR) through Producers/Brand-owners

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesri singh pur	ULB-6 Padampur	ULB-7 Raising hnagar	ULB-8 Sadulshah ahar	ULB-9 Suratga rh	ULB-10 Vijayna gar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
No of Producers associated with ULBs	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None
Financial support by Producers / Brand owners to ULBs	[Nos] / [None]	None	None	None	None	None	None	None	None	[None]	None
Amount of PRO Support	[Rs...]	0	0	0	0	0	0	0	0	0	0
Infrastructure support by Producers / Brand owners to ULBs	[Nos of Producers] / [None]	None	None	None	None	None	None	None	None	None	None
No of collection centers established by Producers / Brand owners to ULBs	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None

Table- 4.3: Inventory of plastic waste generation

Attributes	Unit	ULB-1-Gangana gar	ULB-2 Anupgarh	ULB-3 Gajsinghp ur	ULB-4 Karanp ur	ULB-5 Kesrising hpur	ULB-6 Padampu r	ULB-7 Raisinghn agar	ULB-8 Sadulsha har	ULB-9 Suratg arh	ULB-10 Vijaynag ar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Estimated Quantity of plastic waste generated	MT/day] / [Not Estimated]	Not Estimated	Not Estimated	0.14	0.5	0.10	1.10	Not Estimated	1.30	Not Estimated	1.0

Table- 4.4: Implementation of Collection

Attributes	Unit	ULB-1-Gangana gar	ULB-2 Anupgarh	ULB-3 Gajsinghp ur	ULB-4 Karanp ur	ULB-5 Kesrising hpur	ULB-6 Padamp ur	ULB-7 Raising hnagar	ULB-8 Sadulshah ar	ULB-9 Suratgar h	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Door to Door collection	[100%] / [partial %] / [not initiated]	100%	100%	100%	100%	100%	100	100%	100	100%	100
Segregated Waste collection	[100%] / [partial %]	100%	Partial 10%	0	100%	100%	Partial 10 %	Partial 10%	Partial 10%	Partial 30%	Partial 40%
Plastic waste collection at Material Recovery Facility	[MRF used] / [not installed]	Not Estimated	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed	Not Installed	Installed	Not Installed
Authorization of PW pickers	[Nos] / [not initiated]	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated
PW collection Centers	[Nos] / [not established]	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated	Not initiated

Table- 4.5: Establishment of linkage with Stakeholders

Attributes	Unit	ULB-1-Ganganaga r	ULB-2 Anupgar h	ULB-3 Gajsingh pur	ULB-4 Karanpur	ULB-5 Kesrisingh pur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshah ar	ULB-9 Suratgarh	ULB-10 Vijaynaga gar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Established linkage with PROs of Producers	[Nos] / [not established]	Not established	Not established	Not established	Not established	Not established	Not established	Not established	Not established	Not established	Not established
Established linkage with NGOs	[Nos] / [not established]	Not established	Not established	Not established	Not established	Not established	Not established	Not established	Not established	Not established	Not established

Table- 4.6: Availability of facilities for Recycling or utilization of PW

Attributes	Unit	ULB-1- Ganga nagar	ULB-2 Anup garh	ULB-3 Gajsingh pur	ULB-4 Karan pur	ULB-5 Kesrisingh pur	ULB-6 Padam pur	ULB-7 Raising hnagar	ULB-8 Sadul shahar	ULB-9 Surat garh	ULB-10 Vijay nagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
No. of PWrecyclers	[Nos]	0	0	0	0	0	0	0	0	0	0
No Manufacturers	[Nos]	0	0	0	0	0	0	0	0	0	0
No of pyrolysis oil plants	[Nos]	0	0	0	0	0	0	0	0	0	0
Plastic pyrolysis	[Quantity in MT sent per Month]	0	0	0	0	0	0	0	0	0	0
Use in roadmaking	[QuantityMT used per Month]	0	0	0	0	0	0	0	0	0	0
Co-processing in Cement Kiln	[Quantity in MT sent per Month]	0	0	0	0	0	0.004	0	0.004	0.005	0.005

4.2. Implementation of plastic waste management rule, 2016

The status of implementation of plastic waste management rules, 2016 in Sri Ganganagar district are examined using data collected from different ULBs (Tables 4.1 to 4.6). From the attributes of Table 4.1, the following observations can be drawn:

- In all the ULB's, implementation of ban on plastics below <50 microns' thickness and single use plastics is enforced. Also Compliance of Plastic Waste as per Rule 05 and 06 of PWM Rules 2016, it is envisaged, that the same actions are taken in all the rural areas as well.
- From the collected attributes it is evident that, a few of the ULB's need to enforce the implementation of policies mentioned in PWM, 2016. Strict actions are to be taken to eradicate the sale of plastic bags as just 20% of the ULB's have prohibited the use of the plastic bags. Local bodies should ensure the ban of carry bags completely as it is noticed that at a few of the ULB's still the implementation status is partial.
- Though, four out of ten ULB's, the practice of disposing the segregated plastic to the cement plants in the proximity is being followed, it is clear from the attributes of Table 4.6 that the negligible quantities of plastic waste are being generated from Padampur, Sadulshahar, Suratgarh, and Vijaynagar. Thus the concept of making clusters would help in

the effective management of plastic waste. The ULB which is not practicing the transfer of plastic waste can coordinate with the nearest ULBs and transfer the quantity that is being generated so that it can be sent to co-processing cement kilns in collective manner. This activity may also help to generate revenue for the development of each ULB.

- Strict actions should be taken in all the ULB's to seize the plastic bags. However, it is noticed that practices seizure of plastic is almost negligible. It may also be possible that residents of these ULB's have already adhered to the policies and are not using the plastic bags of less than 50 microns which are banned. An aggressive planning is essential to take actions by each ULB if policies are not being implemented.

4.3 Projection of future generation of plastic wastes

Collection, segregation, processing and disposal of plastic waste is a serious concern. In fact, government and local authorities have banned some type of plastic even though the utilisation of plastic (in various forms of household items) has been increasing day by day resulting in a steep increase in plastic wastes, industrial items and vehicles etc. On the basis of present data/information available, the future plastic waste generation is given in **Table 4.7**. This estimation is based on the per capita present contribution in urban and in rural areas. It is a well known fact that increase in earning leads to generation of more plastic wastes.

Table 4.7: Future Assessment of plastic waste generation in Sri Ganganagar District

Year	Year-wise assessment of Plastic waste generation (T/d)			
	2011	2021	2036	2051
Total Plastic Waste Generation in Sri Ganganagar District	18.86	22.13	27.77	34.30
Plastic Waste Generation in Rural Areas of Sri Ganganagar	7.24	8.50	10.81	13.64
Plastic Waste Generation in Urban Areas of Sri Ganganagar	11.63	13.63	16.95	20.67
ULB-1 Ganganagar	5.66	6.64	8.35	10.36
ULB-2 Anupgarh	0.78	0.94	1.19	1.44
ULB-3 Gajsinghpur	0.25	0.29	0.34	0.39
ULB-4 Karanpur	0.54	0.60	0.69	0.78
ULB-5 Kesrisinghpur	0.35	0.39	0.45	0.50

ULB-6 Padampur	0.46	0.55	0.69	0.85
ULB-7 Raisinghnagar	0.71	0.82	0.99	1.15
ULB-8 Sadulshahar	0.63	0.74	0.90	1.07
ULB-9 Suratgarh	1.78	2.14	2.76	3.45
ULB-10 Vijaynagar	0.46	0.52	0.60	0.68

4.4 Recommendations for the effective management of plastic waste

Plastic waste after due recycling can be used in road construction, as RDF, in cement kilns, powerplants, etc. A few of the areas in which plastic waste can be used are mentioned below

1. Utilization of Plastic Waste in Road Construction:

As per circular from PWD letter No. SE/Road/2018- 19/D-707 dated 04/04/2019 for road construction, it has been suggested that plastic waste has great potential for bituminous construction. If added in small dosages (5-10%) by weight of bitumen, it helps in improving Marshall Stability, Strength, Fatigue Life and other desirable properties of bituminous mix and improves longevity and pavement performance, but uniform coating of plastic to be ensured. The generated plastic waste can also be used in the construction of PMGSY roads.

2. Co-processing of Plastic Waste as Refuse Derived Fuel (RDF):

Co-processing refers to the use of waste materials in industry process such as cement kilns or any other large combustion plants. Co-processing indicates substitution of primary fuel by waste as raw material, or materials recovered from waste. Waste materials such as plastic wastes, used for co-processing are referred as Refuse Derived Fuel. Co-processing of plastic waste offers advantages for cement industry or power plants in saving fossil fuels or raw material consumption and thus contributing in more eco-efficient ways of production.

3. Strengthening the governance by local governing bodies

Every local body shall be responsible for development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste either on its own or by engaging agencies or producers.

The local body shall be responsible for setting up, operationalization and co-ordination of the

wastemanagement system and for performing the associated functions, namely

- a) ensuring segregation, collection, storage, transportation, processing and disposal of plastic waste
- b) ensuring that no damage is caused to the environment during this process
- c) ensuring channelization of recyclable plastic waste fraction to recyclers
- d) ensuring processing and disposal on non-recyclable fraction of plastic waste in accordance with the guidelines issued by the Central Pollution Control Board
- e) creating awareness among all stake holders about their responsibilities
- f) engaging civil societies or groups working with waste pickers
- g) ensuring that open burning of plastic waste does not take place.

The local body for setting up of system for plastic waste management shall seek assistance of producers and such system shall be set up within one year from the date of final publication of these rules in the Official Gazette of India. The local bodies are recommended to frame bye-laws incorporating the provisions of these rules.

The proposed action plan for management of plastic waste is presented in **Table 4.8**.

Table 4.9: Status and action plan for plastic waste management

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
1.	To develop and set up infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic.	As per the data collected, it is apparent that all ULB's have created awareness to segregate plastic at the source. However, collection, storage, transportation, processing and disposal of the plastic in an effective manner is not in practice currently.	Collection, storage, processing and disposal of the plastic needs attention to all ULBs.	The complete process should be placed within next one year to achieve the target of segregation, processing and disposal of plastic.	LSG Department (Municipal Bodies)
2.	Creating Material Recovery Facility (MRF)	It is operational only in Suratgarh	All the other ULB's should plan for setting up a MRF facility.	All ULBs must install an MRF facility within next one year. They should also maintain record of amount of collection of plastic waste on daily basis.	LSG Department (Municipal Bodies)
3.	To frame bye laws incorporating the provision of Plastic Waste Management Rule	It is being partially implemented in all ULBs. Only ULB-4, and ULB-5 have implemented it. Rest of the ULB's need to enforce the implementation of policies mentioned in PWM, 2016 in a much more aggressive way to prohibit sales of Carry bags <	There is a need to create awareness among the masses to inculcate best practices for not using plastic carry bags and other single-use plastics.	All ULBs must prohibit sales of Carry bags < 50 microns and ban on Carry bags and other single-use plastics completely within the next six months. They should create awareness programs monthly to	State Level Monitoring Committee under the administrative control of DoE

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
		50 microns and banning on other single-use plastics completely.		inculcate best practices for not using single-use plastics till this objective is fulfilled.	
4.	The ULBs shall seize banned plastic carry bags and impose fine on defaulters as per provision of the Rajasthan Municipalities Act, 2009 (Article 258)	It is partially implemented in ULB-2, ULB-7, ULB-9, and ULB-10. In rest of the ULB's no action has been taken.	All ULB's have to act seriously on seizing the plastic bags in case they find any violation of the Act.	Since it is a policy-related issue, it is recommended to implement it within 3 months.	Local self-government
5.	Organize IEC/ BCC activities and awareness programmes in various districts involving Municipalities & other stakeholders.	No notable activities are being conducted to bring awareness by any of the ULBs.	Local self-governments and NGO's need to actively participate. Self-helping groups can also be formed to conduct these activities.	At least 6 activities per year may be organized to bring awareness among the people.	Local self-government/ Non-government organizations, Self-helping groups
6.	To take steps for minimizing generation of plastic waste and	No specific measures are being taken	Surprise inspection activities should be conducted in each of the ULB's and it should be	Activities performed to segregate plastic waste at the source should be recorded. Continuous	Local self-government/ Non-government

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
	segregate plastic waste at the source.		extended to all the rural areas.	monitoring and inspection is essential through competent authorities.	organizations, Self-helping groups
7.	Recycling through Pyrolysis	It is not in practice in any of the ULB	All the ULB's should initiate the process of thermal decomposition of plastic waste.		Local self-government
8.	Recycling through use in Roads	Plastic waste is not being used in the road construction in any of the ULB's	Local self-government should promote the prospects of the using plastic waste in the road construction especially roads constructed under PMGSY.	This action can be taken in the next 2 years. If not a new road, plastic waste can also be used in the upgradation and maintenance activities of road network	Local self-government
9.	Co-processing in Kilns	Four out of ten ULB's, have only sent a minimal amount of plastic to cement kilns in the past. Four ULB's have disposed the segregated plastic to the cement plants situated in the proximity.	ULB generating relatively less quantity of plastic waste and far away from cement factories should coordinate with the nearest ULB which has already planned to transport the plastic waste to cement factory.	It may be brought to practice on monthly basis once a proper collection and segregation is developed.	Local self-government

Chapter 5: Construction & Demolition Waste Management

This chapter covers the present scenario of construction and demolition waste management of the Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Finally, it emphasises the details of action plans along with the actionable points, present status of implementation, gap to be addressed, and proposed time line for completion with financial cost required. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks considering next 10-year projections.

5.1 Present scenario

The Construction & Demolition (C & D) Waste comprises of building materials, debris and rubble resulting from construction, re-modeling, repair and demolition of any civil structure produced in the district is presently being dumped on Road side and mostly filled in low lying areas.

The Construction and Demolition (C&D) waste management and utilization strategy is intended to help facilitate the implementation of the C&D Waste Rules 2016 to ensure that ULBs across the country are able to adopt proper C&D waste management and recycled products find appropriate and adequate utilization. Although India produces enormous amounts of C&D waste and volumes are expected to grow further with time, there are no reliable estimates of generation volume, either at the local or national level. Management of the waste has historically been poor, with a very small fraction diverted for reuse and the rest dumped, often in an unauthorized manner, causing myriad environmental problems. The C&D Waste Rules 2016 laid out detailed duties and responsibilities of different stakeholders ranging from waste generators to ULBs to state and central government ministries and agencies. It also provided templates for documents needed for each management step to ease implementation. However, implementation of these Rules has not been to the full extent, despite guidelines and advisories in support of the Rules being issued by different agencies such as CPWD, BMTPC, MoHUA, etc. Delhi and Ahmedabad have pioneered C&D waste management in India with adoption of Public Private Partnership (PPP) which is regarded as sustainable. Best practice in India and abroad shows that 80-90% of C&D waste can be reused after processing in a variety of applications including landscaping, earth works and civil engineering applications. Processing technology is also not complicated, comprising mainly of crushing, screening and washing

to recover coarse and fine recycled aggregates, which can then be used directly or converted into pre-cast products. Independent testing has confirmed that the quality of products made from recycled aggregates can meet relevant standards and cost of such products can also be competitive with that of conventional products provided transportation distances are not prohibitive. BIS and the Indian Roads Congress have also come up with standards prescribing limits up to which recycled aggregates can be safely used in different applications.

Despite such prospects, C&D waste management and utilization has not progressed as envisaged under the 2016 Rules due to several factors. The biggest challenges are at the ULB level. In addition to land, financial resources and personnel constraints, ULB capacities to develop the management and business model are limited. In the absence of adequate state level facilitation, ULBs continue to dedicate their limited resources towards MSW, which is seen as a higher priority by the public. Additionally, the construction industry has its own set of challenges. Demolition has historically been dominated by small players with entrenched ways of working which often involve “getting rid” of the waste to cut costs. On the other hand, recycled products are perceived as inferior in quality and there are concerns about their economic viability. In these context, without a coordinated effort, implementation at the necessary scale will still remain a challenge for all its stakeholders. Ministry of Housing and Urban Affairs along with its specialized agencies and/or empaneled consultants shall handhold the ULBs for C&D waste management. An ad hoc expert task force needs to be created for developing a standard methodology for inventorisation and characterization of C&D waste. An online webportal, as part of the existing Swachh Bharat Mission portal, may be used for data agglomeration for proper inventorisation as well as for dissemination of best practices, toolkits on technology, management and business models, etc. In parallel, facilitation by state level agencies and departments (such as Urban Development) needs to be accelerated to ensure wide implementation throughout each state, and not just in a few pioneer cities. Special emphasis should be placed on the needs of smaller towns where the generation may not be enough to justify a large central processing facility.

Sustained engagement with the 4 construction industry will also be important, in collaboration with industry associations such as BAI, CREDAI, etc., addressing both their roles as responsible generators of waste and potential users of recycled products. Finally, there needs to be a push to promote utilization of recycled products through a variety of

channels including public procurement, development of standards and certification, green rating, quality assurance, GST rebates, and so on. This multi-faceted facilitation strategy, in collaboration with a wide range of stakeholders, needs to be sustained over the medium term, till the time a viable market for recycled products develops, allowing the private sector to profitably pursue recycling on its own.

As part of the on-going support to Resource Efficiency Strategy of NITI Aayog and European Delegation to India, the European Union Resource Efficiency Initiative for India (EU-REI), a consortium led by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH with The Energy and Resources Institute (TERI), Confederation of the Indian Industry (CII) and adelphi proposed to develop a comprehensive Construction and Demolition (C&D) waste management strategy to promote circular economy in India. The goal of the strategy is to provide a framework of implementation of the C&D Waste Management Rules, 2016. Primary beneficiaries of the strategy will be the Urban Local Bodies (ULBs), Central and State Public Works Departments (CPWD & SPWD), Local Contractors. The strategy will strengthen the existing policy framework by Ministry of Environment, Forests and Climate Change (MoEFCC) as well as entrust Building Materials & Technology Promotion Council (BMTPC), Ministry of Housing and Urban Affairs (MoHUA) to further develop the implementation road map. Furthermore, the study will create additional value for relevant regulatory (e.g., Central Pollution Control Board) and implementing bodies, such as public enterprises involved in infrastructure development tasked with management of C&D waste. In addition, the paper will inform strategic decision making on resource efficiency at NITI Aayog.

5.2 Typical steps of processing C&D waste

Recycling of C&D waste starts with segregation of unwanted residual material such as plastic, wood, metal fragments, etc (constituting 10% of the total waste as per the TIFAC composition). The remaining bulky waste is fed into crushers and reduced to smaller and smaller sizes, with size fractions separated depending on end use. Fines are typically best recovered with a “wet process”. A simplified diagram depicting C&D waste processing is shown in **Figure 5.1**.

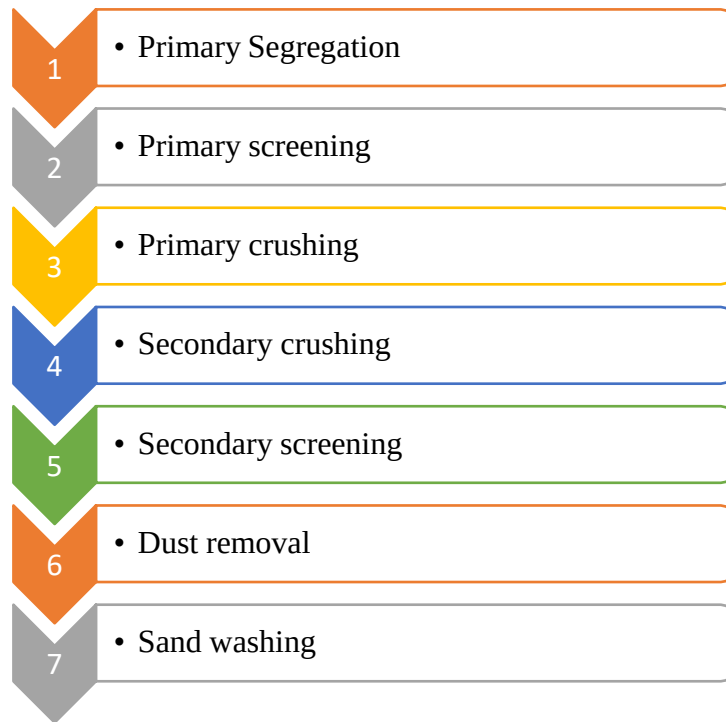


Figure 5.1: Typical steps involved in the recycling of C&D waste

These coarse and fine aggregates of various sizes can be used directly as recycled aggregates in construction or used to manufacture a range of pre-cast products. Products made from recycled aggregates typically tend to have a cost advantage over conventional products since natural aggregates are transported over long distances in most places. This holds true as long as the collection and transportation cost of C&D waste does not become exceedingly high due to long transportation distances.

5.3 Recommendations of National Building Code of India (2005)

As per National Building Code (NBC-CED 46) of India, 2005, part 11, the recycled aggregates can be used in the following areas.

1. Concrete for bulk fills
2. Bank protection
3. Base/fill of drainage structures
4. Pavements
5. Sidewalks
6. Kerbs and gutters

Up to 30% percent of natural crushed coarse aggregate can be replaced by the recycled concrete aggregate. This can be increased up to 50% percentage for pavements and other

where under pure compression specific to the standards and practices pertaining to construction of roads.

The Indian Roads Congress (IRC) has issued 'IRC-121:2017 Guidelines for Use of C&D Waste in Road Sector' outlining what kind of materials from recycled C&D waste and in what proportion, may be safely used for specific road construction/repair application.

5.4 Status of C&D Waste Management in ULB's

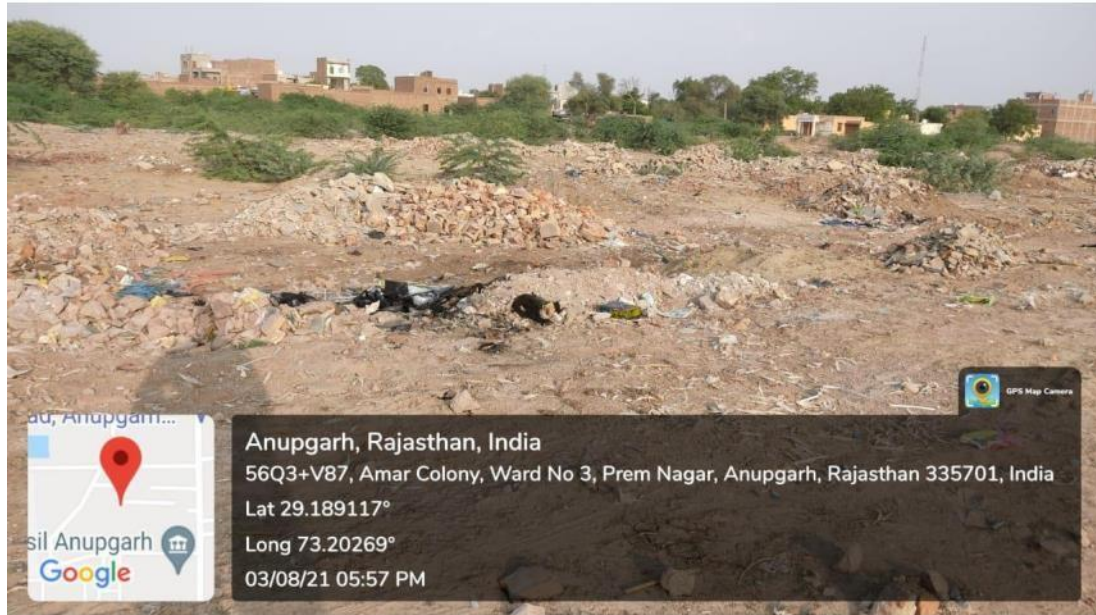
A detailed survey has been conducted in all the ULB's to collect the details of quantity of C&D wastes. The existing C&D sites of Suratgarh and Raisinghnagar is shown in **Figure**



5.2.

Figure 5.2. Satellite and field images of C&D sites at Municipal Board
Suratgarh and Raisinghnagar

Some of the existing C&D sites of Municipal Boards Anupgarh, Kesrisinghpur, and Sadulsahar are shown in **Figure 5.3**. The proposed C&D site selected by Municipal Council Sri Ganganagar is shown in **Figure 5.3D**. The summary of the collected data is



shown in **Tables 5.1 to 5.4**.

Fig. 5.3A: C&D Dumping Site in Municipal Board Anupgarh, Sri Ganganagar



Fig. 5.3B: C&D Dumping Site in Municipal Board Kesrisinghpur, Sri Ganganagar

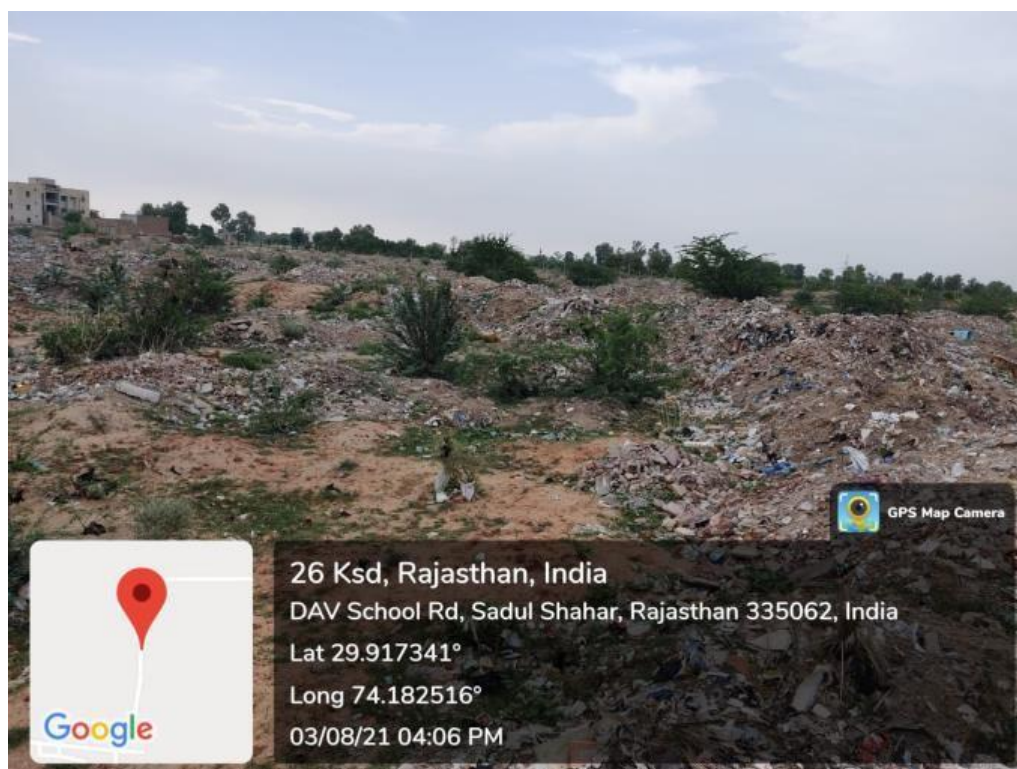


Fig. 5.3C: C&D Dumping Site in Municipal Board Sadulsahar, Sri Ganganagar



Fig. 5.3D: Proposed C&D Dumping Site selected by Municipal Council Sri Ganganagar (Latitude: 29.929877 Longitude: 73.857781)

5.5 Identified challenges and roadblocks for utilizing C&D waste in construction

There remains a host of challenges and roadblocks faced by both government agencies and the private sector that are hindering a wider and quicker adoption of C&D waste management initiatives. It is important to properly understand these challenges so that proposed actions can target them effectively.

5.5.1. Municipal bodies/local authorities

Local authorities/municipal bodies have the most important role in planning and implementing C&D waste management in their respective jurisdictions under the 2016 Rules. Even if the collection, transport and processing is actually contracted out to a private entity, the local authority is ultimately responsible for the overall performance of the management scheme. However, local authorities/municipal bodies appear to be the weakest link hindering rapid adoption of initiatives and face several challenges. Several factors are responsible for this, including:

- a) Officials may understand the broader aspects of C&D waste management but require support to develop tailor-made solutions to their specific circumstances;
- b) ULB's do not have adequate capacities and trained personnel to take up the initiatives;
- c) ULB's do not have financial resources to hire a consultant for an initial feasibility study and/or a DPR;
- d) C&D waste management is considered a low priority (the public is more concerned about MSW), especially in the absence of strong coordination/facilitation by state-level agencies.

Table 5.1: Inventory of C&D waste generation

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Estimated Quantity	[Kg/Day] / [Not estimated]	5.27 TPD	0.028	0.52	0.50	1.02 TPD	0.80 TPD	0.73	0.90 TPD	2.29 TPD	0.63

Table 5.2: Establishment of C&D Waste Deposition centers

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulsh ahah	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Establishment of Deposition Points	[Yes] / [No]	Yes	Yes	No	Yes	Yes	No	No	No	YES	No
C&D Deposition point identified	[Yes] / [No]	Yes	Yes	No	Yes	Yes	No	No	No	YES	No
Available						Not available/un identified					

Table 5.3: Implementation of By-Laws for CD Waste Management

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulsh ahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Implementation of By-laws	[notified] / [not notified]	Notified	Not notified	Notified	Notified	Notified	Notified	Not notified	Notified	Notified	Notified
Collection of Deposition / disposal Charges	[Initiated] / [Not initiated]	Not initiated	Not Initiated	Initiated	Initiated	Initiated	Initiated	Not initiated	Initiated	Initiated	Initiated
Notified/Initiated		Not notified/ Not initiated									

Table- 5.4: Establishment of C&D Waste recycling plant or linkage with such facility

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsingh pur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulsh ahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Establishment CD Waste Recycling Plant	[Established] / [Sent to shared Facility] / [No facility exists]	No facility exists	No facility exists	No Facility exists	No facility exists	No facility exists	No facility exists	No facility exists	No facility exists	No facility exists	No facility exists
Capacity of CD Waste Recycling Plant	[MT/Day] / [Not available]	Not available	Not available	Not Available	Not Available	Not available	Not available	Not available	Not available	Not available	Not available

a) Lack of monitoring capacity/resources

Local authorities/municipal bodies typically suffer from chronic shortages in personnel and resources. They are hard pressed to monitor, collect and dispose MSW adequately, a matter of greater concern to the public, and initiating a new C&D waste management system is an additional responsibility to them for which they feel unprepared. Most cities do not have demolition permits and therefore demolition sites and practices are poorly monitored, if at all. An ideal management plan would require the creation of a new C&D waste monitoring system, as envisioned by the 2016 Rules, for which effective coordination would be required between the ULB's Building Department and the Waste Management Department.

b) Lack of capacity and experience in C&D waste management

In addition to the overall capacity/resource issues, C&D waste management is a relatively new topic that many municipal officials have little awareness or experience of. Experience shows that even after capacity development workshops are held, local authorities/municipal bodies are unsure of how to proceed with waste estimation, feasibility planning, tendering and so on. In many cases, inexperience or prior negative experience with PPPs may be an additional cause of hesitation. The ability to hire a consultant for a feasibility study is limited by funding shortages; even when consultants are hired there is sometimes no guarantee that they will provide appropriate guidance.

c) Concern about finances and business case

Due to chronic financial pressures, local authorities/municipal bodies are instinctively wary of any new commitments that appear to them as a new source of expenditure. During capacity development workshops it is typically difficult to convince them about the successful business case employed in the Delhi and Ahmedabad models. The tipping fee paid to the contracted party by the ULB is seen as an unjustified burden when in reality it may not be a net expense given that: a) the ULB saves money by not having to haul bulky C&D waste, and b) the 2016 Rules allow the ULB to impose charges on waste generators; tipping fees can be paid from this revenue. In some cases, urban officials have even proposed that the contracted party actually pay the ULB rather than receiving a tipping fee for each tonne of C&D waste, and/or share profits from selling recycled products with the ULB. Not surprisingly, this deters potential investors since recycled C&D waste products are still a nascent market in India.

d) Lack of awareness and concern

The construction industry is entrenched in its ways and is historically used to turning a blind eye to how C&D waste is disposed; getting them to change their ways is likely to be a difficult and gradual task. At the same time, there is little awareness about C&D waste recycling and utilisation beyond using rubble as a filling material

e) Dominance of the unorganized sector in demolition

The demolition sector is overwhelmingly dominated by small players in the unorganized sector, the only exception being a handful of specialized companies whose niche is high-tech demolition related to large infrastructure projects. This naturally makes it difficult for urban officials to monitor and regulate small demolition contractors who are typically not registered and are used to getting away with disposing of C&D waste in unauthorized locations.

f) Lack of confidence in recycled products

The experience in Delhi and Ahmedabad has shown that the market for recycled products made from C&D waste is still quite weak in India. Engagement with the construction industry repeatedly demonstrates that potential buyers are hesitant about such recycled products that they perceive to be inferior in quality. Even when informed about the updated BIS standard (383) that allows recycled aggregates in many applications, potential buyers appear risk averse, pointing to their clients who seem to prefer “conventional” products.

g) Poor economic viability of recycled products

Currently aggregates are taxed at 5% and manufactured products are taxed at 18% making the use of recycled products economically unviable for customers. GST relaxation for C&D waste recycled products including manufactured products such as tiles, paver blocks, bricks, sand and aggregates may be considered.

h) Low engagement by public construction agencies

State government agencies such as PWD, Housing Development Board/Authority, City Development Authority, public sector utility companies, etc. are involved in significant construction/demolition work. As per the 2016 Rules, these entities are supposed to coordinate with local municipal bodies about proper disposal of their C&D waste, implement in-situ utilization of C&D waste in their own projects wherever feasible, and adopt policies to

buy recycled products. However, engagement has remained weak, partly as a result of coordination challenges between state and local government level entities.

The proposed action plan for management of C&D waste is presented in **Table 5.5**.

Table 5.5: Action plan for C&D waste management

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
1.	Inventorisation of C&D waste	Some of the ULB's of Sri Ganganagar are currently not maintaining the inventory of C&D waste being generated.	Records should be maintained in a central repository and should be made available for public. This exercise may help to conduct the research activities of including the C&D waste in the construction activities.	8 months	Local self-government
2.	Establishment of C&D waste deposition centers	All ULB's except ULB3, ULB6, ULB7, and ULB8 have established the deposition centers as per the statistics collected.	Necessary actions are to be taken for the successful establishment of deposition centers.	2 years	Local self-government
3.	Identification of C&D waste deposition centers	All ULB's of Sri Ganganagar district except ULB3, ULB6, ULB7, and ULB8 have identified the deposition centers.	Locations should be identified in ULB2, ULB4, ULB6, ULB7, and ULB8 for the establishment of C&D waste deposition centers.	9 months	Local self- governments
4.	Implementation by laws of	All ULB's except ULB2 and ULB7 have notified regarding the implementation of by-laws	Necessary actions are to be taken by LSG's to notify the implementation of by-laws	9 months	Local self-governments
5.	Collection of Deposition and disposal charges	Its implementation is under practice only in ULB3, ULB4, ULB5, ULB6, ULB8, ULB9 and ULB10	Remaining ULB's should take necessary action to collect the deposition and disposal charges	9 months	Local self- governments
6.	Establishment of C&D waste recycling center	None of the ULB's in Sri Ganganagar district have established C&D recycling centers	ULB's with no existing facilities should take appropriate actions to establish the recycling center as it is anticipated that the C&D waste is going to increase in the near future	2 years	Local self- governments

Chapter 6: Bio Medical Waste Management

This chapter mainly deals with the current status of bio-medical waste management in Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials has been presented as per the format prescribed by CPCB for Model DEPs. Finally, it emphasizes the details of action plans along with the actionable points, present status of implementation, gap to be addressed, and proposed time line for completion. The activities are suggested by keeping in view of the future generation of wastes etc. with timelines for completing the tasks considering next 15-year projections.

6.1 Present scenario disposal of hospitals biomedical waste: -

HCF's operating in District Sri Ganganagar have obtained connectivity with M/s E-Tech Projects, operating its plant at Abohar Bypass Road, Hanumangarh Junction, Tehsil & District- Hanumangarh, for Collection, Transportation Treatment and Disposal of BMW, after due agreement with the government authorities of Sri Ganganagar. This site also serves the requirement of Hanumangarh district.

All vehicles transporting biomedical wastes have installed GPS system for its proper monitoring and to ensure that the collection of biomedical waste has been done appropriately. The location of vehicles has also been tracked through GPS systems for their effective monitoring. It has been confirmed by the CMHO that the bio-medical waste disposal from all government hospitals has been done as per the prescribed rule. In case of non-compliance of disposal of bio-medical waste, instructions were issued to take strict actions against the respective Government/private hospitals and/or contractor as per rules. Presently the newly established Primary Health Centers do not have contract of disposal of bio-medical wastes with any company, which shall be completed very soon. The list of actions taken in each of the ULB's is collated with the help of a survey and telephonic conversations with the representatives of each ULB as shown in **Tables 6.1 to 6.7**. Also, data have been collected from Regional Officer, Rajasthan State Pollution Control Board, Sri Ganganagar.

Table 6.1: Inventory of Biomedical Waste Generation in Sri Ganganagar District

S.No	Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
1a	Population	[Nos as per 2011 census]	1969168	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
1b	Population (Projected)	[Nos in 2021 Projected]	2313016	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
2	Total no. of Bedded Hospitals	[Nos] / [No inventory]	202	95	09	01	09	01	09	18	15	31	03
3	Total no. of non-bedded HCF	[Nos] / [No inventory]	12	09	00	00	00	00	00	00	00	02	01
3a	Total no. Clinics	[Nos] / [No inventory]	16	10	00	00	02	00	01	00	00	03	00
3b	No of Veterinary Hospitals	[Nos] / [No inventory]	01	01	00	00	00	00	00	00	00	00	00
3c	Pathlabs	[Nos] / [No inventory]	32	15	00	00	00	00	00	00	00	17	00
3d	Dental Clinics	[Nos] / [No inventory]	07	06	00	00	00	00	00	00	00	01	00
3e	Blood Banks	[Nos] / [No inventory]	00	00	00	00	00	00	00	00	00	00	00
3f	Animal Houses	[Nos] / [No inventory]	00	00	00	00	00	00	00	00	00	00	00
3g	Bio-research Labs	[Nos] / [No inventory]	00	00	00	00	00	00	00	00	00	00	00
3h	Others	[Nos] / [No inventory]	00	00	00	00	00	00	00	00	00	00	00

***Total in the District also includes HCFs of rural area**

Table 6.2: Inventory of Biomedical Waste Generation in Sri Ganganagar District

Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Bedded HCFs	[Nos Authorized]	115	57	04	01	08	01	01	10	03	23	00
Non-bedded HCFs	[Nos Authorized]	32	26	00	00	00	00	00	00	00	06	00

Table 6.3: Biomedical Waste Treatment and Disposal Facilities (CBMWTFs)

Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	1969168	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos in 2021 Projected]	2313016	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
No of CBMWTFs	[Nos] / None	00	00	00	00	00	00	00	00	00	00	00
Linkage with CBMWTFs	[Yes] / [no linkage]	HCFs operating in District Sri Ganganagar have obtained connectivity with M/s E-Tech Projects, Abohar Bypass Road, Hanumangarh Junction, Tehsil & District- Hanumangarh. This site also serve the requirement of Hanumangarh district.										
Capacity of CBMWTFs	[Adequate] / [Not adequate]	Capacity of CBWTDF M/s E-Tech Project, Abohar Bypass Road, Hanumangarh Junction, Tehsil & District- Hanumangarh is 2400 kg/day										
Requirements of CBMWTFs	[Require] / [not required]	-	-	-	-	-	-	-	-	-	-	-
Captive Disposal Facilities of HCFs	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None	None

Table 6.4: Compliance by CBMWTFs

Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Compliance to standards	[Meeting] / [Not meeting] / [NA]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barcode tracking by HCFs / CBMWTFs	[100%] / [Partly %] / [None]	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
Daily BMW lifting by CBMWTFs	[Kg / day]	*	*	*	*	*	*	*	*	*	*	*

*The details of Daily BMW lifting by CBMWTFs is given in Tables 6.6 and 6.7

Table 6.5: Status of Compliance by Healthcare Facilities

Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Pre-segregation	[100%] / [partly %] / [None]	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Linkage with CBMWTFs	[100%] / [partly %] / [None]	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%

Table 6.6: Quantity of Bio Medical Waste sent to TSDF site from Sri Ganganagar District in April 2021

Date	Red (kg/day)	Yellow(kg/day)	Blue (kg/day)	White (kg/day)	Total (kg/day)
01-Apr-21	15.6	570.948	14.400	4.200	605.148
02-Apr-21	14.4	501.720	12.600	2.400	531.12
03-Apr-21	13.2	489.240	12.000	5.400	519.84
04-Apr-21	0	0	0	0	0
05-Apr-21	14.4	585.360	13.200	4.800	617.76
06-Apr-21	15	549.060	13.200	7.200	584.46
07-Apr-21	13.2	553.092	15.600	4.200	586.092
08-Apr-21	12	547.800	10.800	2.400	573
09-Apr-21	14.4	498.948	12.600	9.600	535.548
10-Apr-21	15.6	559.920	14.400	6.600	596.52
11-Apr-21	0	0	0	0	0
12-Apr-21	16.2	589.860	13.200	8.400	627.66
13-Apr-21	14.4	513.120	12.000	5.400	544.92
14-Apr-21	15.6	542.076	13.800	3.600	575.076
15-Apr-21	13.2	501.348	11.400	0.000	525.948
16-Apr-21	16.2	609.840	14.400	8.400	648.84
17-Apr-21	14.4	539.616	16.800	3.600	574.416
18-Apr-21	0	0	0	0	0
19-Apr-21	17.4	600.576	15.000	7.200	640.176
20-Apr-21	15.6	562.272	13.800	3.000	594.672
21-Apr-21	14.4	560.490	12.000	4.200	591.09
22-Apr-21	13.8	621.000	13.200	0.000	648
23-Apr-21	14.4	603.600	11.400	3.600	633
24-Apr-21	15.6	622.542	14.400	6.600	659.142
25-Apr-21	0	0	0	0	0
26-Apr-21	14.4	569.580	17.400	8.400	609.78
27-Apr-21	13.8	625.140	12.600	5.400	656.94
28-Apr-21	15.6	549.660	12.000	9.600	586.86
29-Apr-21	16.8	639.360	3.200	5.400	664.76
30-Apr-21	15	556.440	12.600	7.800	591.84
TOTAL	384.6	14662.608	348.000	137.400	15532.61
				Avg. BMW	517.75

Table 6.7: Quantity of Bio Medical Waste sent to TSDF site from Sri Ganganagar District in May 2021

Date	Red (kg/day)	Yellow(kg/day)	Blue (kg/day)	White (kg/day)	Total (kg/day)
01-May-21	15.6	582.600	14.400	9.600	622.2
02-May-21	0	0	0	0	0
03-May-21	14.4	1015.686	12.000	4.200	1046.286
04-May-21	12	586.260	11.400	0.000	609.66
05-May-21	13.02	685.680	9.600	4.200	712.5
06-May-21	15.6	551.856	14.400	10.800	592.656
07-May-21	14.4	1188.780	12.000	4.800	1219.98
08-May-21	12	705.240	9.600	42.00	768.84
09-May-21	0	0	0	0	0
10-May-21	16.8	1247.640	11.400	2.400	1278.24
11-May-21	14.4	715.560	12.600	5.400	747.96
12-May-21	12.6	661.020	10.800	0.000	684.42
13-May-21	14.4	742.680	12.000	4.800	773.88
14-May-21	13.8	875.880	12.600	1.800	904.08
15-May-21	15	668.100	13.200	6.000	702.3
16-May-21	0	0	0	0	0
17-May-21	14.4	905.700	12.000	3.600	935.7
18-May-21	12.6	834.720	10.800	0.000	858.12
19-May-21	14.4	814.500	12.000	2.400	843.3
20-May-21	12	770.760	13.200	0.000	795.96
21-May-21	15.6	668.760	12.600	5.400	702.36
22-May-21	14.4	698.460	13.200	4.200	730.26
23-May-21	0	0	0	0	0
24-May-21	12.6	1157.490	10.800	0.000	1180.89
25-May-21	14.4	673.680	12.000	2.400	702.48
26-May-21	15.6	582.834	13.200	0.000	611.634
27-May-21	15	604.860	13.800	6.000	639.66
28-May-21	16.8	390.748	15.600	0.000	423.148
29-May-21	12.6	758.280	11.400	4.800	787.08
30-May-21	0	0	0	0	0
31-May-21	14	692.670	12.000	0.000	718.67
TOTAL	369	19785.444	318.600	87.000	20560.04
				Avg. BMW	663.22

6.2 Projection of future generation of Biomedical Wastes

Government of India has released “New Health Care Policy” in March 2017 to provide better health facilities and services to the entire population of India. According to WHO norms presently country is not meeting the availability of hospital beds for per 1000 population. As per the new health care policy total number of beds required in Sri Ganganagar district is given in **Table 6.8**. The total biomedical waste generation based on the total hospital bed requirement is given in **Table 6.9**.

Table 6.8: Requirement of hospital beds for Sri Ganganagar District

Items	Total requirement in Urban Area		Total requirement in Rural Area		Total requirement in Sri Ganganagar District	
	2036	2051	2036	2051	2036	2051
ICU Beds	370	451	1239	1562	1609	2013
Other Hospital Beds	975	1189	3267	4119	4242	5309
Total	1345	1640	4506	5681	5851	7322
Remarks: Total requirements of hospital beds are on the basis New health care policy, 2017 and ICU beds requirements (0.55 beds/ 1000 population) is based on the findings of research papers.						

Table 6.9: Future Assessment of Biomedical waste generation for Sri Ganganagar District

Year	District Population	Total Beds	Total Biomedical waste generated (Ton/day) in Sri Ganganagar District
2036	2925598	5851	9.07
2051	3660869	7322	11.35
Remarks: Future assessment of biomedical waste generation is made on the basis of generation of biomedical waste per bed (as per published research data/ information)			

6.3. Implementation strategy of Bio-medical waste management

As in other solid waste management strategy, the first objective should be to achieve minimization and prevention of waste as much as possible. The next plan of action should be to ensure that biomedical wastes are not mixed with other wastes and shall be collected and segregated at the site of generation itself. Segregation of waste into various categories has been given in Schedule-I of the Rules and Regulations. Biomedical waste can be collected in containers or bags of different colours for appropriate treatment. The colour coding, the type of container, and treatment options should be followed strictly as per the guidelines.

Some of the following essential points must be kept in mind while handling biomedical wastes:

1. Segregate waste at the point of generation.
2. Infectious wastes must not be mixed with safe general non-hazardous waste.
3. Loose garbage should not be thrown.
4. Colour-coded bins must be used all the times.
5. The garbage should not be thrown from the height.

The investment for an on-site waste management system in an individual health care setting is very high. In contrast, an integrated common treatment and disposal facility cost a maximum of IRS. 3-15/kg/day with an added benefit of no capital investment being required. The company/private entrepreneur setting up such a centralized facility will tend to make a profit of about 30 per cent, making it a sustainable venture. The advantages of a centralized facility are a reduction in pollution and energy consumption, streamlined collection, and treatment of waste.

The details of measurable and quantifiable targets, responsibilities of various departments with timelines for completing the tasks are presented in **Table 6.10**.

Table 6.10: Status and Recommendations on Adequacy of Status of ULB for Bio-medical Waste Management

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
1.	Inventorisation of Medical facilities producing Bio-Medical Waste	Inventorisation has been done in all ULBs	Not applicable	Once the facilities are established, they are recorded with due approval.	Medical & Health Department
2.	Preparation of Inventory of Biomedical Waste Generation	Under process	Proper quantification and record keeping is required	Data on bio-medical waste generation, treatment & disposal which are to be updated quarterly.	Medical & Health Department and RSPCB
3.	Capacity building/training of HCFs	For proper management of the waste in the healthcare facilities the technical requirements of waste	No systematic process	It should be Completed within one year.	RSPCB & Medical & Health Department

		handling are needed to be understood and practiced by each category of the staff in accordance with the BMW Rules, 2016.			and RSPCB
4.	Authorisation of such facilities by SPCB/PCCs	HCFs operating in District Sri Ganganagar have obtained connectivity with M/s E-Tech Projects, Abohar Bypass Road, Hanumangarh Junction, Tehsil & District-Hanumangarh for Collection, Transportation Treatment and Disposal of BMW after due agreement officials of Sri Ganganagar. This site also serve the Requirement of Hanumangarh district	Though process is placed, it is important to implement the same in an effective manner to authorize eligible HCFs and clinical as per the prescribed norms.	It should be completed within one year.	RSPCB
5.	Availability of CBMWTFs or Linkage	All ULBs have linkage with M/s E-TechProjects, AboharBypass Road, Hanumangarh Junction, Tehsil & District-Hanumangar, for Collection,Transportation Treatment and Disposal of BMW.	Not applicable	This common facility shouldbe utilized effectively byboth Sri Ganganagar and Hanumangarh district.	Med. & Health Dpt.and RSPCB.
6.	Regular Inspection ofCBMWTFs	Performed (whenneeded) Presently Bio- medical wastes has been sent to M/s E- Tech Projects, Abohar Bypass Road, Hanumangar, which has been monitored by RSPCB and district authorities.	Not applicable	It should be monitored regularly and randomly by the state officials with proper documentation of records.	Team decidedby DistrictCollector
7.	Regular Inspection ofHCFs	Performed by CMHOand team	Not applicable	More frequentvisits are required.	Team decidedby DistrictCollector
8.	Bar Code System	Implementation Status	Process of approving policy decisions	Shall be Functional byJune 30, 2022.	Medical &Health Department

Chapter 7: E-Waste Management

This chapter mainly deals with the current status of E-waste management in Sri Ganganagar district in general and its status in different urban local bodies (ULBs) particularly. Datasheet duly filled by concerned officials has been presented as per the format prescribed by CPCB for Model DEPs. Finally, it emphasizes the details of action plans along with the actionable points, present status of implementation, gap to be addressed, and proposed time line for completion.

7.1 Present scenario E-Waste management: -

The electronic goods contain hazardous materials like lead, mercury, cadmium and arsenic, which has been posing threats not only to the environment but also causing risks to the health of human beings. The risk factors of e-toxins related to our health and environment are harmful to lungs and kidneys, and peripheral nervous systems, increased risk of cancer, acute and chronic effects on plants, animals and micro-organisms.

E-waste or electronic waste can be defined as the electronic products nearing the end of their useful life such as discarded products like PCs, TV sets, cell phones, fax machines, microwave ovens, audio equipment, batteries, and the like. Most of the consumers are either unaware or ignore that computer and electronic equipment contain toxic materials and heavy metals. These materials, if thrown in the municipal solid waste stream, will end up in a landfill, or if incinerated, potentially create an unsafe environment by contaminating the land, water and air.

According to The Global E-waste monitor 2017 shows that e-waste has grown to 44.7 million metric tonnes annually. But only 20% of the e-waste generated is documented to be collected and recycled. The fate of 76% is unknown, but likely dumped, traded or recycled under inferior conditions. Much e-waste also remains in the sheds, attics and storage rooms of its owners or gets disposed of with the normal household bin. India is the 5th largest E-waste producing country in the world in 2014-15 but now it's on the 3rd position behind China and USA in 2019-2020. In spite of being a 3rd largest E-waste hub with more than 10 lakh tonnes annual production, India is producing lowest per capita E-waste with 2.4 kg per capita in 2019. In India, the collection, refurbishment and recycling processes of E-waste is mainly handled by informal sector. Since, there is a lack of formal sectors for treatment of E-waste in India, 95% of the e-waste is processed by informal sector without

any proper rules and regulation that must cause harm to the environment, society as well as human health. The typical steps involved in the E-Waste management processing is shown in **Figure 7.1**.

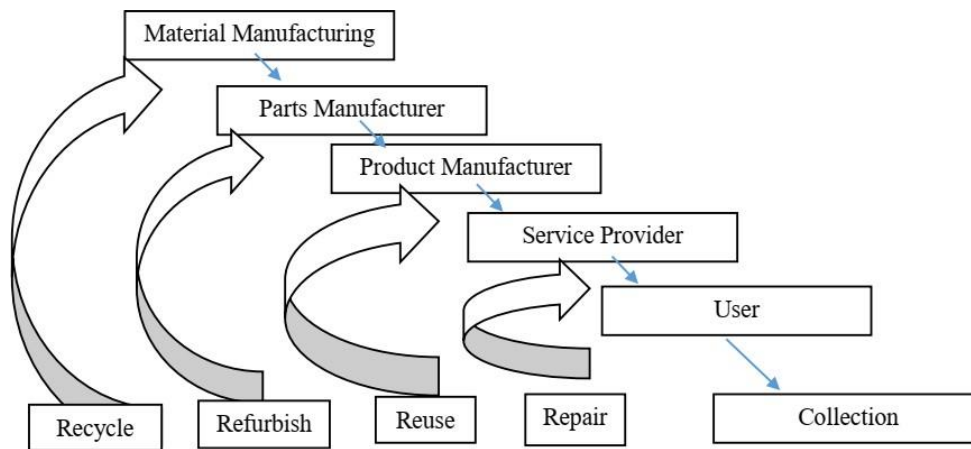


Figure 7.1: Typical steps involved in the E-Waste management processing system

7.2. Implementation of E-Waste management

To reduce the environmental impact caused by improper disposal, and at the same time increase recycling, an efficient and effective computer and recycling depot should be facilitated for residents and business groups. These computer and other electronic equipment recycling depot should be able to collect all types of computer and electronic equipment such as monitors, central processing units (CPUs), laptop computers, printers, keyboards, fax machines, hard drives, modems, speakers, power sources, TV sets, VCRs, stereos, cellular phones, refrigerator, home appliances, batteries, and wiring for recycling and reuse.

Also, proper awareness campaign on e-waste should be launched at frequent interval of time to keep e-waste out of landfills and incinerators. It is estimated that a major portion of electronic items is stored due to uncertainty of how to manage it. Due to this problem, later on, they get easily mixed with municipal solid waste, which are finally disposed of to the landfills. Such terrible situations can be avoided appropriate attention are given on urgent basis by the consumers, manufacturers, local self-governments, and the public. Some of the waste minimization techniques are as follows:

1. Inventory management, proper control over the materials used in manufacturing process is an important way to reduce waste generation.

2. All materials be approved prior to purchase, and evaluated.
3. Ensure that only the needed quantity is ordered.
4. Production process modification.
5. Volume reduction. This technique removes the hazardous portion of a waste from a non- hazardous portion and reduces the volume and thus cost of disposing of a waste material. It can be achieved by source segregation and waste concentration.
6. Recovery and reuse.
7. Extended producer responsibility (EPR). Government intervention is necessary to implement EPR on products such as electric bulbs, tube lights, batteries, computers, TV sets, which cannot be handled individually or locally and which need expertise in their disposal.
8. Separate days and facilities may be set apart for disposal of non-degradable but reusable and recyclable waste such as select e-waste items. These may be collected and stored in RRUs and may be made available for the users on charge.
9. It is important to adopt a 'permit — process approach' while handling modern hazardous waste operations. This requires complex engineering and scientific facility, adequacy of trained operators, safety systems and proper expertise to be secured for compliance, enforcement, issues connected with such management schemes. In the context of high technological revolution catching up in the Indian economy, the possibility of huge accumulation of e-waste, the problem of e-waste management aggravates the overall solid waste management. Effective 'permit— process approach' is critical to monitor the performance of operating e-waste disposal. It is worthwhile to consider separate enforcement agencies for this purpose.
10. Most important and critical point is the prevention of waste rather than managing it. It is possible if the electronic parts which are in working condition can be donated for reuse and for extending the lives of valuable products. Reuse also benefits society. It is therefore high time for the management to take measures for prevention of e-waste in a well-planned manner rather than having a 'wait and watch' policy. Not only will it save some anticipated disaster, but will also show the way to tackle this menace with proper E-waste management strategies.

E-waste is a serious problem at both local and global scales. E-waste problems appeared initially in developed countries and now extend widely to other countries around the world. The volume of e-waste is growing fast because consumer technology is rapidly changing and the innovation of technology results in rapid obsolescence, thus generating massive amounts of e-waste. E-waste consists of many different materials, some of which contain a variety of toxic substances that can contaminate the environment and threaten human health, if the end-of-life management is not meticulously managed.

Therefore, it is important to adopt an efficient E-waste management model. One such model is the Swiss model “**Wheel of Life**”, which consists of five steps:

1. **Buy:** The first step is when any new electronic product is purchased, for which any buyer is charged an Advance Recycling Fee (ARF) which covers non-profitable processes required for safe disposal at the end of the product's life. The amount of the ARF is defined by the type of product and is included in its sale price. With ARF in place, consumers can return retired equipment free of charge at all collection sites in the country.
2. **Return:** When a product comes to the end of its life, the consumers are not allowed to dispose of e-waste through any other means than dedicated collection points. Retailers are required to take back electronics free of cost and independent of any purchases for all types of products they sell. The producers then must dispose of the collected items safely through the four independent Producer Responsibility Organizations (PRO). These four organizations and their responsibility areas are different. Each of these four organizations handles specific categories of e-waste. The main goal here is to prevent electronics from reaching landfills.
3. **Detox:** In this process, all the critical components are carefully removed from the e-waste in order to avoid contaminating downstream processes with toxic substances. Detox requires a large amount of manual labour and is considered the unprofitable portion of the process. ARF is used to cover these costs.
4. **Shred:** Mechanical processing is normally an industrial, large-scale operation to obtain concentrates of recyclable materials and further separate hazardous materials. Some typical machines/components include: crushing units, shredders, magnetic separators, and air separators. Gas emissions are filtered and effluents are treated to minimize environmental impact. Workers' safety norms are also considered and

simultaneously monitored.

5. **Refine:** Refining resources from e-waste is possible and technical solutions exist to extract raw materials with minimal environmental impact. Most extracted elements must be refined before being sold as secondary raw materials or disposed of in a final disposal site. The refining process focuses on three main materials: metal, plastic, and glass.

The model does not consider refurbishing and reusing old electronics before being totally discarded. Refurbishing and reusing might be more economical in processing many e-wastes. Refurbished items could provide marketable goods in second hand markets.

So, this same model can be improvised by adding two more possible steps in the framework of the process which includes refurbishing as well as designing new products.

The returned items in good condition would be considered for refurbishing, possibly using materials recovered after refining. Refurbished items would be sold in the market at a lower price. Refined materials should also be used in designing new products if possible. In the Refine steps of the new model, major focus is on regaining all reusable materials. The idea is to obtain as many raw materials as possible with the smallest amount of environmental impact. In recycled electronics valuable metals, like gold, silver and copper can be found. We assume that the precious metals gained from the refining step in the model would add more values to the value chain and it would be self-financing and possibly be a profitable social business overtime. This process can be proved as a substantial contribution in the field.

The list of actions taken currently in each of the ULB's is collated with the help of a survey and telephonic conversations with the representatives of each ULB as shown in **Tables 7.1 to 7.4**. Also, data have been collected from Regional Officer, Rajasthan State Pollution Control Board, Sikar.

Table 7.1: Status of facilitating authorized collection of E-Waste

Attributes	Unit	Total in the District	ULB-1 Ganga nagar	ULB-2 Anupgarh	ULB-3 Gajsing hpur	ULB-4 Karanpur	ULB-5 Kesrisin ghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	1969168	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos in 2021 Projected]	2313016	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Collection centres established by ULB in District	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None	None
Collection centres established by Producers or their PROs in the District	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None	None
Does the district has linkage with authorized E-Waste recyclers / Dismantler	[Yes] / [No]	No	No	No	No	No	No	No	No	No	No	No
No authorized E-Waste recyclers / Dismantler	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None	None

Table 7.2: Status of Collection of E-Waste

Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsing hpur	ULB-4 Karanpur	ULB-5 Kesrisin ghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Authorizing E-Wastecollectors	[Authorized] / [None]	None	None	None	None	None	None	None	None	None	None	None
Involvement of NGOs	[Yes] / [No] / [Nos]	No	No	No	No	No	No	No	No	No	No	No
Does Producers have approached NGOs/ Informal Sector for setting up Collection Centers.	[Yes] / [No] / [Nos]	No	No	No	No	No	No	No	No	No	No	No
Does ULBs have linkage with authorized Recyclers / Dismantlers	[Yes] / [No]	No	No	No	No	No	No	No	No	No	No	No

Table 7.3: Control E-Waste related pollution

Attributes	Unit	Total in the District	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	1969168	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population(Projected)	[Nos in 2021 Projected]	2313016	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Does informal trading, dismantling, and recycling of e-waste exists in District	[Yes] / [No]	No	No	No	No	No	No	No	No	No	No	No
Does the administration closed illegal E- Waste recycling in the District	[Yes] / [No] / [Nos]	No	No	No	No	No	No	No	No	No	No	No
No of actions taken to close illegal trading or processing of E-Waste	[Nos]	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Table 7.4: Creation of Awareness on E-Waste handling and disposal

Attributes	Unit	Total in the District	ULB-1 Gangana gar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	1969168	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos in 2021 Projected]	2313016	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Does PROs / Producers conducted any District level Awareness Campaigns	[Yes] / [No] / [Nos]	No	No	No	No	No	No	No	No	No	No	No
Does District Administration conducted any District level Awareness Campaigns	[Yes] / [No] / [Nos]	No	No	No	No	No	No	No	No	No	No	No

7.3 Projection of future generation of E-Wastes

Currently, collection and disposal of E-Waste is not the focused area for all of us. In India only about 10% E-Waste was collected in year 2018-19 and it was about 3.5 % in year 2017-18. Use of electrical vehicles, installation of solar panels, computers, laptops and mobile phones etc. will increase in future and that will lead to generate huge quantity of E-Waste that has to be handled properly. Presently no data is available on E-Waste with the district authority. On the basis of published data future plastic waste generation is given in **Table 7.5**.

Table: 7.5: Future Assessment of E-waste generation

Year	District Population	Total Projected E-waste (Ton/year) in the District
2036	2925598	3197
2051	3660869	5384
Remarks: Future assessment is based on the per capita present contribution (0.812 kg/capita/ yr) with an increase of average 2% per year.		

There is total 22 authorized dismantler/ Recycler/ Refurbisher in Rajasthan currently according to RSPCB. But in Sri Ganganagar not a single authorized e-waste centre is working so informal activities have the interference with improper management of E-waste.

E-waste management, can be dealt by two ways:

Case I: Reuse, Refurbish, and Recycling

- A pick-up service for e-waste can be requested and desktops, laptops, LCD/LED monitors, printers, scanners, cell phones, fax machines, game consoles, CDs, DVDs, and computer accessories are tested for their reusability and hence, based on that it can be reused, recycled and refurbished. The waste received at this location is tested for its reusability.
- If the electronic product is still functional, it is sold at a lower cost for reuse. Also, the components of the electronics are tested separately and the working components are either sold individually or sometimes used to refurbish a new model and

then sold as a unit.

- The electronics items that cannot be reused are sent for recycling. No machinery is used at this location. The electronics are manually dismantled and separated into various streams and then individual streams are shipped to various locations for subsequent processing. The dismantling process is used to remove metals, plastics, circuit boards, and ink/toner before the e-waste is shipped to specific processors.

Case II: Manual Dismantling and Recycling

The waste from computers and televisions to small home appliances can be treated under this case. The main objective should be to remove hazardous materials from the waste stream and then ship the remaining material for subsequent processing. The processing centre should have four separate processing lines:

- Line 1 deals with computers and laptops. Workers remove components such as wire, circuit boards, and outer casings, and put them in separate containers for shipping.
- Line 2 works on removing hazardous materials from small home appliances. Major hazardous materials are batteries and mercury tubes.
- Line 3 is the accessories line dealing with the processing of computer accessories such as keyboards, printers, scanners, mouse, hard drives, etc. The major hazardous material to be removed from this line is the ink and toner from the printer.
- Line 4 is the display processing line dealing with dismantling of televisions and computer displays. The back panel of the CRT screen is leaded glass and is removed from the front panel, which is the high-quality glass. In the case of flat screens, the glycol assembly and mercury bulb are the major hazardous materials that are removed from the system.

After the dismantling and hazardous material removal, the remaining materials (mostly metal and plastic) are baled and shipped for final processing.

The proposed action plan for management of E-waste management is presented in **Table 7.6**.

Table 7.6: Action plans for E-waste management

Sr. No.	Action Point	Present Status	Gap	Timeline	Department
1.	Registration of E-Waste collectors	There are no ULBs at themoment authorizing E-Wastecollectors.	First, we need to register E-Wastecollectors with all ULBs. This willhelp to conduct the research activities and management.	12 months	LSG Department(Municipal Bodies)
2.	Partnering with NGOs	No ULBs have approached NGOs for setting up collection centres of E-waste.	NGOs pave a good way to raiseawareness among the people.	2 months	LSG Department(Municipal Bodies) & NGOs
3.	Raising awarenessabout E-waste	There is very less awareness insociety regarding E-waste.	More awareness will help create more action which will help to counter the rising E-waste problem.	3 months	LSG Department(Municipal Bodies), NGOs, Educational Institutes, etc.
4.	Establishment of E-Waste deposition and management Centers	The number of management and deposition centres facilitating authorized collection of E- Waste are none currently.	The major aim is the collection of E-waste, which is posing a great threat, in a systematic manner.	12 months	LSG Department(Municipal Bodies)
5.	Implementation of bye laws	None of the ULBs have closed illegal E-Waste recycling ormanagement in the district and there are no proper guidelines.	Necessary actions and guidelinesshould be provided.	6 months	LSG Department(Municipal Bodies)
6.	Collection of deposition and disposal charges	No implementation.	ULBs should take necessary actionto collect the deposition and disposal charges afterestablishment of the system.	9 months	LSG Department (Municipal Bodies)
7.	Establishment ofE-waste recyclingcenter	There are no establishedrecycling centers in any of the ULBs.	E-waste should be considered as an imminent threat and these should be established as soon as possible.	1 year	LSG Department (Municipal Bodies)
8.	Training of staff	There is no practice currentlythrough which ULB staffslearns the process.	Programs are not being conductedcurrently in a methodical manner. A systematic training program/workshop should be organizedonce in a two year to share the bestpractices to be adopted by ULBs inhandling E-waste management.	1 year	LSG Department(Municipal Bodies)/Village Panchayat, University

Chapter 8: Hazardous Waste Management

Hazardous waste means any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes.

Hazardous waste is primarily generated from industrial activities and is required to be managed in an environmentally safe manner. The management of the hazardous waste is regulated as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016), notified by Ministry of Environment, Forest and Climate Change, Govt. of India under the Environment (Protection) Act, 1986.

The HOWM Rules, 2016, lays down provisions with respect to generation, packaging, storage, transportation, recycling/reprocessing, utilization, treatment, disposal, etc. of hazardous waste and obtaining authorization from the concerned State Pollution Control Board (SPCB) / Pollution Control Committee (PCC) for the same. The HOWM Rules, 2016, also lays down the responsibility of occupier of hazardous waste for their safe and environmentally sound management following the waste management hierarchy viz. prevention, minimization, reuse, recycle, recovery, utilization and lastly safe disposal.

The recycling and utilization as resource or energy recovery of hazardous waste are preferential option over disposal of hazardous waste since it conserves resources and leads to reduction of carbon foot print. Utilization of hazardous waste by co-processing in cement Kiln has proven a sustainable option because there is a dual benefit in terms of utilizing the waste as supplementary fuel as well as alternative raw material. The HOWM Rules, 2016, has stipulated provisions about such utilization of hazardous waste as resource or energy recovery. The HOWM Rules, 2016, stipulates provisions for maintaining records and filing annual returns pertaining to hazardous waste generation and their management. As per Rule 20(2) of the HOWM Rules, 2016, the occupier handling hazardous waste and operator of the disposal facility are required to submit the annual return (about hazardous wastes generation, storage, recycling, utilization, disposal, etc.) in the prescribed Form to SPCB/PCC by 30th June of every financial year. Based on which, SPCBs/PCCs are required to prepare annual inventory of the waste generated, recycled, utilized, disposed, etc. for the respective State/UT and submit the same to CPCB by 30th September of every financial year in accordance with the provisions stipulated under Rule 20(3) of the HOWM

Rules, 2016. And, as per Rule 20(4) of the HOWM Rules, 2016, CPCB is required to prepare consolidated report on management of hazardous wastes and submit the same to the Ministry.

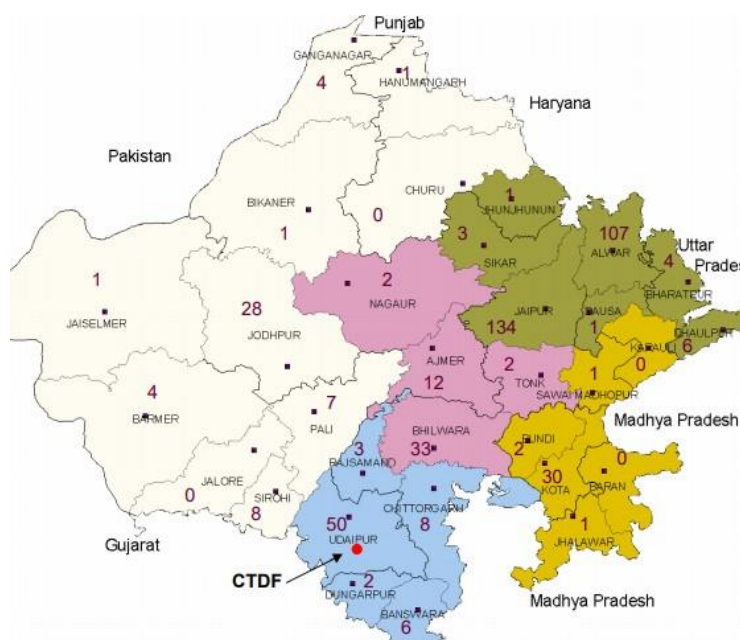


Figure 8.1: Total number of hazardous was generating units in each district

considering the inventory of solid waste generation, it is noticed that domestic hazardous waste is being collected at the household level without separating it at the source and notable quantities has been found. For the effective management, it is recommended to separate it at the source. From the collated information, it is evident that no sources generating hazardous waste exist in Sri Ganganagar district. Since no hazardous waste is being emitted from the existing industries, no essential resources are required for the mitigations activities.

Table 8.1A. Inventory of Hazardous Waste

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
No of HW Generating Industry	[Nos.]	00	NA	NA	NA	NA	NA	NA	NA	NA	NA
Quantity of HW	[MT/Annum]	359.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00
Quantity of Incinierable HW	[MT/Annum]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quantity of land-fillable HW	[MT/Annum]	4.84	4.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
Quantity of Recyclable / utilizable HW	[MT/Annum]	355.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Contaminated Sites and illegal industrial hazardous waste dumpsites: Nil											
Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
No of HW dumpsites	[Nos] / [None]	None	None	None	None	None	None	None	None	None	None
Probable Contaminated Sites	[Nos] (provide list)	None	None	None	None	None	None	None	None	None	None

Table 8.1B. Inventory of Hazardous Waste

Authorization by SPCBs/PCCs											
Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghp ur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
No of industries authorized	[Nos]	11	00	00	00	00	00	00	00	03	00
Display Board of HW Generation in front of Gate	[Nos]	11	00	00	00	00	00	00	00	03	00
Availability of Common Hazardous Waste TSDF											
Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghp ur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Common TSDF	[Exists] / [No] / [Sent to Other District within State]	*No	*No	*No	*No	*No	*No	*No	*No	*No	*No
Industries linkage with TSDF	[Nos.]	*Yes	*Yes	*Yes	*Yes	*Yes	*Yes	*Yes	*Yes	*Yes	*Yes

* Common TSDF is available at Udaipur and maintained by Udaipur Chamber of Commerce and Industries (UCCI), Udaipur. Hazardous waste from all industries situated in Sriganganagar is sent to UCCI for disposal.

Table 8.1C. Inventory of Hazardous Waste

Linkage of ULBs in District with Common TSDF											
Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
ULBs linked to Common TSDFs for Domestic Hazardous Waste	[Yes] / [No]	Common TSDF is available at Udaipur and maintained by Udaipur Chamber of Commerce and Industries (UCCI), Udaipur. Hazardous waste generate from aforesaid unit is been sent to UCCI for disposal .	No	No	No	No	No	No	No	No	No

Chapter 9: Water Quality Management Plan

Sri Ganganagar district is located in the northernmost part of Rajasthan State and extends between latitudes 28°42'30'' and 30°12'00'' N and longitudes 72°39'15'' and 74°18'30''E. Occupying an area of around 11154.66 sq km, the district is surrounded by Bikaner and Hanumangarh districts of Rajasthan, Ferozpur district of Punjab and International border of Pakistan in the south, east, north and west respectively. The district is divided into ten development blocks viz. blocks viz., Anupgarh, Sri Ganganagar, Gharsana, Karanpur, Padampur, Raisinghnagar, Rawla Mandi, Sadulshahar, Suratgarh, Vijaynagar. It has a total population of 1969168 as per the 2011 Census. The district has 3014 villages and 12 cities and towns. The rural and urban population of the district is 14.34 lakh and 5.36 lakh, respectively.

In 1969, six observation wells were established by the erstwhile Ground Water Wing of the Geological Survey of India for groundwater regime monitoring. The number of monitoring wells was increased to 41 by 1978 by Central Ground Water Board to have better coverage of the district. In 2006, a report on Hydrogeological framework and development prospects in the Sri Ganganagar district was brought out by Central Ground Water Board.

Presently, groundwater regime monitoring is being carried out in the district from a network of 143 observation wells. Water levels in these borewells are monitored during pre-monsoon and post-monsoon periods. The type of formation tapped while drilling the borewells is presented in Table 9.1. From the attributes, it is imperative that the formation tapped in all blocks of Sri Ganganagar is the same.

Table 9.1. Salient observations from the ground water exploration

Block	Formation tapped
Anupgarh	Alluvium
Ganganagar	Alluvium
Gharsana	Alluvium
Karanpur	Alluvium
Padampur	Alluvium
Raisinghnagar	Alluvium
Sadulshahar	Alluvium
Suratgarh	Alluvium

9.1. Soil types and irrigation projects

The northern part of the district is characterized by sierozems or arid soils which are light yellowishbrown to pale in colour. Presence of kankar layer (calcareous concretions) has been noticed in the depth range of 75 to 100 cm. Soils are deep and moderately drained. Permeability is moderate to moderately slow and water holding capacity and natural fertility are generally poor. Loamy sand and sandy loam are the predominant types of soil met within this soil group. At places, patches of sand also occur. The southern portion of the district is characterized by desert soils, which are very pale brown to yellowish brown in colour and are generally devoid of lime concretions. Soils are generally well drained to excessively drained and have low moisture holding capacity and high permeability. Principal means of irrigation in the district is through canals, though some areas are irrigated by wells/ tubewells. As per the data available on the website of Department of Economics and Statistics, Ministry of Agriculture, Govt. of India, as on 2009-10, net area irrigated from canals is 526562 hectares while ground water irrigates only a small area of 842 hectares. Total net area irrigated is 527404 hectares and gross area irrigated is 788016 hectares including 786895 hectares of area irrigated by canals and 1121 hectares of area is irrigated by tubewells (CGWB, 2013).

The desert land in Sri Ganganagar was converted to a green town by the efforts of Maharaja Ganga Singh, who brought the Ganga Canal. Punjab and Himachal Pradesh's excess waters were carried to this region through Ganga Canal, making Sri Ganganagar a district known as the “food basket of Rajasthan.”

The district's economy is based on agriculture; its main crops are wheat, mustard, and cotton. Other crops are guar, bajra, sugar cane, and grams. In recent years, farmers have been diverting towards horticulture. Kinnow (a citrus family fruit or a hybrid citrus fruit) is a popular, horticultural product; other citrus family fruits are also grown.

The district is drained by canals of (1) the Bhakra canal system, (2) Indira Gandhi Nahar Pariyojana, and (3) the Ganga canal system. Bhakra canal system: Bhakra canal draws water from Govind Sagar, which is fed by Sutlej and Beas rivers. Rajasthan's share in Sutlej water is 2096 million cubic metres (mcm)/year. It provides irrigation to 372,000 hectares (ha) area through a total of 1,949 km of the canal network. Branches of the Bhakra canal irrigate northern and northeastern parts of the Ganganagar district. Indira Gandhi Nahar Pariyojana: Indira Gandhi Nahar Pariyojana is a multidisciplinary irrigation project

conceived to use 10.69 billion cubic metres (bcm) of water available from the Ravi and Beas rivers annually to cultivate 1087 million hectares (mha) of land in the Thar desert of western Rajasthan. The IGNP Stage-I includes Anupgarh and Suratgarh branches/ distributaries in the Ganganagar district. Gang Canal System: Gang canal begins at Hussainiwala head works in Punjab. The upper section of this canal is lined and is known as the Bikaner canal. It enters Rajasthan from the north and is known by the name Gang canal. It is unlined and irrigates a significant part of the Sri Ganganagar district. The Indira Gandhi Canal, which is also the largest in India. Although Sri Ganganagar district lies in the Thar Desert, irrigation via the Indira Gandhi and Ganga Canals has changed flora and fauna in the district. The district can be classified into five geographical regions:

1. The region irrigated by the Ganga Canal and the Bhakra canal tributaries: the northern region, which is 3/4 of the district, resembles the fertile plains of Punjab. Ganga Canal irrigates the northern-western area of the district. Some areas, like the area between the towns of Raisinghnagar and Vijaynagar, have desert-like conditions.
2. Area irrigated by the Suratgarh branch of the Indira Gandhi canal.
3. Area irrigated by Anupgarh branch of Indira Gandhi canal: It comprises Anupgarh and Gharsana tehsils. It is the southernmost region of the district, much of which has been converted into plains, but some sand dunes remain. The Anupgarh branch of the IGNP canal is the main source of irrigation in southern tehsils.
4. The Naali belt: This is a narrow basin of the Ghaggar River, the only major river of the district. It is a seasonal river that flows only in the rainy season. It enters the district near Suratgarh and flows in Jaitsar, Vijaynagar, and Anoopgarh, then crosses the Indo-Pakistan border.
5. The villages in the area are named after the Canal/water distributary passing nearby. For example, village-Chak 5 BB is the 5th village on the BB Canal. Similarly, Chak 4 E is the 4th village on the E Canal/Distributary.

9.2. Aquifers

There are no hard rock aquifers mapped in the area as all of the water till explored depth occurs in alluvium only. The alluvium is of two types viz., Younger alluvium which predominantly is wind-blown sand whereas the Older alluvium is more of fluvial origin.

More than 90% of the aquifer area is Younger alluvium and the rest is Older alluvium. reveals that the thickness of unconfined aquifer varies from less than 10 m to about 90m with the thickest parts lying to the south and northeast of Sadulshahar and Suratgarh block. Rest of the blocks have moderate to low thickness of aquifers in alluvium under unconfined condition. The general thickness of the district is up to 60m. The spatial variation of aquifer thickness in the Sri Ganganagar district is shown in Figure 9.1.

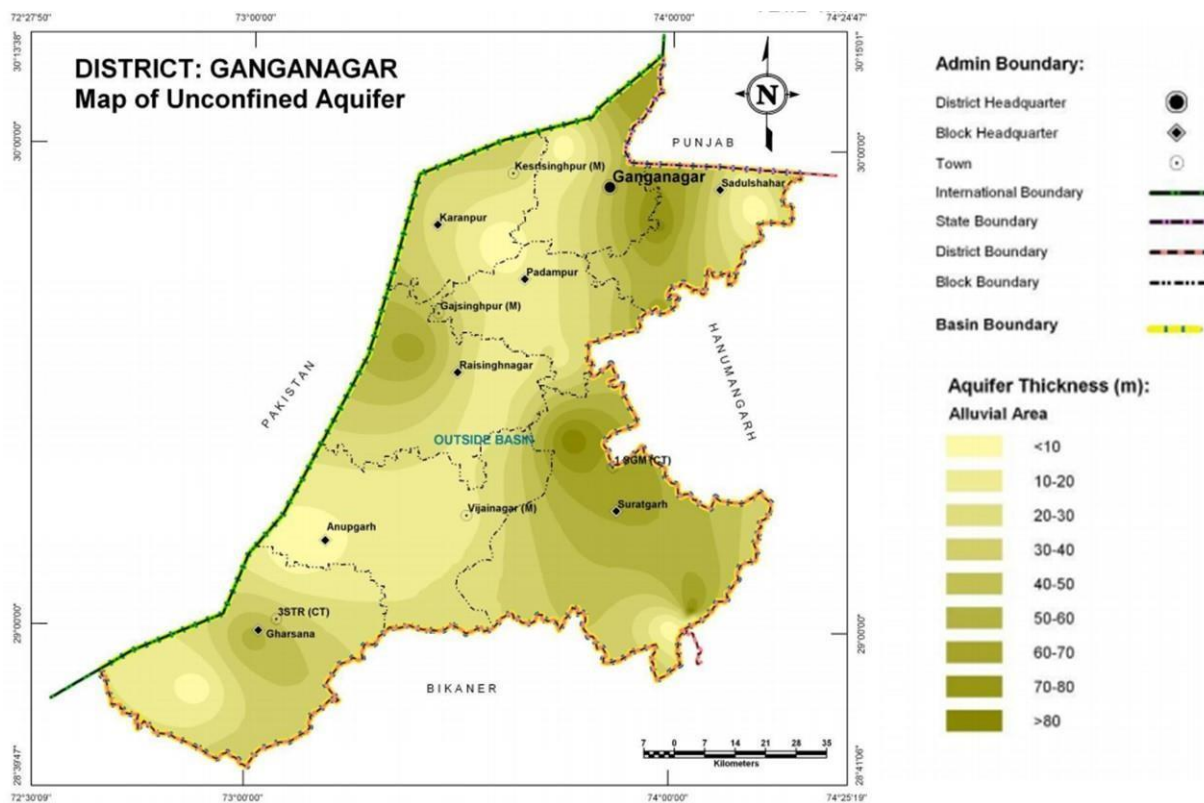


Figure 9.1. Thickness of unconfined aquifers in Ganganagar

9.3. Depth to bed rock

The beginning of massive bedrock has been considered for defining top of bedrock surface. Figure 2 presents the variation of in depth of bed rock over the district. It is evident that maximum depth to bedrock is about 200 meters below ground level and such areas are seen in the south-western fringe of Gharsana block. The bedrock is overlain by alluvial deposits of primarily aeolian origin. Moderately deep bedrock has spread all over the district between the ranges of 140m bgl to 180m bgl. Eastern side of Ganganagar, Padampur, Sadulshahar and Suratgarh blocks are reported to have shallow depth to bedrock (less than 140 meter bgl) as compare to other parts of the district (CWD,2013). The spatial variation of depth to bed rock

within the district is presented in Figure 9.2.

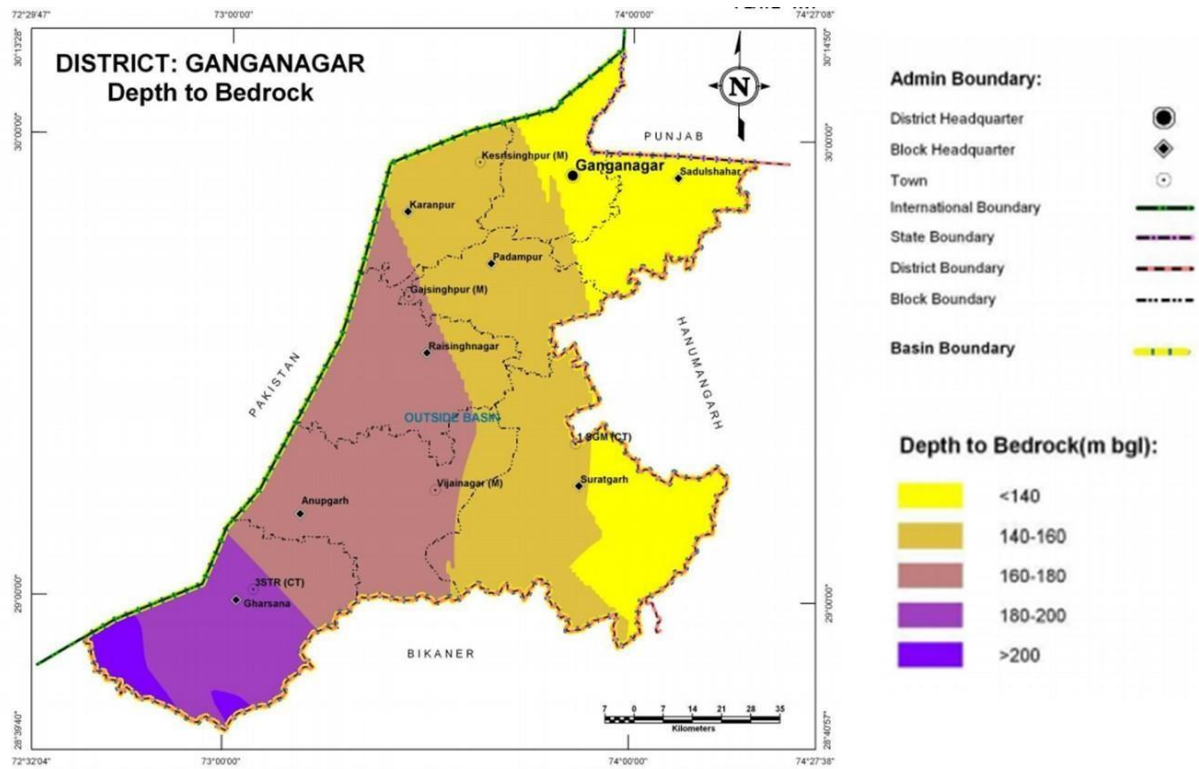


Figure 9.2. Variation in the depth of bed rock over Sri Ganganagar

9.4 Groundwater scenario Geological framework

The entire Ganganagar district is covered by Quaternary Alluvium overlain by thin veneer of windblown sand in the central part and by high sand dunes in the southern part. In the northern

part and in Ghaggar flood plain, alluvium is without any blown sand cover. Quaternary alluvium is mostly fluvial in origin and consists of alternating sequences of sand, silt and clay. The alluvium is underlain by rocks of Marwar Supergroup and Plana Series of Palaeozoic and Tertiary age respectively.

A map depicting the hydrogeological features of the district is shown in Figure 9.3. Sand dunes and intervening depressions comprise of older or newer alluvium depending upon topographic position with respect to the present flood plain.

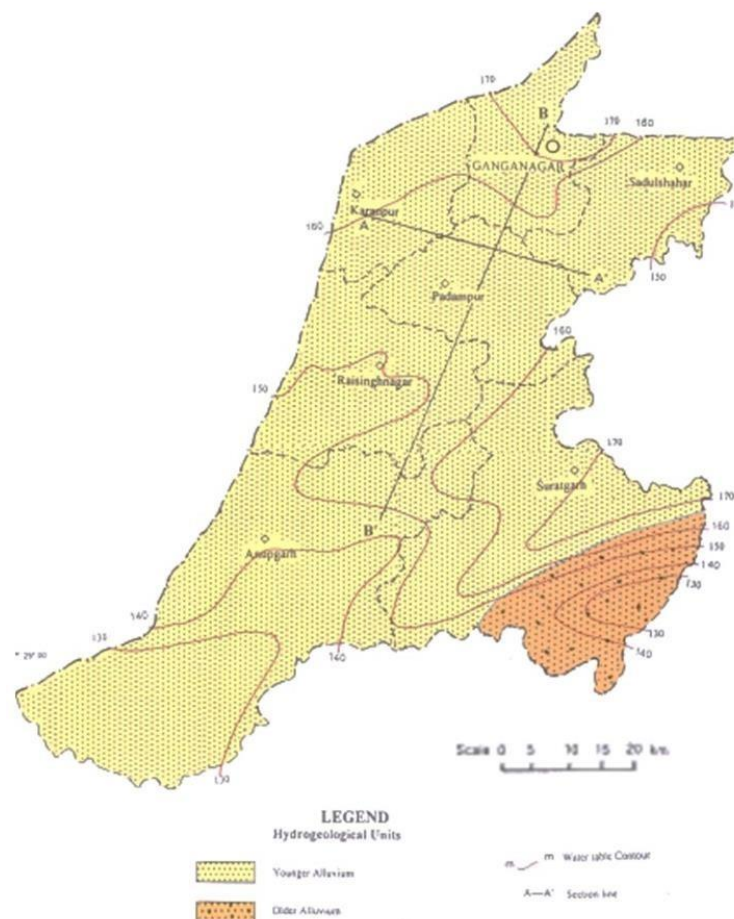


Figure 9.3. Hydrogeological map of Sri Ganganagar district (Source: CGWB)

The ground water in the district occurs under water table condition but at a few places, it also occurs under confined conditions due to presence of overlying impermeable clay horizons. Alluvial thickness varies from 10 m to a maximum of 40 m in the northern part and 40 m to 80 m in the southern part of the district. Depth to confining bed varies from 40 to 100

m in the northern part whereas it lies between 90 m and more than 100m in the southern part. Thickness of confiningstratum varies from 10 to 20 m in the northern part and 10 to 40 m in the southern part. The confined aquifer belongs to basal part of alluvium and those associated with Palana and Nagaur sandstone. Rocks of Palana and Nagaur are not exposed anywhere but have been encountered below the alluvium at varying depths in exploratory boreholes drilled by CGWB. Yield of exploratory wells tapping alluvium varies from 180 to 430 lpm for drawdown of 3.75 to 13 m. Transmissivity values of aquifer range from 375 to 723 m²/day. The Storativity values range from 1.50×10^{-3} to 1.0×10^{-2} indicating phreatic ground water condition.

9.5. Depth of water level

From the study conducted by CGWB (CGWB, 2019), it is observed that groundwater quality has been deteriorating due to rapid development and industrialization. Also, the population increase has put pressure on the groundwater. Therefore, there is a need for scientific planning in development of groundwater under different hydrogeological situation and to evolve effective management practices with involvement of community for better ground water governance. In view of emergent challenges in the ground water sector in the state there is an urgent need for comprehensive and realistic information pertaining to various aspects of groundwater resource available in different hydrogeological setting through a process of systematic data collection, compilation, data generation, analysis and synthesis. The water quality and quantity of ground water is monitored by CGWB at few discrete wells in the district.

Therefore, mapping the ground water level, quality of ground water over the entire region of Sri Ganganagar district is the need of the hour. Considering this in view, a detailed study is performed by collating the information available with CGWB and Ministry of Jal Shakti. For better understanding of the scenario, water level and water quality is discussed separately.

Systematic and regular monitoring of ground water levels brings out the changes taking place in the groundwater regime. The maps so generated are of immense help for regional groundwater flow modelling which serves as a groundwater management tool to provide the necessary advance information to the user agencies to prepare contingency plans in case of unfavorable groundwater recharge situation. The data also has immense utility in deciding the legal issues arising out of conflicting interests of groundwater users.

Water level data in Sri Ganganagar is monitored at 143 discrete locations. Among these

borewells, 113 borewells are dug wells (DW) and 30 are piezo metric wells (PW). The spatial distribution of these monitoring wells is shown in **Figure 9.4**.

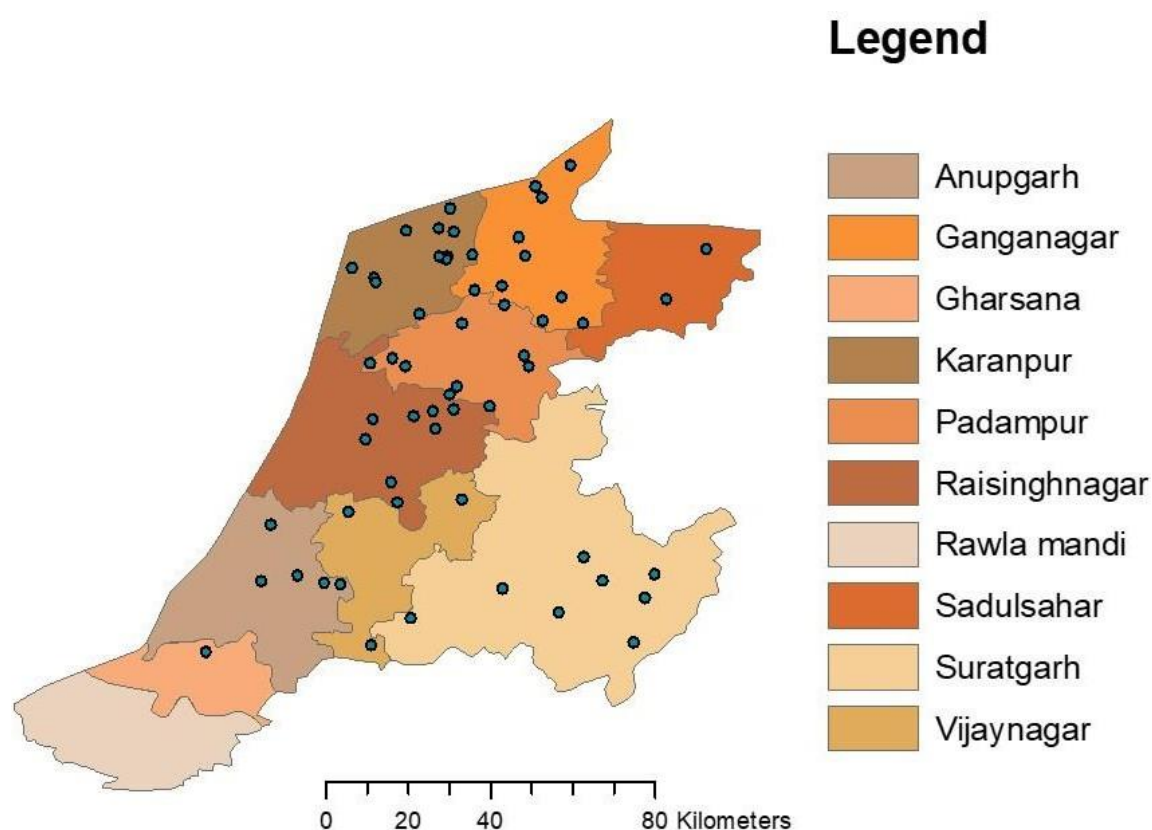


Figure 9.4: Spatial distribution of monitoring wells in Sri Ganganagar district

The water level at these discrete locations during pre-monsoon season and post-monsoon season is reported by CGWB. The spatial variation of the water level during 2019 is shown in **Figure 9.5**. It may be noted that the localities of damaged and dry wells are not shown in the Figure 9.5. Similarly, the variation of ground water for the post-monsoon period is shown in **Figure 9.6**.

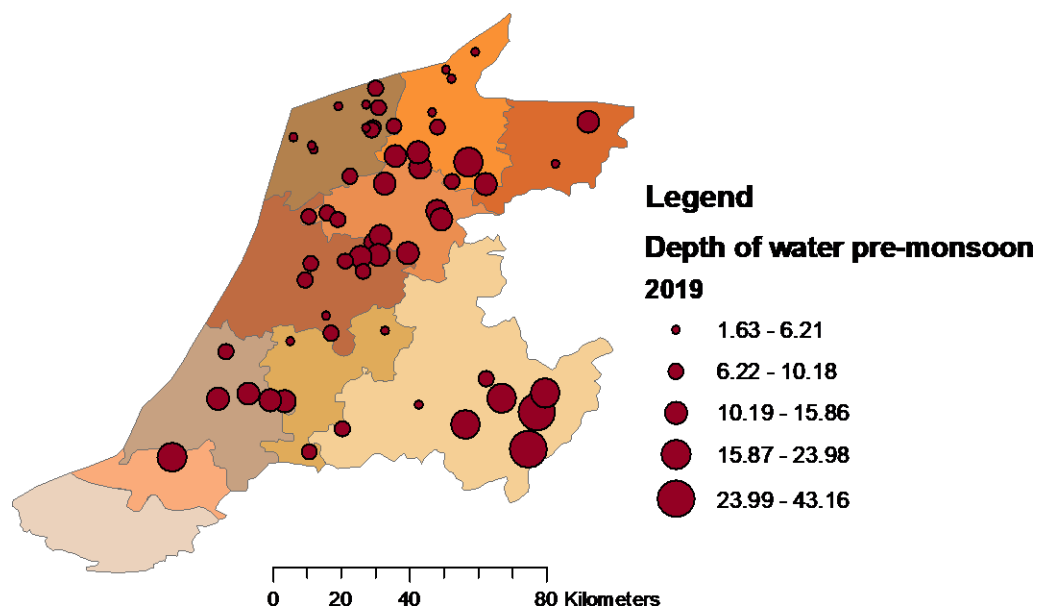


Figure 9.5. Water level data in the wells during pre-monsoon well in the year 2019

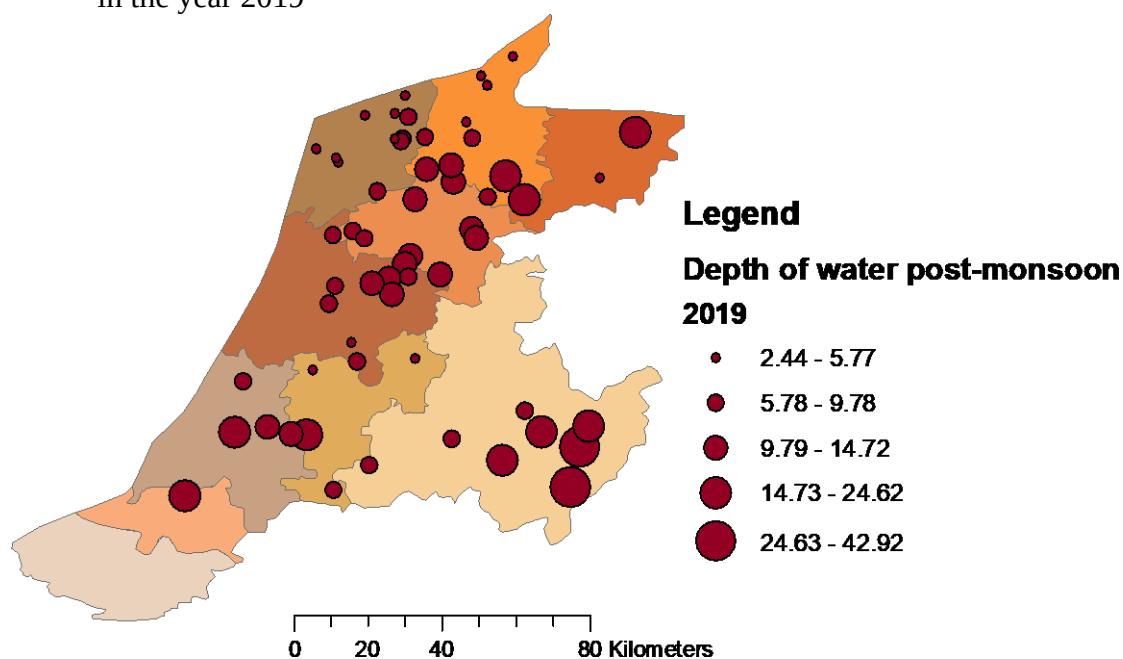


Figure 9.6. Water level data in the wells during post-monsoon well in the year 2019
 Equivalent data for the pre monsoon and post monsoon season during 2019 is shown in **Figure 9.7** and **Figure 9.8**.

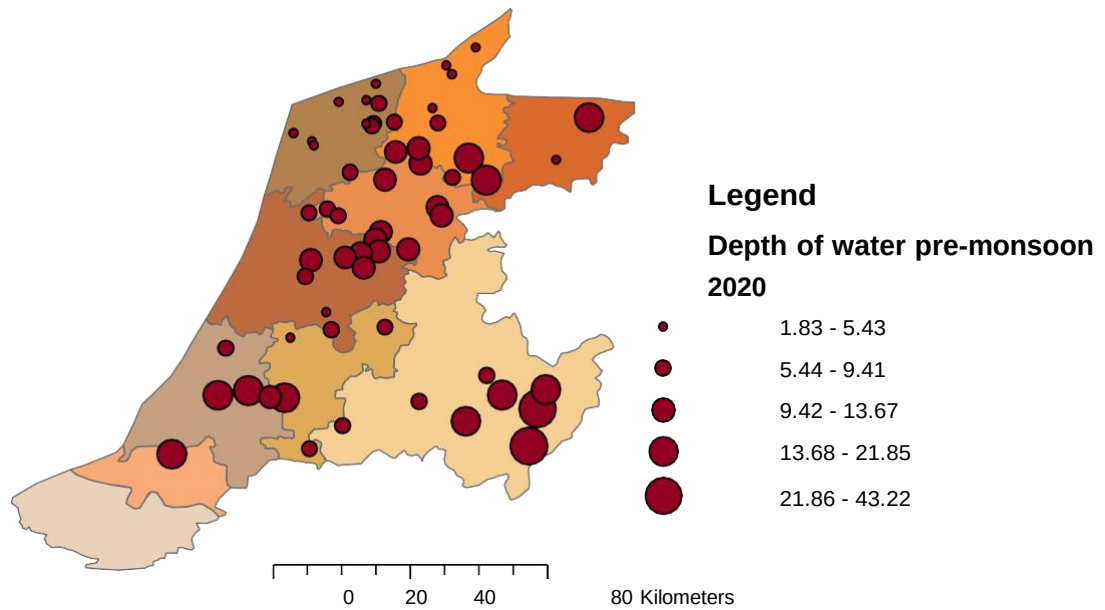


Figure 9.7. Water level data in the wells during pre-monsoon well in the year 2020

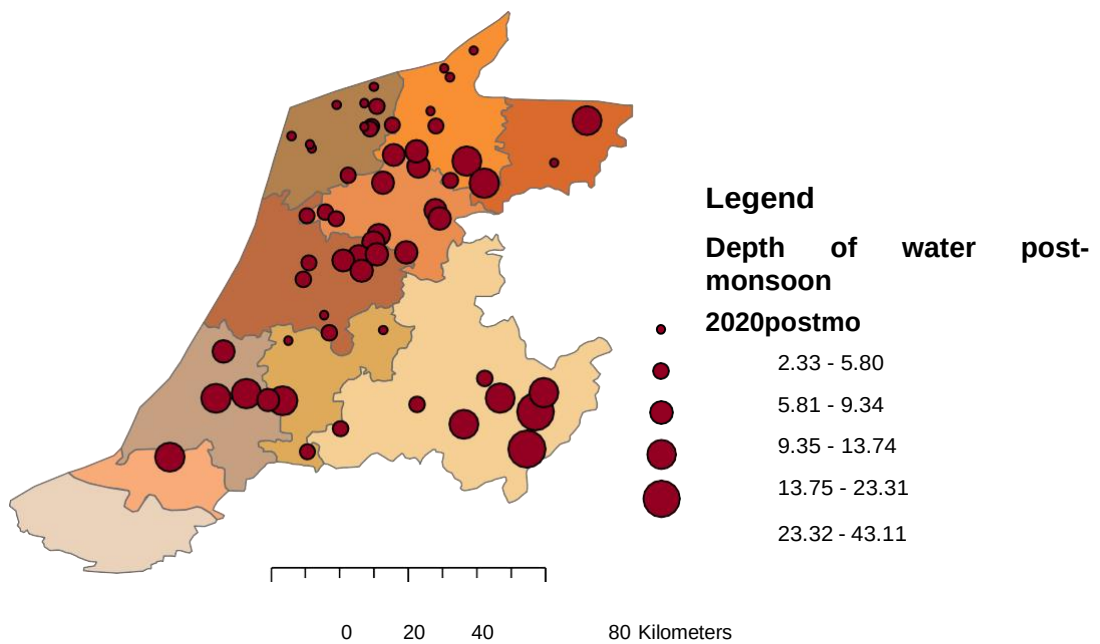


Figure 9.8. Water level data in the wells during post-monsoon well in the year 2020

For a better understanding of water level in the district, statistical analysis is performed and the graphical summary of it is presented in **Figure 9.9.**

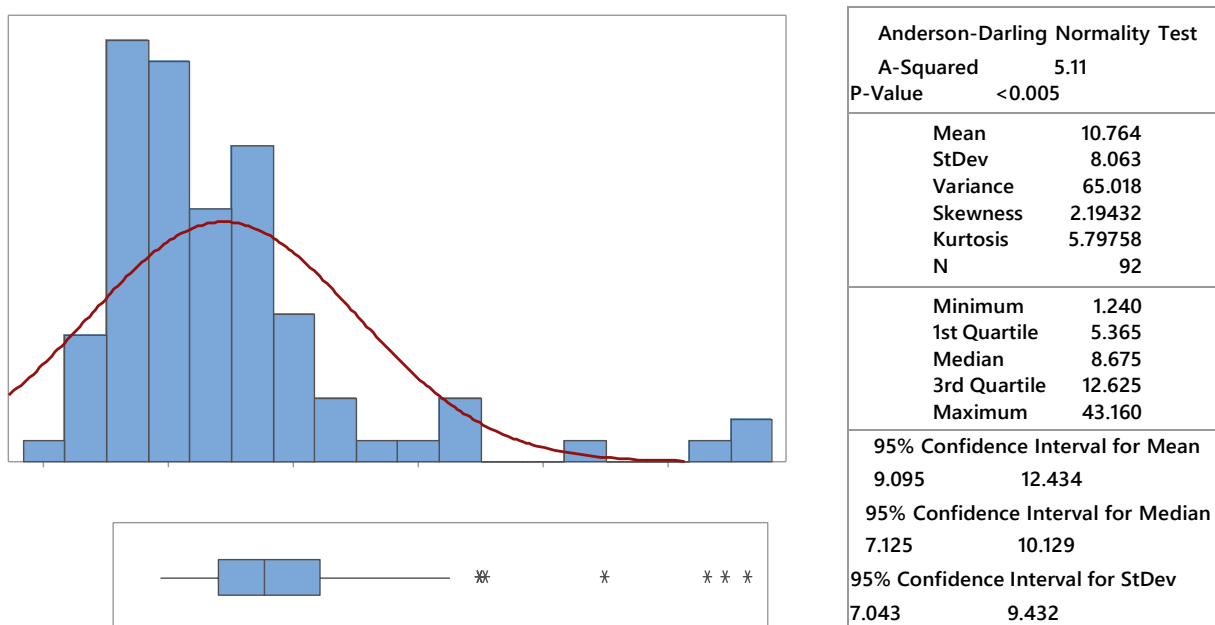


Figure 9.9. Graphical summary depicting the variation of water level in Jhunjhunu district pre-monsoon season 2019

From **Figure 9.9**, it is evident that the variation of water level over the monitoring wells is notable. Nearly the water level at 23 borewells is below 5.36 meters while the water level in another 23 borewells is greater than 12.6 meters. The average water level of all the monitoring well is 10.7. Though the graphical summary presents a brief overview of water level in all the borewells in Sri Ganganagar district, the variation at the ungagged locations remains unmapped. An information on the water level over the entire Sri Ganganagar helps in the management of existing water resources. Considering this, spatial interpolation techniques are used to map the variation of waterlevel over the entire district.

Kriging interpolation techniques are used to determine the spatial variation of the water level over the entire region and the obtained variation of water level during pre-monsoon for the year 2020. is presented in **Figure 9.10**. Equivalent analysis is made for post-monsoon 2020 period and the findings are presented in **Figure 9.11**.

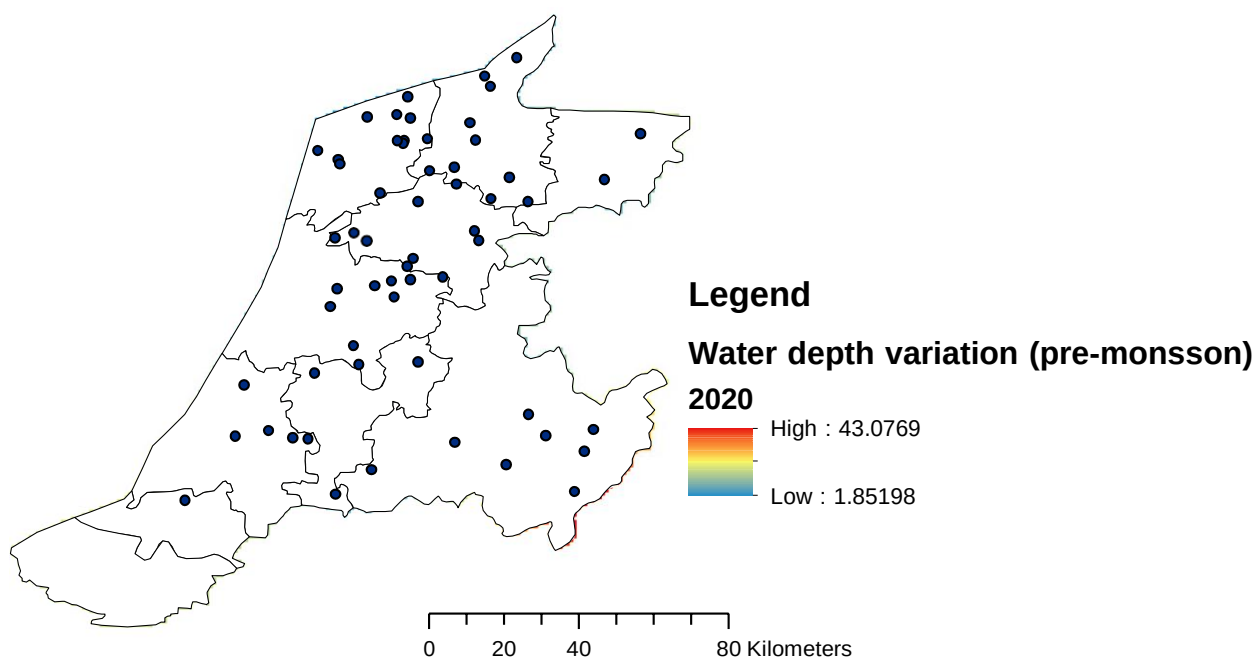


Figure 9.10. Variation of water level over Jhunjhunu (Pre-monsoon, 2019)

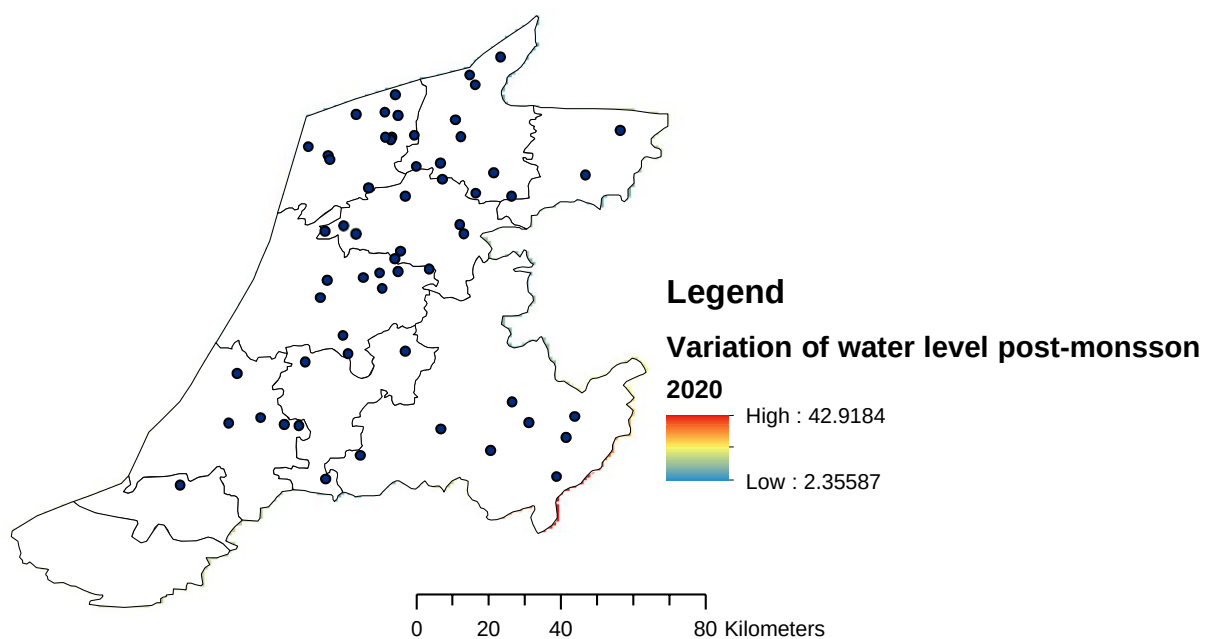


Figure 9.11. Variation of water level over Jhunjhunu (Post-monsoon, 2019)

Among the monitored villages, 26% of the villages experienced a negative fluctuations and 64%of the villages experienced positive fluctuation of the water levels.

9.6 Ground water quality

The quality of ground water is alkaline in major part of the district. Presence of excess fluoride, nitrate, iron and electrical conductivity in ground water has been reported from some pockets in the district. Detailed analysis of water samples collected from each of the blocks is available in the portal of Jal Jeevan Mission (<https://ejalshakti.gov.in/>). The details of quality parameters such as Turbidity (NTU), Arsenic (mg/l), Fluoride (mg/l), Iron (mg/l), Chloride (mg/l), Nitrate (mg/l), Sulphates (mg/l), Calcium (mg/l), Magnesium (mg/l), Manganese (mg/l), Copper (mg/l), E -Coli (MPN /100 ml), pH (pH), Salinity (mg/l), TDS (mg/l), Hardness (mg/l), Residual Chlorine (mg/l), Alkalinity (mg/l), Aluminum (mg/l), Coliform (MPN/100ml) are analyzed under the supervision of Department of Drinking water and sanitation. The block wise statistics are analyzed and the findings are presented in **Table 9.2** below. The block wise comparison of water quality parameters is analyzed and the graphical summary of each variable is presented in **Figures 9.12-9.15**.

Table 9.2. Mean water quality of each block in Sri Ganganagar district

ULB/Number of samples		Fluoride (mg/l) Limit – 1.0 Max- 1.5	Chloride (mg/l) Limit – 250 Max - 1000	Nitrate (mg/l) Limit - 45	pH	TDS (mg/l) Limit – 500 Max- 2000	Hardness (mg/l) Limit – 200 Max -600	Alkalinity (mg/l) Limit – 200 Max -600
Anoopgarh (n=148)	Min	0.2	20	0	7	110	60	0
	Max	7.4	470	200	8.8	2900	1410	430
	Avg	0.40	49.43	6.45	7.81	410.34	214.34	128.60
Ganganagar (n=690)	Min	0.13	20	0	7	170	80	70
	Max	4.5	1450	310	9.7	5300	1690	440
	Avg	0.29	36.43	2.19	7.77	276.22	123.56	86.10
Gharshana (n=645)	Min	0.12	20	0	7.3	170	80	70
	Max	1.48	440	210	8.5	2000	1090	410
	Avg	0.278688	31.875	3.7125	7.875	258.5	130.0625	92.9375
Karanpur (n=365)	Min	0.21	20	0	6.9	90	80	70
	Max	1.75	170	41	8.7	1150	730	210
	Avg	0.28	22.31	1.12	7.72	226.33	112.33	88.08
Padampur (n=425)	Min	0.21	20	0	7.2	160	80	20
	Max	2.7	2250	250	8.6	6300	1980	400
	Avg	0.34	59.38	4.4	7.890	372.44	162.11	97.71
Raisinghnagar (n=301)	Min	0.21	0	0	7.02	160	80	70
	Max	13.9	560	100	8.6	3800	1290	550

	Avg	0.50	31.57	3.69	7.83	299.78	141.18	106.97
Sadulshahar (n=534)	Min	0.2	20	0	6.9	20	80	0
	Max	4.7	350	5	8.5	2700	480	260
	Avg	0.33	25.70	1.42	7.75	246.12	110.49	90.61
Suratgarh	Min	0.21	20	0	7	20	80	70
	Max	8.3	2300	210	9.1	6900	1510	530
	Avg	0.34	34.90	2.60	7.76	279.18	121.40	98.42
Vijainagar	Min	0.12	20	0	6.9	20	40	0
	Max	44.5	2100	240	9.9	7600	2760	1020
	Avg	1.50	117.06	13.72	7.77	655.15	272.69	171.20

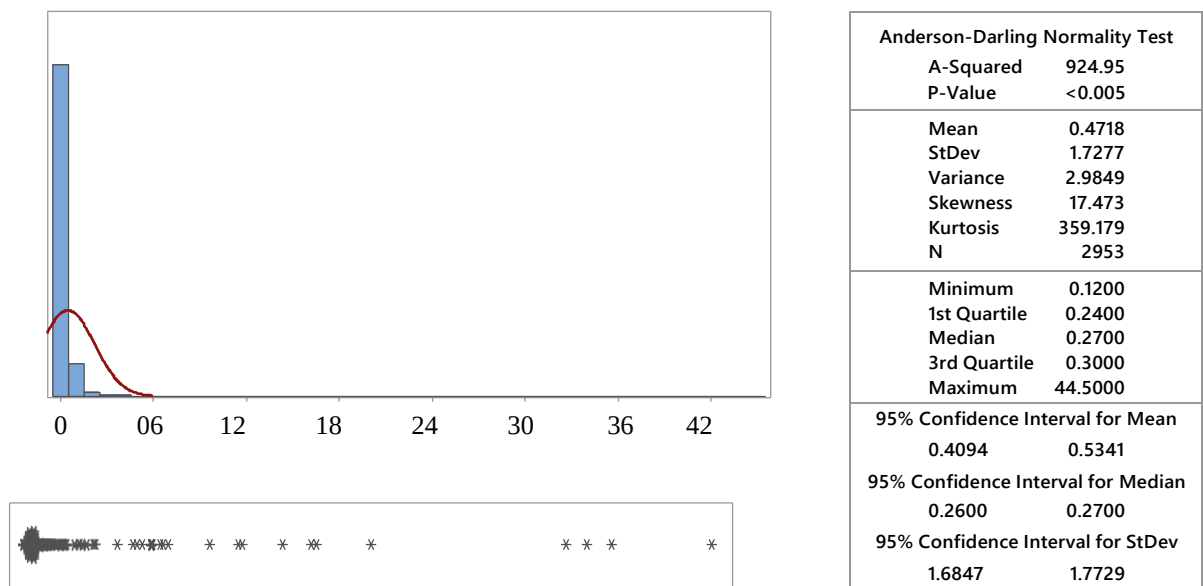


Figure 9.12. Statistical comparison of fluoride concentration in the blocks of Sri Ganganagar

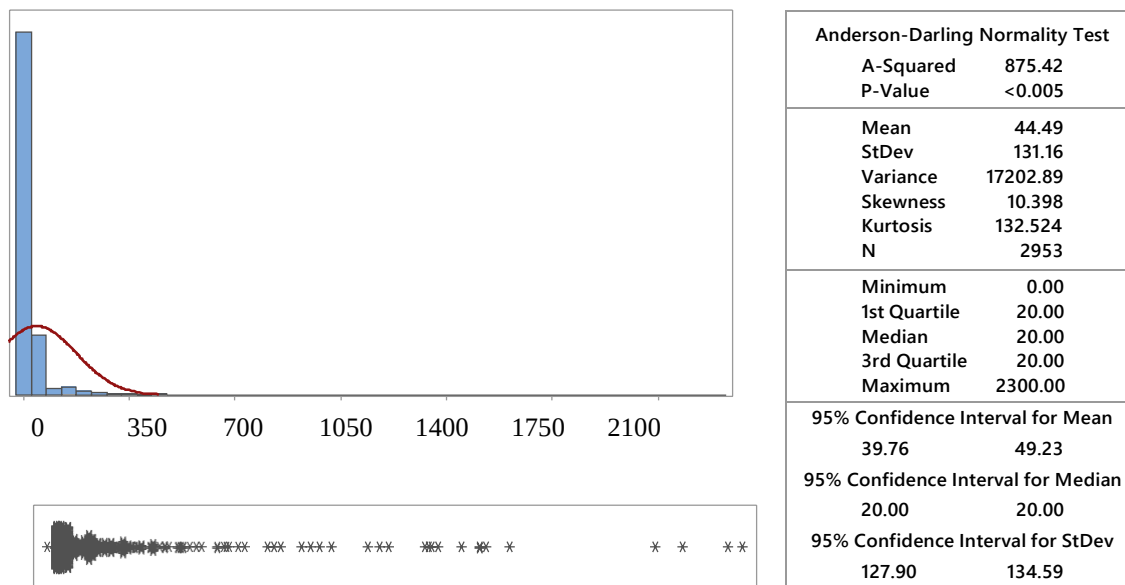


Figure 9.13. Statistical comparison of chloride concentration in the blocks of Sri Ganganagar

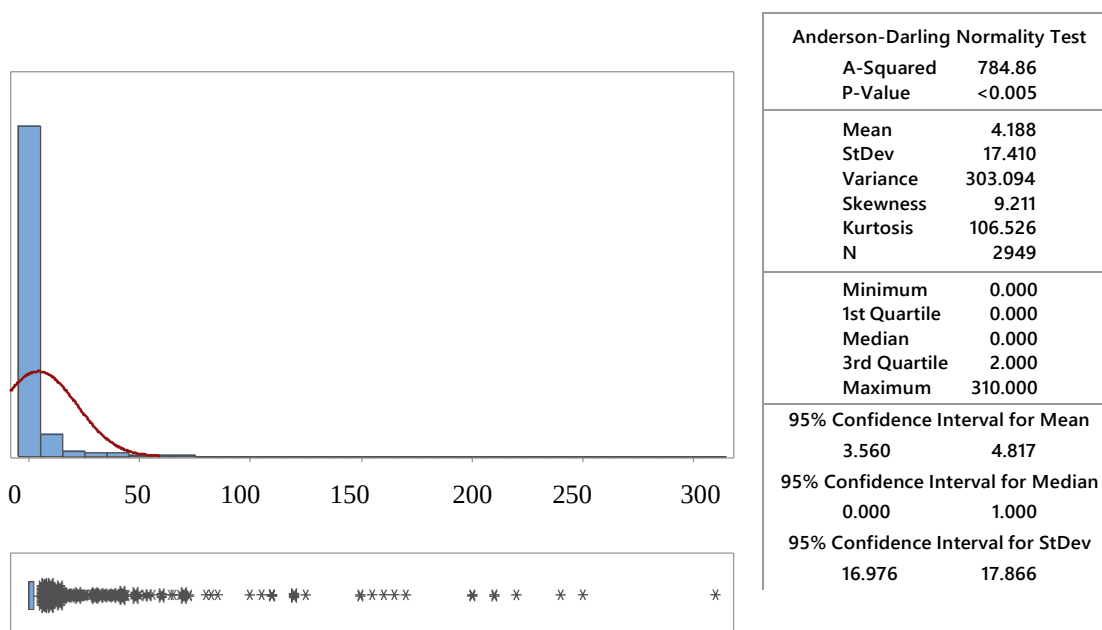


Figure 9.14. Statistical comparison of nitrate concentration in the blocks of Sri Ganganagar

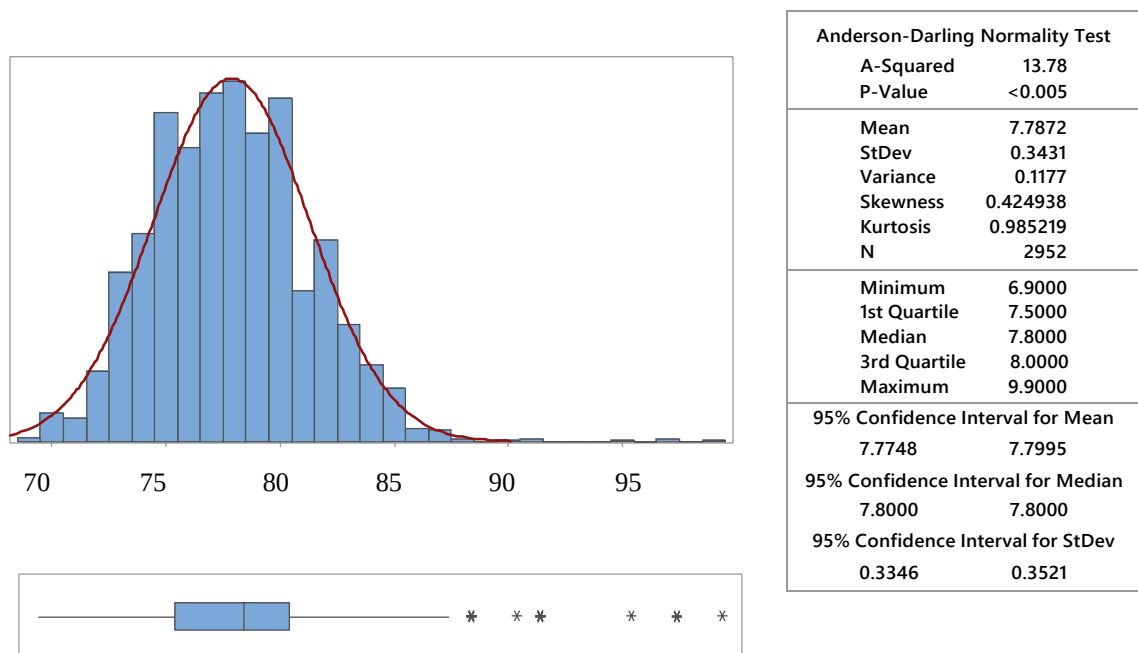


Figure 9.15. Statistical comparison of pH concentration in the blocks of Sri Ganganagar

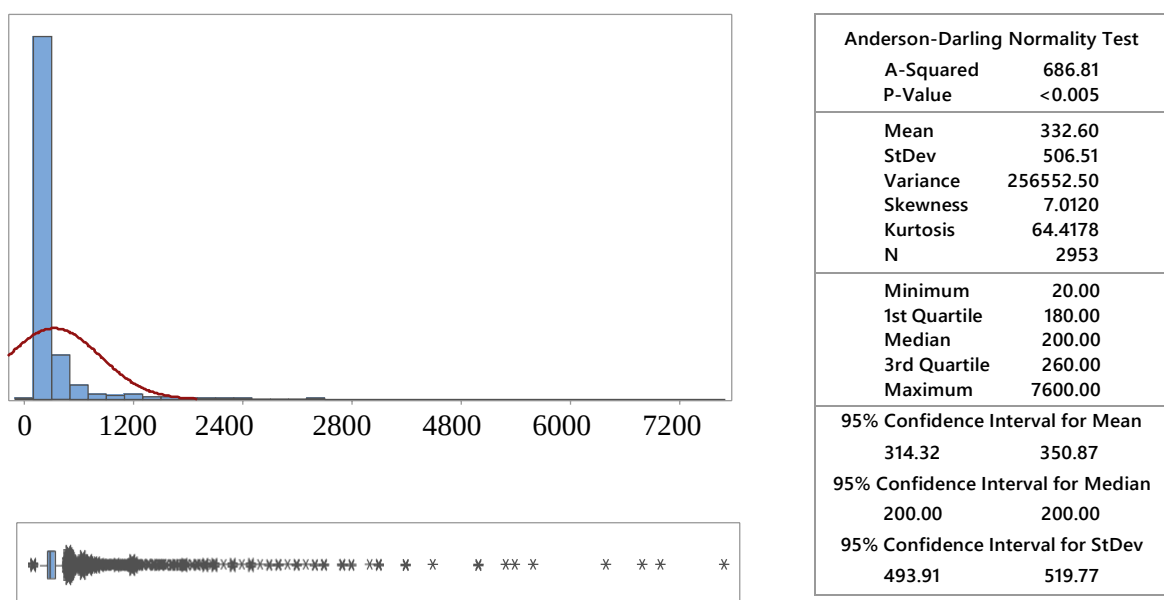
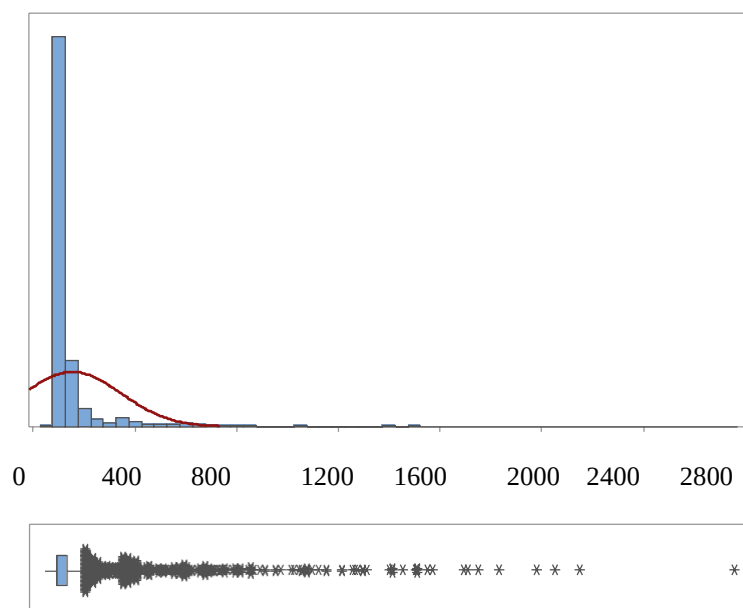
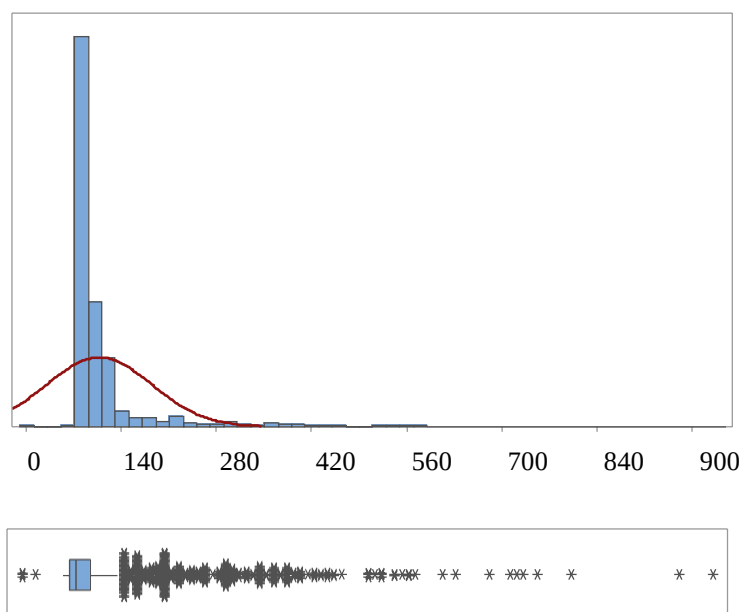


Figure 9.16. Statistical comparison of TDS concentration in the blocks of Sri Ganganagar



Anderson-Darling Normality Test	
A-Squared	633.89
P-Value	<0.005
Mean	152.52
StDev	192.81
Variance	37174.87
Skewness	5.5825
Kurtosis	40.6454
N	2951
Minimum	40.00
1st Quartile	90.00
Median	90.00
3rd Quartile	130.00
Maximum	2760.00
95% Confidence Interval for Mean	
	145.56 159.47
95% Confidence Interval for Median	
	90.00 90.00
95% Confidence Interval for StDev	
	188.01 197.86



Anderson-Darling Normality Test	
A-Squared	508.48
P-Value	<0.005
Mean	106.41
StDev	77.60
Variance	6021.79
Skewness	4.6010
Kurtosis	29.0145
N	2948
Minimum	0.00
1st Quartile	70.00
Median	80.00
3rd Quartile	100.00
Maximum	1020.00
95% Confidence Interval for Mean	
	103.61 109.21
95% Confidence Interval for Median	
	80.00 80.00
95% Confidence Interval for StDev	
	75.67 79.63

Figure 9.18. Statistical comparison of Alkalinity concentration in the blocks of Sri Ganganagar

9.7. Ground Water Related Issues and Problems

Since the native groundwater of entire district is brackish to saline except in small pockets, the urban and rural water supply schemes primarily depend upon surface water source. Maximum requirement is fulfilled from surface water supply through Bhakra canal and Indira Gandhi Canal system. Problem of water logging occurs in the IGNP canal command. Most of the water logged areas are located in Ghaggar river bed along depressions and in the head reaches of State I in Tibi sector and Vijaynagar area. Nineteen natural inter-dunal depressions occur in the south and east of Suratgarh town. These depressions are used to store excess floodwaters of Ghaggar river. Occurrence of impermeable or poorly permeable layer at shallow depth impedes the downward percolation of seepage and return flow from irrigation, which leads to water logging. Because of absence of natural drainage system also adds to the problem of water logging.

9.8. Ground Water Development and Management Strategy

In view of the ground water level, quality and the current practices as observed from the inventory of water quality and quantity data, the following recommendations are proposed.

- As the principal cause of water logging in the district is excessive availability of surface water, it is essential that a conjunctive use of surface and ground water be promoted in canal command areas. This will lead to reduction in the rate of rise in water table due to reduced availability of surface water and resultant fall in the ground water levels due to extraction of ground water.
- Construction of ground water abstraction structures and withdrawal system involve substantial capital investments. Since irrigation supplies are available free of cost, there is discrimination on the part of farmers to adopt ground water irrigation. In such areas, to encourage development of ground water, liberal subsidy or if need be incentive may be provided to farmers for construction of wells and installation of pump sets.
- Supply of quality power for irrigation wells must be assured at least six hours a day during irrigation season. Further, system of pricing of surface water must be introduced to recover at least the O& M costs.

- Adoption of micro irrigation techniques must be encouraged in areas where feasible.
- Change in cropping pattern and cropping intensity by the farmers due to prolific availability of surface water has led to increased seepage and recharge to ground water consequently leading to rise in water levels. Cropping pattern and cropping intensity need to be suitably changed by the farmers so as to reduce the problem of water logging. Bio-drainage to lower water levels has been proved to be effective in IGNP area. Such practice needs to be promoted.
- Over-exploitation may disturb the hydrochemical balance of fresh and saline water interface leading to contamination of saline water ingress. Therefore, proper care should be taken to avoid over-exploitation. Clustering of tube wells should also be avoided.
- There is need to educate people to make them aware of importance of ground water, better practices of water use available in domestic, irrigation and industrial sectors, present ground water scenario, need and means of water conservation, artificial recharge techniques etc.
- Desalination and defluorosis plants may be installed in the areas /villages facing ground water salinity and fluoride hazards.
- The surplus water during the rainfall can be used for artificial recharge through the various techniques feasible in alluvial and hard rock terrain. In alluvial area, following ways of recharge techniques may be adopted.
- Roof top/paved area rain water harvesting for recharge to ground water in urban and industrial area.
- Village water runoff/roof top water harvesting by dug wells/percolation tanks in rural area.
- Construction of recharge shafts with gabion structures in nalas.
- Recharge by dug well/percolation pit in agriculture farm. In hard rock terrain nala bunding, anicuts, dug wells, percolation tanks etc. are feasible structures which may be used to recharge the ground water body. Technical guidance is provided to various organizations as and when approached.
- Mass awareness programmes should be arranged at local level to make common

mass aware of importance of ground water resources, its better practices of use in domestic, irrigation and industrial fronts, present status of ground water scenario, its conservation etc.

- Training programmes should be arranged at local level to teach the common mass of various techniques of artificial augmentation to ground water resources.
- Status and Inventory of water resources in Sri Ganganagar District
- A short survey is conducted to collect the information of Water Resources Management Information and Inventory of water resources in Sri Ganganagar District and the collated information is shown in Tables 9.3 to 9.10.

Table 9.3. Inventory of water resources in District

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisin ghpur	ULB-6 Padampur	ULB-7 Raisingh nagar	ULB-8 Sadulsha har	ULB-9 Suratgarh	ULB-10 Vijaynagar	Overall in the district
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425	1969168
Population(Projected)	[Nos as per 2021	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532	2313016
Rivers	Nos.	-	1	-	-	-	-	-	-	1	1	1 (GhaggarRiver), It is an intermittent river. It flows rarely when highrain fall in Himalayasduring monsoon
Length ofCoastline	Meter	Nill	0	0	0	0	0	0	0	0.0 K.M.	0	
Nalas/Drains meeting Rivers	Nos.	0	0	0	0	0	0	0	0	1	0	
Lakes / Ponds	Nos.	4	0	0	0	0	0	0	0	0	0	
Total Quantity of sewage and industrial discharge in District	MLD	26.3	3.7	1.1	2.4	1.6	2.2	3.3	2.9	8.5	2.1	

Table 9.3A: Details of Rivers in District

S. No.	Name of River	Entry Point	Exit Point	Length
1.	Ghagger	34 STG, (Suratgarh Teh.)	Indo-Pak Border (Near Laila Majanu Majaar, Anoopgarh Teh.)	Approx. 110 Km.

Table 9.3B: List of Dam in District Sri Ganganagar under Water Resources Division

S. No.	Name of Dams	Tehsil	FTL In Ft	GS in Mcft	LS (Mcft)	CCA in Ha
1	NIL					

Table 9.3C: List of Dam in District Sri Ganganagar under Panchayat Raj Department

S. No.	Name of Dams	Gram Panchayat	Panchayat Samittee	Capacity In MCFT	CCA in Ha
1	NIL				

Table 9.4: Control of Groundwater Water Quality

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar	Overall in the district
Estimated number of bore-wells	[Nos]	184	39	12	19	21	13	27	13	66	25	2868 (Overall district data including rural area's bore-wells)
No of permissions given for extraction of groundwater	[Nos]	0	0	0	0	0	0	0	0	0	0	
Number of groundwater polluted areas	[Nos]	0	0	0	0	0	0	0	0	0	0	
Groundwater Availability	[adequate] / [not adequate]	not adequate	not adequate	not adequate	not adequate	not adequate	not adequate	not adequate	not adequate	not adequate	not adequate	not adequate

Table 9.5: Availability of Water Quality Data

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar	Rural Areas
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425	1507766
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532	1770627
Creation of monitoring cell	[Yes] / [No]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Access to Surface water and groundwater quality data at DM office	[Available] or [Not available]	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available

Table 9.6: Control of River Side Activities

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisingh pur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
River Side open defecation	[Fully Controlled] / [Partly controlled] /[no Measures taken]	Partly controlled	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken
Dumping of SW on river banks	[Fully Controlled] / [Partly controlled] /[no Measures taken]	Partly controlled	Partly controlled	Partly controlled	Partly controlled	Partly controlled	Partly controlled	Partly controlled	Partly controlled	Partly controlled	Partly controlle d
Control measures for idol immersion	[Measures taken] / [Measures taken post immersion] / [No Measures taken]	Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken	No Measures taken

Table 9.7. Control of Water Pollution in Rivers

Attributes	Unit	ULB-1-Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Percentage of untreated sewage	[%] (automatic SM1g/SM1a)	78.74	100	100	100	100	100	100	100	64.71	100
Monitoring of Action Plans for Rejuvenation of Rivers	[Monitored] / [Not monitored] [not applicable]	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored	Not monitored
No of directions given to industries for Discharge of Untreated industrial wastewater in last 12 months	[Nos]	0	0	0	0	0	0	0	0	0	0

Table 9.8A. Awareness Activities

Attributes	Unit	ULB-1-Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population(Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
District level campaigns on protection of water quality	[Nos in previous year]	Source of water is canal (IGNP/GANG/BHAKHARA).All the Engineers doing various meeting at district/block/panchayat level spread the awareness for protection of water quality.									

Table 9.8 B. Oil Spill Disaster Contingency Plan

Attributes	Unit	ULB-1-Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population(Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Creation of District Oil Spill Crisis Management Group	[Created] / [Not Created]	Not Created	Not Created	Not Created	Not Created	Not Created	Not Created	Not Created	Not Created	Not Created	Not Created
Preparation District Oil Spill Disaster Contingency Plan	[Prepared] / [Not Prepared]	Not Prepared	Not Prepared	Not Prepared	Not Prepared	Not Prepared	Not Prepared	Not Prepared	Not Prepared	Not Prepared	Not Prepared

Table 9.9. Protection of Flood plains

Attributes	Unit	ULB-1-Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Encroachment of flood plains is regulated.	[Yes] / [No]	No	No	No	No	No	No	No	No	Yes	No

Table 9.10. Rainwater Harvesting

Attributes	Unit	ULB-1- Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghp ur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshah ar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Action plan for Rain water harvesting	[Implemented] / [Not implemented]	Implemented	Not implemented	Not implemented	Not implemented	Not implemented	Not implemented	Not implemented	Not implemented	Implemented	Not implemented

Implementation strategy of Water Resources Management Plan

The details of measurable and quantifiable targets, responsibilities of various departments with timelines for completing the tasks are presented in **Table 9.11**.

Table 9.11: Action plan for Water Resources Management Plan

S. No.	Action Points	Strategy and approach	Stake holders responsible
1.	Inventory of water resources in District	Inventory of water resources in District covering Rivers, canals and other natural/ man made water bodies, Nalas/ Drains meeting Rivers Lakes / Ponds, etc. which is to be completed within Dec, 2021	CEO Zilla Parishad DFO ULBs
2.	Collection of Water Quality Data	To enable water quality sensors are to be installed in each of the monitoring wells to make the data collection centralized. This ensures the collection of water quality data without any errors.	EE PHED
3.	Control of Groundwater Water Quality & Quantity	Water quality of samples is analyzed and the meticulous analysis of historic data revealed that the water resources in Sri Ganganagar district is over exploited.	EE PHED, ULBs, Ground Water Department
4.	Control of River side Activities	River side activities like River Side open defecation, Dumping of SW on river banks, Idol immersion etc. to be controlled as it is evident from the inventory data that these exercises have not been commenced.	District Administration EE PHED, BDOs EO of ULBs
5.	Awareness Activities	District level campaigns on protection of water quality and Control of Water Pollution in Rivers/Canals and other water bodies.	EE PHED BDOs
6.	Protection of Floodplains	Encroachment of flood plains to be regulated.	District Administration Circle Officers,
7.	Rainwater Harvesting	A separate action plan for Rain water harvesting in line with Government policy would be prepared. Centralized information base of the rainwater harvesting details should be maintained.	District Administration, EO of ULBs, BDOs
8.	Repair and treatment of water bodies/Talav	Water bodies for the restoration/ repair and treatment work should be identified	Dist. Admin BDOs, Forest Department, ULB officials, CEO zila Parishad, Land and Water resource Department
9.	Aqua life and Ecological changes	Due to Construction of Dams/Canal or other projects, study of any negative impact and their mitigation plans	Water Resource Department
10.	Awareness programs	Awareness programs on water quality, rain water harvesting should be conducted in each of the localities in Sri Ganganagar district. ULB's can collaborate with the local educational institutions to conduct the awareness programs.	ULB's

Chapter 10: Domestic Sewage & Industrial Waste Management

This chapter includes the details of ULB-wise sewage generation, availability of treatment capacity and its utilization, sewerage connectivity, and treatment gap. The relevant information related to the functional status of the treatment plant (if exists), effluent discharge standards used, and efficiency of plants are also included. Datasheet duly filled by concerned officials has been presented as per the format prescribed by CPCB for Model DEPs. Finally, it emphasizes the details of action plans along with the actionable points, the present implementation status, gap to be addressed, and proposed timeline for completion of the relevant tasks. The activities are suggested by keeping because of the future generation of wastes etc.

10.1 Present scenario of domestic sewage management

Safe potable water supply and hygienic sanitation facilities are basic essential requirements for a healthy community and are the top priority. The safe water supply is essential throughout the year in all towns, urban centers, and rural villages, but it is quite challenging to maintain an adequate quantity of supply of water in acute summer seasons. Similarly, hygienic sanitation facilities employing appropriate treatment options are a must to achieve proper living standards and quality of life in urban and rural areas. It also becomes important because about 80% of the water used by the community comes out from houses and apartments, mostly coming from the kitchen, bathroom, and laundry sources. Things like dishwashing, garbage disposal, and of course baths and showers are included in the mix in the form of wastewater, which, unless adequately collected, conveyed, treated, and safely disposed of, may eventually contaminate our valuable land and water resources, cause environmental degradation and cause of various health issues. The provision of safe drinking water alone cannot be sufficient to break the chain of water-borne diseases. The safe disposal of wastewater is even much more important. It is essential to adopt appropriate treatment technologies to prevent any injury or health hazards whenever wastewater is disposed of. The projected total amount of sewage waste generated from each of the Urban Local Body (ULB) in 2021 is shown in **Figure 10.1**.

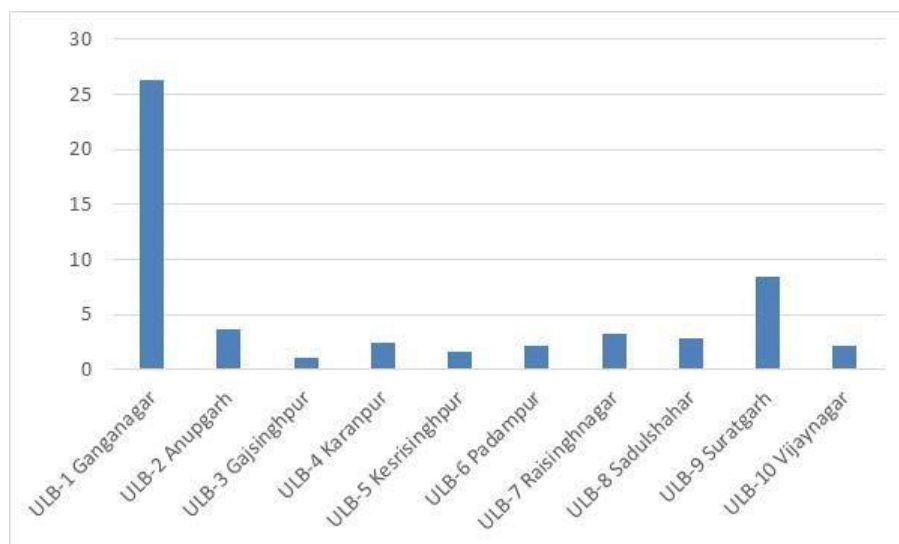


Figure 10.1: Amount of domestic sewage (in MT) generated in each ULB of Sri Ganganagar

For mapping the current scenario of the existing domestic sewage management practices, a survey with the representatives of each ULB has been conducted, and the details of the inventory available are collated as summarized in **Tables 10.1 to 10.3**.

Currently, all ULBs of Sri Ganganagar district either do not have appropriate domestic sewage treatment capacity facilities or do not have sufficient sewerage networks to transport it from its source (households) to the treatment plant. From the collected information, it is noticed that all the households in ULB's are not connected to sewage management infrastructure either at home or through proper drains across ULB to Sewage Treatment Plant. As a result, only some fraction of the sewage collected from these households is treated efficiently either at primary or secondary sewage treatment plants under current circumstances. Also, no systematic plan has been found to reuse this treated wastewater. The treated wastewater and sludge could be used effectively for crop irrigation, or public parks, sports fields, etc. provided certain quality constraints are met. Irrigational use of treated wastewater from STPs should not be regarded as a primitive and inferior method of getting rid of wastewater or sludge. Properly designed and operated, irrigation systems can be convenient and low-cost methods, comparable with tertiary treatment, and capable of satisfying environmental criteria. The reuse of treated effluents has much broader application, especially in arid or semi-arid regions.

The remaining domestic wastewater/ human excreta generated from the urban population in different ULBs of Sri Ganganagar district is either being disposed of in the form of onsite sanitation like a septic tank/soak pit or bathroom, and kitchen wastewater is being disposed into side road drains or directly on roads, thereby creating unhygienic conditions or, open defecation has been taking place due to non-availability of sanitation facilities. Though the septic tanks are an accepted onsite treatment, as the septic tanks are not designed and maintained properly, the effluent does not conform to the standards. Due to poor maintenance, septic tanks do not function properly and often overflow into drains.

The untreated or partially treated sewage of about 42.8 MLD out of 54.1 MLD generated by them flows onto the land in the low lying areas, which mixes into the soil or water bodies directly or indirectly. It can also degrade the quality of groundwater. Considering the increasing population, which consequently rises the amount of domestic sewage generation, there is a great need to speed up the process of connecting all households to the STP Plants wherever applicable.

Also, most of the ULBs do not have any organized sewerage system. Presently, the wastewater from kitchens & bathrooms is discharged into stormwater drains, culminating finally to the Nallah or on the ground, polluting the environment and contaminating the groundwater. Open defecation is not uncommon in most of the towns. Most of the residential, commercial buildings and educational institutions have on-site septic tanks and soak pits. The effluents from the septic tanks directly drain into the open drains. In the absence of a safe sewage disposal system, the public is generally exposed to an unhealthy and unhygienic environment. Though the roads in ULBs are equipped with open drains, most of the drains are silted, resulting in overflow and flooding in the monsoon.

Therefore, public representatives are also demanding the facilities of a sewerage system on a priority basis.

Very few STP's are installed in the Sri Ganganagar district. Only 2 out of 10 ULB's have partially installed STPs. The geotagged image of STP in Sri Ganganagar and Suratgarh are shown in **Figures 10.2 and 10.3**, respectively.



Figure 10.2A: STP located on Suratgarh-Padampur Bypass road, Sri Ganganagar @10.0 MLD Capacity (Latitude & Longitude 29.881490, 73.864333)



Figure 10.2B: Proposed STP located near Sugar Mill, Sri Ganganagar @15.0 MLD Capacity (Latitude & Longitude 29.925526, 73.885055)



Figure 10.2C: Proposed STP located near Idgah 10 MLD STP, Sri Ganganagar @10.0 MLD Capacity (Latitude & Longitude 29.919516, 73.853769)

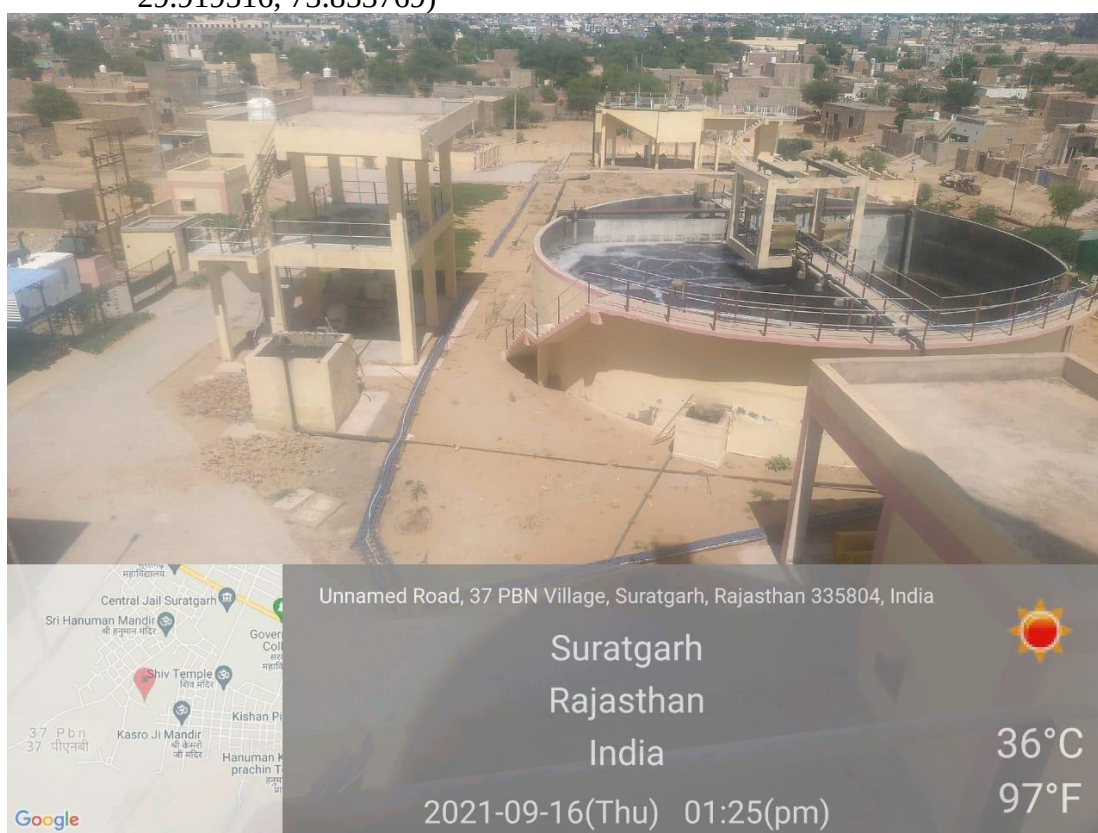


Figure 10.3A: Existing SBR based STP 1 located on behind sub Jail, Suratgarh@2.5 MLD Capacity

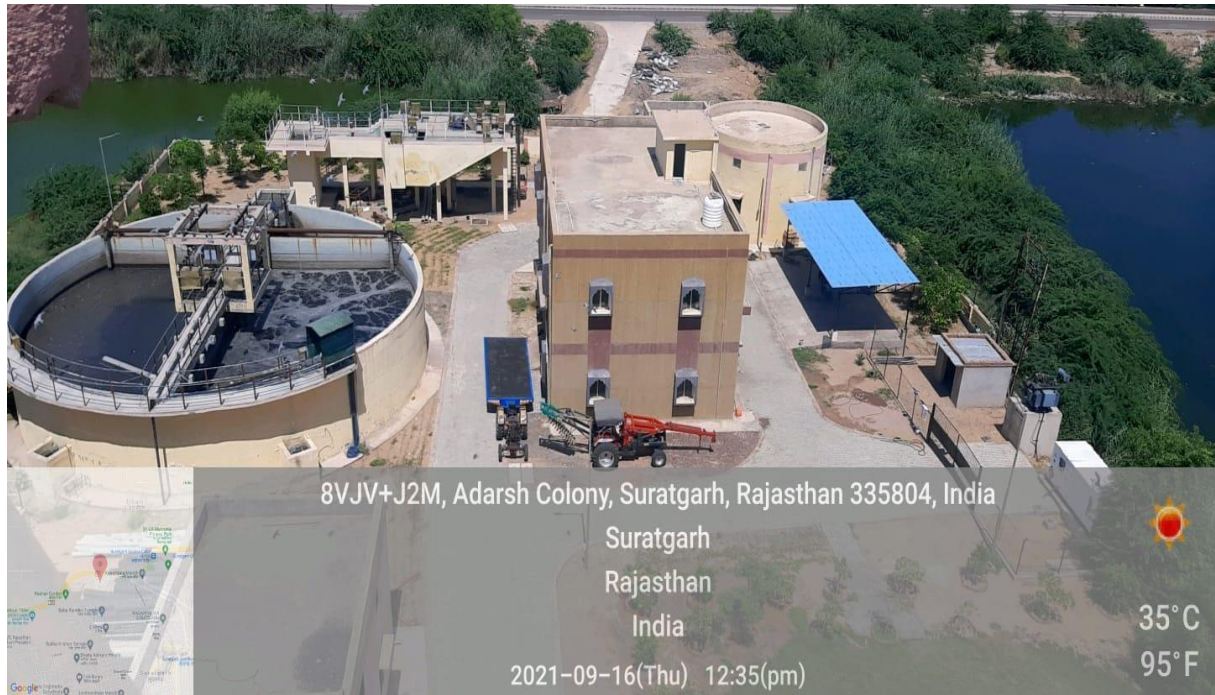


Figure 10.3B: Existing SBR based STP 2 located on near Adarsh Kalyan Bhoomi, Suratgarh@2.5MLD Capacity

If we take the example of municipal board Anupgarh, all wards have pakka roads with the provisions of drains. The wastewater from individual households is disposed of directly into these drains. Two larger-sized drains carry the wastewater of the entire town and transfer the same at the low-laying areas located outside the town, as shown in **Figure 10.4**. Households are connected with smaller drains of up to 1.5 feet depth, and such drains are connected finally with the larger size drains for further wastewater transfer. The wastewater is generally discharged towards the agricultural lands for irrigation without any treatment and precautionary measures.

The approximately 3.0-3.7 MLD of wastewater is generated in Anupgarh. This vast amount of water allows breeding ground for mosquitoes, thus bringing diseases like dengue and malaria into the scene. There is also a problem of foul odor in the streets due to the disposal of wastewater on the streets.



Figure 10.4: Wastewater disposal site located in the low laying area outside of Anupgarhtown

The status and the number of STPs/FSTPs required in each ULB are presented in **Table 10.1**. The details of adequacies of available infrastructure for sewage treatment and Sewerage Network are given in **Table 10.2 and Table 10.3, respectively**.

As STP's are located in two of the ULB's, it is noticed that the quantity of untreated waste is relatively on a higher side. Lack of connectivity between households and the STP's is identified as the prime reason. Very few towns in the district have a sewerage network. Also, the entire population is not covered under the sewerage network. Therefore, there is a great need to propel the connectivity between the household and the STP units. It is, therefore, necessary to develop sewerage networks by connecting all households to installed Sewage Treatment Plants (STPs). Also, those ULBs who do not have STP on the date should immediately plan to set up suitable STP/FSTP of adequate capacity.

Table 10.1: Inventory of Sewage Management

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisingnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per projected in 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Total Quantity of Sewage generated in District from towns in 2021	[MLD]	26.3	3.7	1.1	2.4	1.6	2.2	3.3	2.9	8.5	2.1
Total Quantity of Sewage to be generated in District from towns in 2036	[MLD]	33.1	4.7	1.3	2.7	1.8	2.7	3.9	3.6	10.9	2.4
No of Class-II towns and above (having 0.5 to 1 lac population)	[Nos]	0	0	0	0	1	1	0	0	1	0
No of Class-I towns and above (having more than 1.0 lac population)	[Nos]	1	0	0	0	0	0	0	0	0	0
No. of Towns needing STPs	[Nos]	02 additional [15 MLD, 10 MLD are should be installed by June 2024]*	01 [STP or FSTP is required which should be installed by June 2024]*	01 [STP or FSTP is required which should be installed by June 2025]*	01 [STP or FSTP is required which should be installed by June 2024]*	01 [STP or FSTP is required which should be installed by June 2024]*	01 [STP or FSTP is required which should be installed by June 2026]*	01 [STP or FSTP is required which should be installed by June 2026]*	01 [STP or FSTP is required which should be installed by June 2026]*	02 Nos., [STPs or FSTP are required which should be installed by June 2025]	01 [STP or FSTP is required which should be installed by June 2026]*
No of STPs installed	[Nos]	1 STP [10 MLD]	0	0	0	0	0	0	0	1 STP [2.5 MLD, 2.5 MLD]	0
Quantity of treated sewage flowing into Rivers (directly or indirectly)	[MLD]	0	0	0	0	0	0	0	0	0	0
Quantity of untreated or partially treated sewage (directly or indirectly)	[MLD]	18.0*	3.7**	1.1**	2.4**	1.6**	2.2**	3.3**	2.9**	5.5*	2.1**
Quantity of sewage flowing into lakes	[MLD]	0	0	0	0	0	0	0	0	0	0
Number of industrial townships	[Nos]	1	0	0	0	0	0	0	0	1	0

*Sri Ganganagar Municipal Council: The present treatment capacity is 10.00 MLD STP (near Suratgarh Padampur Byapass) and 82.84 % of targeted population for this STP

is connected in 2021. As per 2021 projected population, quantity of sewage generated in the Municipal Council is 26.3 MLD hence two STP plants (15 MLD STP Near Sugar Mil Pond and 10 MLD STP Near Idgah) are proposed to be installed with complete sewerage network connectivity for all households by June 2024. Quantity of untreated or partially treated sewage (directly or indirectly) = $26.3 - 8.284 = 18$ MLD.

****Municipal Board Anupgarh:** There is no STP and sewerage network connectivity currently. A proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) of worth Rs. 270.87 Lakhs has been submitted to RUIDP, Jodhpur. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 3.7 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 3.7 MLD should be installed by June 2024.

****Municipal Board Gajsinghpur:** There is no STP and sewerage network connectivity currently. ULB should work for a proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) to cater their needs. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 1.1 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 1.1 MLD should be installed by June 2025.

**** Municipal Board Karanpur:** There is no STP and sewerage network connectivity currently. ULB should work for a proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) to cater their needs. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 2.4 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 2.4 MLD should be installed by June 2024.

****Municipal Board Kesrisinghpur:** There is no STP and sewerage network connectivity currently. A proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) of worth over Rs. 210.74 Lakhs has been submitted to RUIDP, Jodhpur. Tendering process is on. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 1.6 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 1.6 MLD should be installed by June 2024.

**** Municipal Board Padampur:** There is no STP and sewerage network connectivity currently. ULB should work for a proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) to cater their needs. In fact ULB officials have initiated process to get approval for submission of DPR to install FSTP. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 2.2 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 2.2 MLD should be installed by June 2026.

****Municipal Board Raisinghnagar:** There is no STP and sewerage network connectivity currently. ULB should work for a proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) to cater their needs. DPR should be submitted to RUIDP for approval and tender process and work order should be issued once they get approval of funding so that FSTP facility can be functional by June 2025. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 3.3 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 3.3 MLD should be installed by June 2025.

**** Municipal Board Sadulshahar:** There is no STP and sewerage network connectivity currently. ULB should work for a proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) to cater their needs. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 2.9 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 2.9 MLD should be installed by June 2026.

***Municipal Council Board Suratgarh:** The present treatment capacity is 5.00 MLD (@2.5 MLD capacity of 2STPs with 60% of targeted population is connected with these two STPs in 2021. As per 2021 projected population, quantity of sewage generated in the Municipal Council is 8.5 MLD hence at least 2 STP plants (@2.0 MLD STP each) should be installed with complete sewerage network connectivity or FSTP@3.5 MLD capacity for all households by June 2025. A proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) has been prepared by the ULB but it is not sanctioned. Currently about 5.5MLD (i.e. 8.5-3.0) quantity of untreated sewage (directly or indirectly) is being disposed to the environment and hence two STPs (or Faecal sludge Treatment Plant facility) with 3.5 to 4.0 MLD capacity should be installed by June 2025.

**** Municipal Board Sri Vijaynagar:** There is no STP and sewerage network connectivity currently. ULB should work for a proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) to cater their needs. Currently all quantity of untreated sewage (directly or indirectly) is being disposed to the environment = 2.1 MLD and hence one STP (or Faecal sludge Treatment Plant facility) with 2.1 MLD should be installed by June 2026.

Table 10.2: Adequacy of Available Infrastructure for Sewage Treatment

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per projected in 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Total Quantity of Sewage generated in District from towns in 2021	[MLD]	26.3	3.7	1.1	2.4	1.6	2.2	3.3	2.9	8.5	2.1
Total Quantity of Sewage to be generated in District from towns in 2036	[MLD]	33.1	4.7	1.3	2.7	1.8	2.7	3.9	3.6	10.9	2.4
% sewage treated in STPs	percentage	31.26 *	0	0	0	0	0	0	0	35.29%	0
Total available Treatment Capacity	[MLD]	10.0	0	0	0	0	0	0	7.0	5	0
Additional treatment capacity required	[MLD]	16.3 *	3.7**	1.1**	2.4**	1.6 **	2.2**	3.3 **	2.9**	3.5*	2.1 **

*Sri Ganganagar Municipal Council: The present treatment capacity is 10.00 MLD STP (near Suratgarh Padampur Byapass) and 82.84 % of targeted population for this STP is connected in 2021. As per 2021 projected population, quantity of sewage generated in the Municipal Council is 26.3 MLD hence two STP plants (15 MLD STP Near Sugar Mil Pond and 10 MLD STP Near Idgah) are proposed to be installed with complete sewerage network connectivity for all households by June 2024. Quantity of untreated or partially treated sewage (directly or indirectly disposed into the environment) = $26.3 - 8.284 = 18$ MLD. Hence, another STP plants of at least 18.0 MLD would be required with complete sewerage network connectivity for all households.

*Municipal Council Board Suratgarh: The present treatment capacity is 5.00 MLD (@2.5 MLD capacity of 2STPs with 60% of targeted population is connected with these two STPs in 2021. As per 2021 projected population, quantity of sewage generated in the Municipal Council is 8.5 MLD hence at least 2 STP plants (@2.0 MLD STP each) should be installed with complete sewerage network connectivity or FSTP@3.5 MLD capacity for all households by June 2025. A proposal with detailed project report (DPR) to install faecal sludge treatment plant (FSTP) has been prepared by the ULB but it is not sanctioned. Currently about 5.5MLD (i.e. 8.5-3.0) quantity of untreated sewage (directly or indirectly) is being disposed to the environment and hence two STPs (or Faecal sludge Treatment Plant facility) with 3.5 to 4.0 MLD capacity should be installed by June 2025.

**Municipal Boards Anupgarh, Gajsinghpur, Karanpur, Kesrisinghpur, Padampur, Raisinghnagar, Sadulshahar, and Vijaynagar: There is no STP installed at Municipal Boards Anupgarh, Gajsinghpur, Karanpur, Kesrisinghpur currently. Municipal Boards Anupgarh, Karanpur, and Kesrisinghpur should plan to install STP/FSTPs by June 2024. Similarly, Municipal Boards Gajsinghpur, and Suratgarh should plan to install STP/FSTPs by June 2025 and Padampur, Raisinghnagar, Sadulshahar, and Sri Vijaynagar also do not have STP/FSTP facilities. They should plan to install FSTPs/STP by June 2026.

Table 10.3: Adequacy of Sewerage Network

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per projected in 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532
Total Quantity of Sewage generated in District from towns in 2021	[MLD]	26.3	3.7	1.1	2.4	1.6	2.2	3.3	2.9	8.5	2.1
Total Quantity of Sewage to be generated in District from towns in 2036	[MLD]	33.1	4.7	1.3	2.7	1.8	2.7	3.9	3.6	10.9	2.4
No of ULBs having partial underground sewerage network	[Nos]	01	0	0	0	0	0	0	0	01	0
No of towns not having sewerage network	[Nos]	01	01	01	01	01	01	01	01	01	01
% population covered under sewerage network as on August 2021	[percentage]	31.26%	0	0	0	0	0	0	0	35.29	0

10.2 Projection of future generation of domestic wastewater

Adequate quantity of generation of wastewater should be considered while designing collection, conveyance, treatment and safe disposal systems. The quantity of domestic waste water has been estimated for the year 2021, 2036 and 2051 as shown in **Table 10.4**.

Table 10.4: Future assessment of generation of domestic wastewater

Name of ULB	Year		
	2021	2036	2051
ULB-1 Ganganagar	26.3	33.1	41.1
ULB-2 Anupgarh	3.7	4.7	5.7
ULB-3 Gajsinghpur	1.1	1.3	1.6
ULB-4 Karanpur	2.4	2.7	3.1
ULB-5 Kesrisinghpur	1.6	1.8	2
ULB-6 Padampur	2.2	2.7	3.4
ULB-7 Raisinghnagar	3.3	3.9	4.6
ULB-8 Sadulshahar	2.9	3.6	4.2
ULB-9 Suratgarh	8.5	10.9	13.7
ULB-10 Vijaynagar	2.1	2.4	2.7

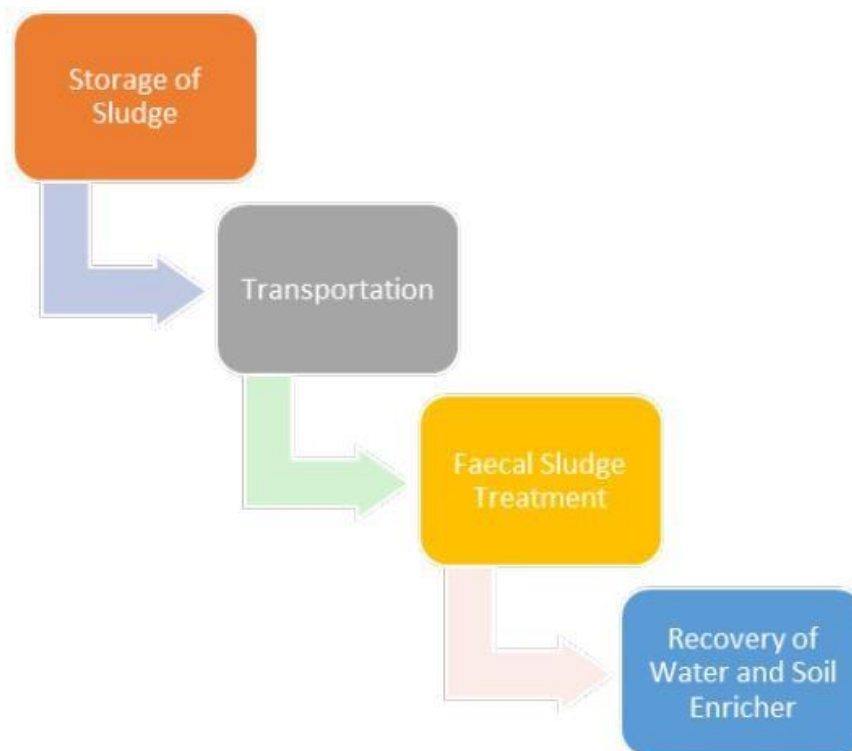
10.2.1 Domestic wastewater management practice using sewage treatment plants

The capacity requirement of STPs varies 15-25% for years 2021 and 2036 in different ULBs. As in SBR technology-based, STPs can handle flowrate quantity with a variation of 20-25% in an effective manner by changing the cycle duration and oxygen requirement; SBR technology may be used in these towns to meet not only the current requirement but also can be used for future requirement of the year 2036.

10.2.2 Domestic wastewater management using faecal sludge and septage management system

In traditional faecal sludge and septage management systems, disposal is the final functional element, which is generally disposed of through open deposition at low laying. However, a modern disposal facility for inert/sludge is not a dump; instead, it is an integrated, engineered facility used for disposing pathogenic sludge on land without creating nuisance or hazards to public health and safety under different steps of scientific methodology, as shown in Figure 10.4

Figure 10.4: Process flow of Faecal Sludge & Septage Management System (FSSM)



While adopting best practices for faecal sludge management, the respective ULBs should capture the following important information:

- Accurate estimation of faecal sludge is essential as it will determine the complete management mechanism right from desludging intervals, collection system, treatment modules, size of the treatment unit, an area required for treatment, to the end-use of the treatment by-products. To determine the quantity of faecal sludge receivable at the faecal sludge treatment facility, a population-based method for calculating faecal sludge generation in the city using sludge accumulation rate (CPHEEO Manual) can be used.
- It is essential to define the rate at which the faecal sludge will be fed into the treatment system. The faecal sludge feeding into the treatment system depends on the capacity and discharge arrangement of the desludging trucks. The treatment modules should be designed considering a designed flow rate (generated by discharging 3.5 Kilo litres of faecal sludge being discharged from the truck into the treatment plant in 8-10 minutes).

- In order to ensure the effective treatment of sludge as well as sludge water, it is necessary to provide adequate sludge and hydraulic retention time for each of the treatment modules proposed.
- In order to ensure the effective treatment process, it is necessary to consider the climatic conditions for the design of treatment modules, especially the temperature to ensure treatment efficiency, rainfall to ensure the drying of solids in the drying beds, etc.
- Though the real concern with odours is often not recognized during the design stage and only becomes apparent after the treatment plant becomes operational, it should be dealt with at the planning stage of the establishment of faecal sludge treatment facility. Minimization of odour related issues should be addressed in the design details by providing proper ventilation for all modules of FSTP. It is also essential to develop good housekeeping practices in the facility operation.
- Site identification of septage treatment is critical for the effective implementation of septage management plan. The following parameters should be considered before finalizing treatment sites: (i) Distance from emptying to delivering and accessibility of the treatment site are significant issues. The transport of relatively small faecal sludge volumes on congested roads over long distances in large urban areas is financially unfeasible. A too far away site implies fewer trips per day, less revenue, and more fuel costs to private operators, (ii) A treatment site may generate nuisance, nasty odours. Hence, it should be located at an appropriate distance from the residential areas, (iii) Projects are often delayed because of non-availability or high price of land. The respective ULBs should identify the land bank for the treatment facility. ULB should also explore the possibility of developing septage treatment facility at solid waste dumping or treatment site or proposed STP site, (iv) Assessment of existing geological conditions on-site like groundwater table, type of soil, prone to flooding is always recommended as it may directly affect the selection of technology option.
- The suitability of the number of vehicles and their size as per the width of the roads and lanes required for collection and transportation of Faecal sludge should be examined.
- Manpower required for all collection, transportation, treatment, and disposal should be assessed.

- Appropriate technology should be identified by analyzing the pros and cons of all possible alternatives, keeping in view transportation and effectiveness of different processes under local conditions using multi-criteria techniques. Each technology should be evaluated based on various factors such as (i) Technology viability and maturity, (ii) Regulatory acceptance, (iii) Scale of capital investment, revenues and financial model, (iv) Critical risks and success factors, and (v) Potential barriers in implementation.

10.3 Inventory of Industrial development scenario in the district

The district provides good scope for industrial development. Therefore, an action plan for the district's industrial development would have to be drawn to synchronize the pace of industrial development with the pace of infrastructure development. It may be pointed out that the development of the infrastructural facilities usually goes very slow. Because these form part of the overall state/country planning thus usually face so many resources and area demand constraints. The phased implantation, therefore may be helpful in steady industrialization of the district and attracting infrastructural facilities without overburdening the financial resources of the State.

10.3.1. Availability of Power, Water, and Land

Availability of power at present is insufficient to meet the present demand/load. Suratgarh has come as a growth center where many industries are likely to set up. Looking at the area's power needs of the area, two Mini Hydel Powerhouse and 2 MW at Suratgarh Branch of Indira Gandhi Canal is proposed at Suratgarh, which would add to the availability of power in the area. The sixth unit of the Suratgarh thermal power station has been started production [1500 MW]. Water availability in the district is better as compared to other districts of the state. It is enough both for industrial and drinking use. The supply of water needs only better management and distribution, and it is reported that water would not be in short supply. The land is an essential factor for setting up industries; sufficient land is necessary for setting up industry, and it should be enough to plan future expansion. Enough land is available in the district.

10.3.2. Training

At present, there are five Govt. ITI, one polytechnic college, functions in the district, and some private ITI is also working. Some private institutions are also producing trained people in various trades and crafts. However, the proposed industrial units in the district

will require more trained/skilled manpower, for this vision of necessary facilities in the form of a few more training institutes would be necessary. Since agriculture would continue to be the mainstay of the population in the district, for providing necessary training, know-how, and technologies required in agriculture, it has been suggested to open an agriculture college at Sri Ganganagar.

10.3.3. Availability of Transportation

The district is well connected with different types of roads such as national highway/State highway main district roads, other roads, in all there are 4539.078 K.M. roads in the district. All the tehsil headquarters are well connected with weather metaled roads; however, in view of the proposed industrialization and development of new growth centers and mandies, upgrading to existing roads and construction of some new roads would be essential. It is learned that the concerning department has prepared to plan for extension and upgrading of the roads in the district. There is a need to implement this early. The district is also well connected with the broad gauge railway line. The total rail length in the district 265 K.M. is broad gauge. Broad gauge is connecting the district with Delhi via Punjab and Haryana. Broad Gauge is connected with Jaipur via Bikaner and Sikar. The rail transport is considered sufficient to meet the current requirement of goods movement.

10.3.4. Availability of Infrastructure

The existing infrastructural facilities in the district are considered just sufficient to meet the present needs. Availability of power is sufficient. It needs to be augmented in terms of proposed district water industrialization, and land availability is sufficient. RIICO has already developed 15 industrial areas in the district and provides needed infra facilities in these areas. The occupancy in all the areas is almost full. Looking to the additional demand of plots, the RIICO has expanded Udyog Vihar and developed new areas. Five Govt. ITI functioning is producing trained personal of various trades looking to the likely increase in requirement of such person; it is suggested that one more ITI and one agriculture University be open in the district. In view of the proposed industrialization, upgrading existing roads and construction of some new roads is considered necessary. The facilities like telephone, post, and telegraph are sufficient, but their efficiency needs be ensured. Educational and medical facilities are just sufficient to meet present demand. These needs are to be increased /improved to cope with the growing population's

increasing demand, especially in the important industrial centers, which are likely to develop in view of the proposed industrialization. It is suggested that the organization like the Rajasthan Housing Board may plan to develop a few housing colonies at important industrial centers and mandies to meet the demand of the population on the industrial cities and growth center.

10.3.5. Strategy

In order to establish industrial units in the district, the role of concerned development agencies is also very important to ensure smooth credit and development of this sector. Such steps are broadly narrated below.

1. Rajasthan Industrial Development & Investment Corporation Ltd. (RIICO) should develop more industrial areas and provide necessary infrastructures like roads, power, and other related works.
2. Khadi village Industries Board [KVIB] must ensure the latest technical know-how to artisans and other inputs to encourage the rural craftsman, village, and cottage industries.
3. District Industries Centre [DIC] Guide entrepreneurs in choosing the right type of project, publish the incentive and arrange training for interested entrepreneurs.

a. Potential Industries/Agro-Based Industries

4. Cotton Ginning and Pressing: Ganganagar is the cotton belt of India and ranks first in Rajasthan in cotton production. Nearly 354269 MT of America cotton [Narma] and desi cotton 6732 Bails has been produced during the year 2017 through a good number of about 18 ginning and pressing units have already been set up still there is ample scope in cotton ginning and pressing industries because these units are not able to cope with the heavy demand of ginning cotton during the season.
5. Cotton Spinning Mills: The district's total cotton production is about 361001 bales per season [1 Bale 170 kg.], but only 10-15% bales are being processed by the local spinning mills and the rest of production being sent to other states for spinning purpose.
6. Oil Mills: Ganganagar is famous for its oil mills and also ranks first in Rajasthan in the production of Oil Seeds. During the year 2018, about 317285 MT Oilseeds were produced in the district. There are 73 oil mills registered in the district. There is a good demand for Ganganagar's oil in west Bengal and Eastern State as such few more

units can be established.

7. Solvent Extraction Plant – After extracting oil from seeds, a byproduct is named Oil cake. 5-6% Oil can be further extracted from oil cake. After extracting oil from oil cake, there remains a byproduct De-Oiled cake[DOC]. There is a good demand for DOC in Pakistan.
8. Vanaspati Ghee: The availability of cotton seeds, groundnut, and sunflower in the district is good, and the demand for Vanaspati Ghee [hydrogenated Oil] is increasing very fast. Some medium or large-scale units may be set up to meet the growing demand of the area.
9. Rice Mills: Rice is a good scope of export if the latest technological-based Rice Mill is established in the area. The product of Rice in the district, and there are two Rice Mills in the district. Though the main rice cultivation area remained with the newly formed Hanumangarh district, there is still good scope for rice mills in Sriganganagar.
10. Roller Flour Mills: The district rank is good in the state in the production of wheat. During 2018, about 167564 hectares of wheat were taken into wheat cultivation, and
11. 11.16 lacs MT of wheat was produced in the district. There are ten roller flour mills in districts. The production of wheat in the district is further likely to increase with the availability of more and more irrigation facilities. Ganganagar itself has developed as a big grain mandi of the country, and presently wheat is sent out of the district to the various part of the state and country. The possibility of growing profit to the grower cannot be ruled out of the production of wheat put to industrial use. Thus there is a possibility of setting up some roller flour mills in the district.
12. Straw Board Units: Large quantity of wheat and rice straws is available in the district. Straws being agro-waste have no important use, but it can still provide base material for about one plant of the strawboard in the district. Hence there is a good scope for some strawboard units in the district
13. Food processing units: Since the economy of the district is based upon agriculture, and the increasing production of fruit like Malta, Mausummi, and Kinnoo in the district provide possibilities of food processing units, "Kinnoo" of the district Ganganagar is very much famous in abroad Ready to Sip juice units of kinoo and

sugarcane can be setup in the district. Some small units of Achar, Murabba, Jam, and Jelly can also be established in the vicinity.

14. Dal Mills: The production of pulses and grams in the district is about 148189 lacs MT, which roughly comes to 6.15% of the state's total production. There are 15 dal mills in districts. Since only 1/3 of the production is used in industries, looking to the local need, five more DAL MILLS can be established in the district.
15. Sugar Mill: There is only one sugar mill in the district, and that too in the public sector. As such, there is no private sector governed Sugar Mill in the district. Looking towards the local production of sugarcane, there is a good scope for setting up one more Sugar Mill in the area.
16. Industries Based on the by-product of Sugar Industry –
 - a. Distillery
 - b. Card Board Unit
17. Khandsari Sugar Units: Khandsari sugar units have good prospects in the district. These units have good employment potential as they are more labor-intensive.
18. Gur Making Units: Gur making units can be established in a big way as in the Meerut area of U.P. by producing sugarcane locally. There is an excellent demand for Gur in rural areas of the district.
19. Solar Energy- There is no solar energy unit established in the district. There is a good scope of solar energy units in Anupgarh, Gharsana, Rawla area of Sriganganagar district.
20. Cattle Feed: Availability of Raw material for cattle feed is in good quantity in the district so that there is a good scope of cattle feed units.
21. Cement Tiles: There is a good scope of cement tiles, mosaic tiles and interlocking tiles in the districts.
22. Agro waste briquettes: The main sources of livelihood of the people are agriculture and animal husbandry. Livestock plays a vital role in the development of the economy of a district. Since the economy of the Sriganganagar district is mainly based on agriculture and livestock is vital next to agriculture, there is lots of raw material available for agro waste briquettes.

The list of potential industries category wise are presented in **Table 10.5** and **Table 10.6**.

Table 10.5: List of potential industries in Sri Ganganagar District

S. No.	Name of industry	Suggested location
1.	Agriculture Implements	Gajsinghpur, Raisinghnagar, Anupgarh
2.	Drip Irrigation	Padampur, Suratgarh, anupgarh, gharsana
3.	Particle boards from cotton stick	Sriganganagar, Padampur, Suratgarh, Karanpur
4.	Gypsum grinding unit	Anupgarh, Gharsana, Rawala, Ramsinghpur
5.	Plaster of paris	Anupgarh, Gharsana, Rawala, Ramsinghpur
6.	Bio coal briquettes	Sriganganagar, Padampur, Srikanpur, Raisinghnagar, Anupgarh, Sadulshahar
7.	Seed processing	Sriganganagar, Padampur, Srikanpur, Raisinghnagar, Anupgarh, Suratgarh
8.	Interlocking tiles	Sriganganagar, Padampur, Srikanpur, Raisinghnagar, Anupgarh, Suratgarh, Gharsana
9.	LED Units	Sriganganagar, Suratgarh
10.	Solar Energy	Anupgarh, Gharsana, Rawla, Suratgarh, Srikanpur
11.	Barbire and Jaali	Sriganganagar, Suratgarh, Anupgarh, Gharsana, Srikanpur

Table 10.6: Demand based industries in Sri Ganganagar district

S. No.	Name of industry	Suggested location
1.	Solvent extraction plant	Sriganganagar, Padampur, Srikanpur
2.	Guar Gum Powder and [Implementation]	Sriganganagar, Padampur, Raisinghnagar, Anupgarh Srikanpur,
3.	Vanaspati Ghee	Sriganganagar, Anupgarh, Suratgarh
4.	Roller Flour Mill	Anupgarh, Gharsana, Rawala, Ramsinghpur
5.	Tomato Sauce, Achars Murabba	Sriganganagar, Padampur, Raisinghnagar Srikanpur,
6.	Dal Mill	Sriganganagar, Padampur, Raisinghnagar, Anupgarh, Gharsana Srikanpur,
7.	Surgical cotton	Sriganganagar, Padampur, Srikanpur
8.	Oil Mill Mustered oil, Mustered cake	Sriganganagar, Padampur, Srikanpur, Raisinghnagar
9.	Gur Gum Churi	Sriganganagar, Padampur, Srikanpur, Raisinghnagar
10.	Cotton Hosiery	Sriganganagar, Padampur
11.	Expeller Parts	Sriganganagar

10.3.6. Proposed Augmentation of Industrial Areas

The work of industrial augmentation in the state has been assigned primarily to the state industrial Development and investment corporation (RIICO) at the state level. However, another organization like the Rajasthan Financial Corporation (RFC) is also involved in the industrial promotion. This work is being done by the local office of the organizations mentioned above and the DIC at the district level.

These concerned organizations have organized industrial promotion campaigns within and outside the state on important centers where the entrepreneurs of Rajasthan origin have set up industrial ventures viz. Delhi, Calcutta, Madras, Bombay, etc., to attract them and other interested industrialists to set up ventures in the state. These campaigns have been quite successful as such, it is suggested that this programme should be continued in the future also; industrial camps may also be organized at the district level and follow by the DICs in collaboration with RIICO, RAJCON, and RFC to attract local entrepreneurs to set up industrial units in the district.

10.4 Role and Responsibilities of Authorities and actions require for Domestic Sewage Management and Industrial development scenario

In view of the existing inventory, sewage connections, population and industrial development, the following action plans (shown in **Table 10.7**) are proposed for the effective management of domestic sewage management.

Table 10.7: Action plan for domestic sewage and industrial wastewater/wastes management plan

S. N.	Action Points	Responsible Authorities	Strategy and approach & Time frame
1.	Inventory of Sewage Management	ULBs/ Village Panchayat	All ULBs/ Village Panchayat should complete the survey and identification all Households to ensure proper drainage and management of sewage. They should validate the projection of sewage generation rate and evaluate options for disposal system within one year.
2.	Adequacy of Available Infrastructure for Sewage Treatment	ULBs/ Village Panchayat	- All ULBs/ Village Panchayat must find out the treatment facility required and available within one year and make a plan for better wastes water management. - Some Household may have its own sewage management infrastructure so as to pull down this water to maintain water level in earth and to reuse this water at various other domestic works after removing contaminants. i.e., grey water after removing contaminants may be used in gardens, toilet flushing etc. - All households should be connected to sewage management infrastructure either at home or through proper drain across ULB to Sewage treatment plant or FSTP should installed with appropriate numbers.
3.	Adequacy of Sewerage Network	ULBs/ Village Panchayat	- Proper sewerage systems to be constructed to connect all Households under each ULB to ensure total sewage management. - Sri Ganganagar Municipal Board: The present treatment capacity is 10.00 MLD and 82.84% of targeted population is connected with plant by August 2021. As per 2021 projected population, quantity of sewage generated in the Municipal Council is 26.3 MLD hence another STP plants of at least 16.3 MLD would be required with complete sewerage network connectivity for all households by June 2024. - Suratgarh Municipal Board: The present treatment capacity is 5.00 MLD and 60% of targeted population is connected with these plants by August 2021. As per 2021 projected population, quantity of sewage generated in the Municipal Board is 8.5

			MLD hence another STP plant of 3.5 MLD would be required with complete sewerage network connectivity for all households. This should be achieved by June 2025. OR Faecal sludge management scheme should also be approved and implemented with appropriate collection-transportation systems so that no untreated wastewater should be disposed natural water courses.
			• Municipal Boards Anupgarh, Gajsinghpur, Karanpur, Kesrisinghpur, Padampur, Raisinghnagar, Sadulshahar, and Sri Vijaynagar: Municipal Boards Anupgarh, Gajsinghpur, Karanpur, Kesrisinghpur, Padampur, Raisinghnagar, Sadulshahar, and Vijaynagar: There is no STP installed at Municipal Boards Anupgarh, Gajsinghpur, Karanpur, Kesrisinghpur currently. Municipal Boards Anupgarh, Karanpur, and Kesrisinghpur should plan to install STP/FSTPs by June 2024. Similarly, Municipal Boards Gajsinghpur, and Suratgarh should plan to install STP/FSTPs by June 2025 and Padampur, Raisinghnagar, Sadulshahar, and Sri Vijaynagar also do not have STP/FSTP facilities. They should plan to install STP/FSTPs by June 2026. • All these Municipal boards must ensure that the process of laying of sewerage network and households connections are made with newly installed STPs so that these plants should be operational with its full capacity. Implementation of faecal sludge management schemes should also be done within the stipulated time. If FSTPs are planned to be installed, it must be ensured that adequate and efficient collection-transportation systems are available.
4.	Creating a geospatial data	ULB and LSG	If a digital database of the existing inventory is made, it would be easy to classify the connected and unconnected household. This not only help to determine the optimal path for the connection between the household and the STP units but also helps to develop cost effective collection and transportation systems for FSTP units.
5.	Creating a plan of reuse of treated effluents of STPs for irrigating public parks, agriculture, horticulture etc.	ULB and LSG	Rather getting rid of the treated or partially treated effluents from STPs, municipal authorities should work for conserving the resources of treated effluents (both water + nutrients) by exploring its value addition in irrigation. As a case study, an attempt should be made so that farming is in-built into a waste disposal scheme. by a value addition concept of using treated effluent according to its water + nutrient + soil conditioning value. Every Municipal board/Municipal Council must have a case study of this type in their locality by June 2025.

6.	Inventory of Industrial areas	RIICO/ District admin./RSPCB	Mapping of type of industries and institutions and monitoring of level of pollution emissions (Air, Water, land or noise pollution) along with disposal mode by them. This task would be completed by June 2022. Responsible agency would ensure that pollution emissions by the industries do not exceed the prescribed limit.
7.	Provision of sanitation facilities for labourers/workers in industrial areas	RIICO	There must be sanitation facilities for labourers/workers in the industrial areas. RIICO should ensure that all workers have proper sanitation facilities. This task shall be completed by June 2022.
8.	Provision of storm-water drain in all industrial areas and drainage facilities	RIICO	There must be storm-water drain facilities in the industrial areas. However, it must be ensured that it should carry only storm-water. No industrial wastewater should flow in such drains. RIICO should ensure that storm water drains are provided with flow measurement devices. This task shall be completed by June 2022.
9.	Monitoring and Review	District Collector	District collector will monitor/review the performance of their respective ULB/ Panchayats/ RSPCB/ RIICO / PHED/ WRD/ GWD on the respective issues related to concern department and may constitute district level expert committee for advice.

Chapter 11: Air Quality Management Plan

Under National Ambient Air Quality Standards, 2009; 12 pollutants are notified based on short term & long term monitoring for Industrial/residential and Sensitive/ecological areas, i.e., PM₁₀, PM_{2.5}, SO₂, NO₂, NH₃, Pb, O₃, CO, Ni, As, benzo [a] pyrene (B[a]P) and Benzene. Under National Air Monitoring Program (NAMP), a huge quantity of data generates annually for prescribed parameters, i.e., PM₁₀, SO₂ and NO₂. CPCB evaluated the concept of the Air Quality Index (AQI) utilizing ambient air quality data to ascertain air quality in terms of its probable impact on health and the environment. A brief insight on each of the air pollutants is described below:

11.1. Major Air Pollutants

The most common outdoor air pollutants are discussed below (<https://www.blf.org.uk/>)

11.1.1. Particulate matter (PM_{2.5} and PM₁₀)

Particulate matter is a mix of solids and liquids, including carbon, complex organic chemicals, sulphates, nitrates, mineral dust, and water suspended in the air. PM varies in size. Some particles, such as dust, soot, dirt, or smoke, are large or dark enough to be seen with the naked eye. However, the most damaging particles are the smaller particles, known as PM₁₀ and PM_{2.5}.

11.1.2. Nitrogen Oxides (NO, NO₂, NO_x)

Nitrogen oxides are a group of seven gases and compounds composed of nitrogen and oxygen, sometimes collectively known as NO_x gases. The two most common and hazardous oxides of nitrogen are nitric oxide (NO) and nitrogen dioxide (NO₂).

11.1.3. Sulphur Dioxide (SO₂)

Sulfur dioxide or SO₂ is a colorless gas with a strong odor, similar to a just-struck match. It is formed when fuel containing sulfur, such as coal and oil, is burned, creating air pollution.

11.1.4. Carbon Monoxide (CO)

Carbon monoxide is a colorless, highly poisonous gas. Under pressure, it becomes a liquid. It is produced by burning gasoline, natural gas, charcoal, wood, and other fuels.

11.1.5. Benzene, Toluene and Xylene (BTX)

Benzene, toluene, xylene, and formaldehyde are well-known indoor air pollutants, especially afterhouse decoration. They are also common pollutants in the working places of the plastic industry, chemical industry, and leather industry.

11.1.6. Ammonia (NH₃)

Ammonia pollution is pollution by the chemical ammonia (NH₃) – a compound of nitrogen and hydrogen, which is a byproduct of agriculture and industry.

11.1.7. Ozone(O₃)

Ground-level ozone is a colorless and highly irritating gas that forms just above the earth's surface. It is called a "secondary" pollutant because it is produced when two primary pollutants react in sunlight and stagnant air. These two primary pollutants are nitrogen oxides (NO_x) and volatile organic compounds (VOCs).

11.2. Air Quality Index

The air quality index is calculated based on averages of all pollutant concentrations measured in a full hour, a full 8 hours, or a full day. The schematic illustration involved in the computation of AQI is shown in **Figure 11.1**. To calculate an hourly air quality index, we average at least 90 measured data points of pollution concentration from a full hour. The classification of regions based on AQI is shown in **Figure 11.2**.

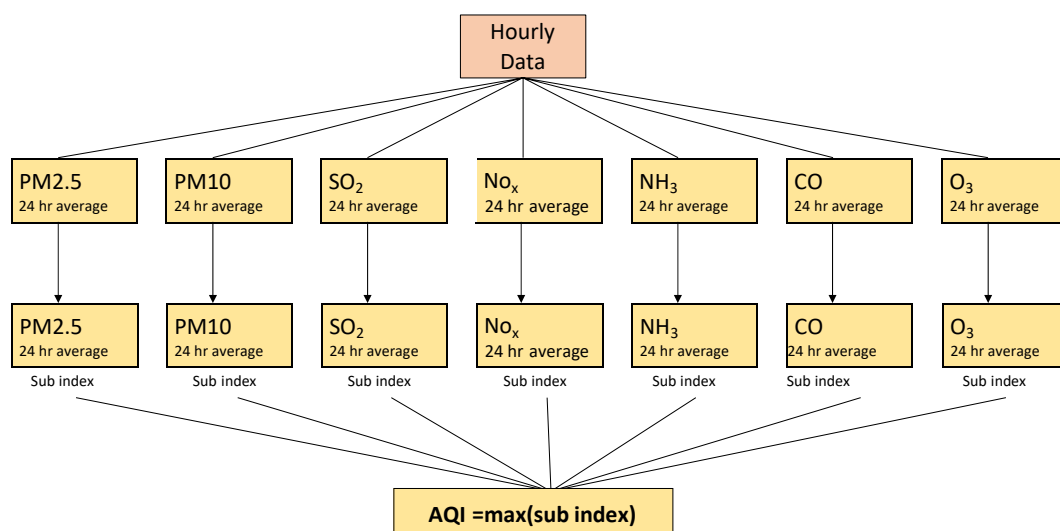


Figure 11.1. Computation of AQI

AQI	Remark	Color Code	Possible Health Impacts
0-50	Good		Minimal impact
51-100	Satisfactory		Minor breathing discomfort to sensitive people
101-200	Moderate		Breathing discomfort to the people with lungs, asthma and heart diseases
201-300	Poor		Breathing discomfort to most people on prolonged exposure
301-400	Very Poor		Respiratory illness on prolonged exposure
401-500	Severe		Affects healthy people and seriously impacts those with existing diseases

Figure 11.2. AQI ranges, Remarks, and possible health impacts

11.3. Status and Inventory of Air Quality Management in Sri Ganganagar District

A short survey is conducted to collect the information of Air Quality Management Information and Inventory of air quality management in Sri Ganganagar District, and the collated information is shown in **Tables 11.1 and 11.2.**

Table 11.1: Inventory of Air Quality Management in Sri Ganganagar district

No.	Action Areas	Details of Data Requirement	Unit/ Status	RSPCB
AQ1	Availability of Air Quality Monitoring Network in District			
AQ1a		Manual Air Quality monitoring stations of SPCBs /CPCB	[Nos] / [None]	None
AQ1c		Automatic monitoring stations Operated by SPCBs / CPCB	[Nos] / [None]	One CAAQMS station is proposed at Play Ground Govt Sr Sec School (Multipurpose), Sri Ganganagar
AQ2	Inventory of Air Pollution Sources			
AQ2a		Identification of prominent air polluting sources	[Large Industry] / [Small Industry] / [Unpaved Roads] / [Burning of Waste Stubble] / [Brick Kiln] / [Industrial Estate] / [Others] (Multiple selection)	Large Scale Industries Situated in Sriganganagar District are – 1.Shree Cement Ltd., Village-Udepur, Tehsil-Suratgarh, District-Sriganganagar (Only Clinker Grinding Unit) 2.Bangur Cement Unit- A unit of Shree Cement Ltd., Village-Rohi Udepur-Udasar, Tehsil-Suratgarh, District-Sriganganagar (Only Clinker Grinding Unit) 3.Rajasthan State Ganganagar Sugar Mills Ltd. (Sugar Mill Unit), Chak- 23 F, Kaminipura, Tehsil-Srikaranpur, District-Sriganganagar
No.	Action Areas	Details of Data Requirement	Unit/ Status	RSPCB

				4.Rajasthan State Ganganagar Sugar Mills Ltd. (Distillery Unit) Chak- 23 F, Kaminpura, Tehsil-Srikaranpur, District-Sriganganagar 5.Suratgarh Super Thermal Power Station (RRVUNL) Suratgarh, Tehsil-Suratgarh, District-Sriganganagar 6.Kalpataru Power Transmission Ltd. Chak- 27 BB, Padampur- Gajsinghpur Road, Tehsil- Padampur, District-Sriganganagar 7.Suratgarh Supercritical Thermal Power Plant, Admin Building SSTPS, Suratgarh, Teh-Suratgarh, Dist-Sriganganagar Beside this other prominent Units are Brick Kilns, Plaster of Paris, Cotton Ginning and Edible Oil Refinery.
AQ2b		No of Non-Attainment Cities	[Nos / [None]	None
AQ2c		Action Plans for non-attainment cities	[Prepared] / [Not yet prepared]	NA
AQ3	Availability of Air Quality Monitoring Data at DMs Office			
AQ3a		Access to air quality data from SPCBs & CPCB through Dashboard	[Available] / [Not yet Available]	Not yet Available
AQ4	Control of Industrial Air Pollution			
AQ4a		No of Industries meeting Standards		Nearly all the industries are complying with prescribed standards.
AQ4b		No of Industries not meeting discharge Standards	-	-
AQ5	Control of Non-industrial Air Pollution sources			
AQ5a		Control open burning of Stubble –during winter	[Nos of fire incidents]	0
AQ5b		Control Open burning of Waste – Nos of actions Taken	[Nos]	0
AQ5c		Control of forest fires	[SOP available] / [No SoP]	
No.	Action Areas	Details of Data Requirement	Unit/ Status	RSPCB
AQ5d		Vehicle pollution check centers	[% ULBs covered]	-Not available-

AQ5e		Dust Suppression Vehicles	[% ULBs covered]	-Not available-
AQ6	Development of Air Pollution complaint redressal system			
AQ6a		Mobile App / Online based air pollution complaint redressing system of SPCBs.	[Available] / [Not available]	

Table 11.2: Inventory of Air Polluting Industries in the Sri Ganganagar District

Attributes	Unit	Total No. in district	ULB's of Sri Ganganagar									
Type of Industries	[Nos]	671	7 -Large Scale Industries Situated in Sriganganagar District are – 1. Shree Cement Ltd., Village-Udepur, Tehsil-Suratgarh, District-Sriganganagar 2. Bangur Cement Unit- A unit of Shree Cement Ltd., Village-Rohi Udepur-Udasar, Tehsil-Suratgarh, District-Sriganganagar 3. Rajasthan State Ganganagar Sugar Mills Ltd. (Sugar Mill Unit), Chak- 23 F, Kaminpura, Tehsil-Srikanpur, District-Sriganganagar 4. Rajasthan State Ganganagar Sugar Mills Ltd. (Distillery Unit) Chak- 23 F, Kaminpura, Tehsil-Srikanpur, District-Sriganganagar 5. Suratgarh Super Thermal Power Station (RRVUNL) Suratgarh, Tehsil-Suratgarh, District-Sriganganagar 6. Kalpataru Power Transmission Ltd. Chak- 27 BB, Padampur- Gajsinghpur Road, Tehsil-Padampur, District-Sriganganagar 7. Suratgarh Supercritical Thermal Power Plant, Admin Building SSTPS, Suratgarh, Teh-Suratgarh, Dist-Sriganganagar Beside this, approx. 1200 other Units are established in Sriganganagar district major of them are Brick Kilns (600 units), Plaster of Paris (50 units), Cotton Ginning (50 units) and Edible Oil Refinery (6 units)									
No of Crushers in the District	[Nos]	00	00	00	00	00	00	00	00	00	00	00

11.4. Monitoring real-time air pollution

Large amount of granular data relating to the concentration of each air pollutants in India is available and it is made accessible to every citizen by Central Pollution Control Board (CPCB), India (<https://app.cpcbcr.com/AQI India/>). Though there are numerous monitoring stations spread over the country, there exist no monitoring stations in Sri Ganganagar district. The locations of monitoring stations within the proximity of Sri Ganganagar are shown in **Figure 11.3**. For better understanding of the distribution of air pollution over the entire Sri Ganganagar the historic data of SO₂ emissions is accessed from TROPOMI Explorer (<https://showcase.earthengine.app/>) as shown in **Figure 11.4**. Though the imagery obtained from TROPOMI Explorer helps in the visualizing the variation of air quality over the years, due to the limited functionalities, it does not enable the user to study at a specific region of interest.

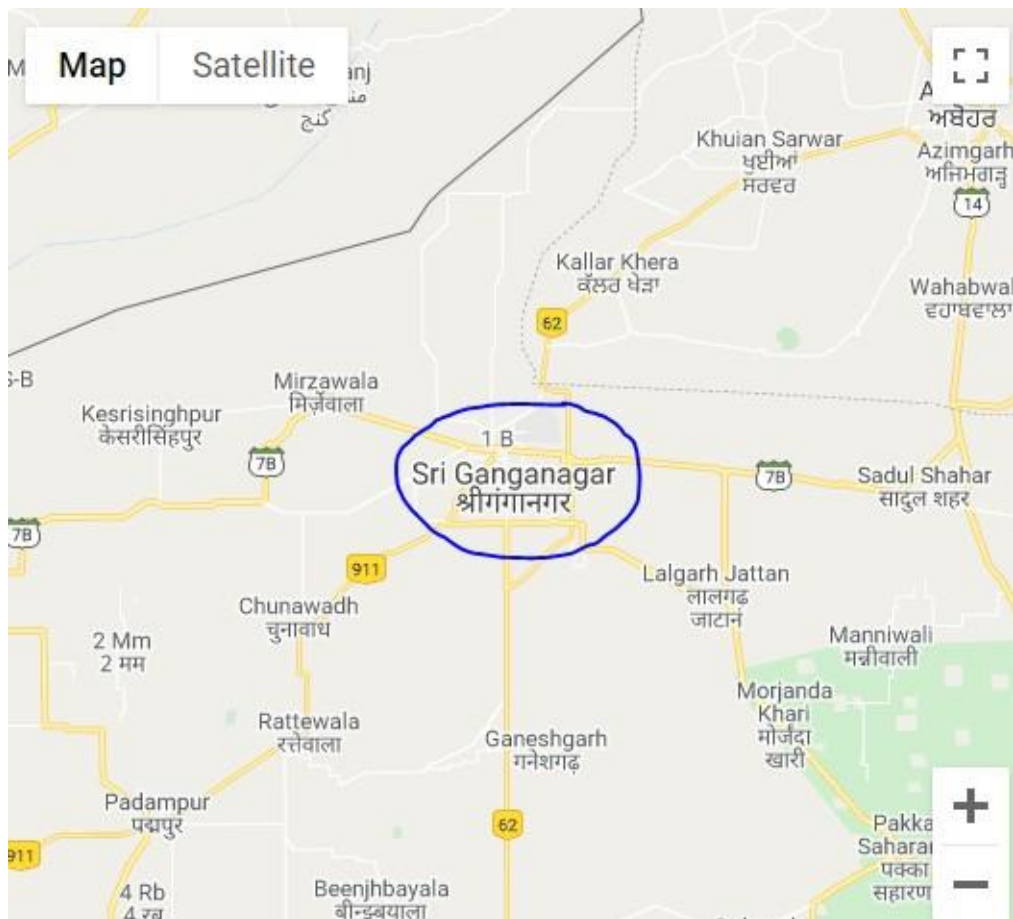


Figure 11.3: Locations of monitoring stations within the proximity of Sri Ganganagar district

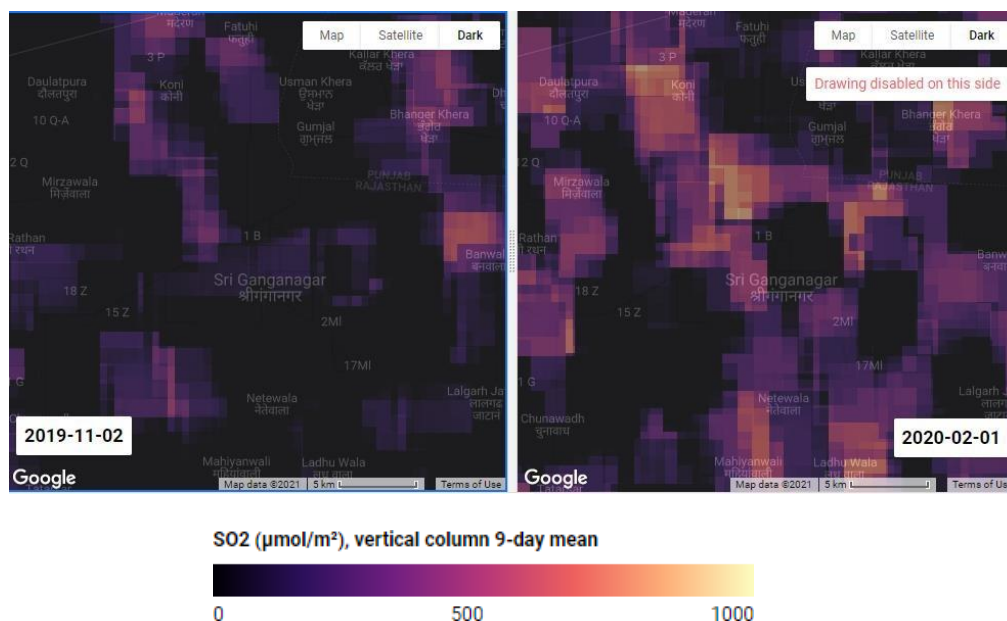


Figure 11.4: Variation of SO₂ over the Sri Ganganagar region

9.5. Inventory of Air Pollution Management Plan

A detailed survey is carried out in each ULB and the obtained information is collated as shown in **Tables 11.1 and 11.2**. From the collected information, it has been identified that seven major industries located in the Sri Ganganagar district are the primary sources of air pollution. Despite massive operational capacities, it is observed that the pollution levels emitted by these industries are found to comply with the norms prescribed by State Pollution Control Board. In continuation to that, show-cause notices were issued to these units. Project Proponents, later on, rectified the deficiencies and submitted a reply of the same to this office, which are now found to be adequate. Considering the existing inventory, a detailed action plan is developed, as shown in **Table 11.3**.

Table 11.3: Air Pollution Management Plan

Sr. No.	Action Point	Present Status	Gap	Strategy and approach & Timeline	Responsible Authorities/Department
1.	Availability of Air Quality Monitoring Network in District	There is no existing air quality monitoring network in the district. A location (district capital) is chosen for the installation of monitoring station.	There is a need of several monitoring stations in Sri Ganganagar	Online measuring system with public display board is to be installed within one year at least at one place in every ULB by December 2022.	Local self-government, RSPCB
2.	Inventory of air polluting industries in District	No systematic data is available.	Data need to be collected from all the large scale industries, brick kilns, plaster of paris units, cotton ginning units, and edible oil refineries on a periodic basis.	Inventory of all air polluting industries is to be mapped along with type of pollutant releasing, discharge, concentration and details of control device by December 2021.	RSPCB/ RIICO
3.	Identification of hot spot	No such hot spot has been identified presently.	Details of critical location are not available.	Hot spot in relation to air pollution is to be identified within one year and plan is to be made to keep AQI as per norms.	RSPCB
4.	Monitoring the discharge of emissions from Industry	Real time monitoring of air pollution will help to control and keep track of the pollution levels from the industries.	Data need to be collected from bricks kilns, plaster of paris units, cotton ginning units, and edible oil refineries and any such polluting sources.	December 2021	RSPCB

Sr. No.	Action Point	Present Status	Gap	Strategy and approach & Timeline	Responsible Authorities/Department
5.	Targeting 100% LPG access in households	A study published in Lancet has shown how premature deaths from household air pollution is responsible for health cost that is equivalent to close to 1 per cent of the state's GDP in Rajasthan	Maximizing clean energy access and enabling 100 percent coverage of household with reliable LPG connection. At the same time eliminate use of solid fuels from open eateries and restaurants and link this with their commercial license.	By 2022	Local self-government
6.	Improve walking and cycling	No programs that promote walking and cycling are in place in Sri Ganganagar	To Promote the use of cycles for the trips within 5km	Tracks should be constructed by each ULBs and Gram Panchayats.	ULBs/ Village Panchayats
7.	Electric vehicle programme:	No policies are in place	Promote the use of electric vehicles by proposing 100% exemption of taxes for electric vehicle.	By December 2024	State and Central Government
8.	Clean fuel initiative	No policies are in place	Discounts for the registration of LPG and CNG vehicles should be implemented.	By December 2022	State and Central Government
9.	Traffic Movement plan	City Traffic movement plan has been prepared time to time by local Police. Bye -pass is to be constructed for movement of heavy vehicles wherever feasible.		It should be ensured that air pollution be minimized at hot spots while educating public acceptability within one year. Bye -pass is to be constructed for movement of heavy vehicles wherever feasible within next 5 years.	Traffic Police, PWD

10.	Vehicle pollution checkcenters	Random checks are being done to ensure whether public follow best practices.	Proper record to be made available online with their names and vehicle numbers so that people avoid to break the rules.	Data availability should be made online by June 2022.	RTO, Local Police
11.	Dust Suppression Vehicles/Roads	Much of this dust is on the ground and when dry, it can be thrown up into the air by trucks and other vehicles.	If road conditions are poor bicyclists and two-wheeler motorcyclists face problems.	It should be ensured that dust from the road should not be thrown up into the air by vehicles, especially if road condition become poor. Proper speed limit must be specified with proper signage at critical locations whenever required.	RTO, Local Police, PWD
12.	Awareness Activities	The details of district level campaigns on effect of air pollution is not available.	Such information should be made available online at RSPCB website.	District level campaigns on effect of air pollution continuously.	RSPCB/ RIICO/ District Admin/ Educational Institutes
13.	Monitoring and Review	This is continuously being done by the District Administration		District collector or his representative should monitor/ review the performance of their respective ULB/Panchayats/RSPCB/RIICO / PHED/ WRD/ GWD on the respective issues related to concern department and may constitute district level expert committee for suggestions.	District Administration

Chapter 12. Mining Waste Management Plan

The district is not very rich in respect of minerals. Gypsum is the only mineral available in the district. Currently, there are eleven mining leases of gypsum. Also, 91 permits are given for excavation of gypsum up to 2.0m depth from the ground surface for improving agricultural land. Four hundred seven brick earth permits are also issued for making bricks. Gypsum is used in the manufacturing of fertilizer, Portland cement, and plaster of Paris. There are no mines in Sri Ganganagar. The historical details of the mineral production in the Sri Ganganagar district are shown in **Tables 12.1**.

Table 12.1. Inventory details of minerals for the year 2015-2016, 2016-2017, and 2017-2018

S. No.	Minerals	2015-16 (tons)	2016-2017 (tons)	2017-2018 (tons)
1	Gypsum	375599.88	434709.59	236241.58
2	Brick Earth	5651100	4636800	3487260
3	Calmyshora	There is no mining lease		

Compiled from: Industrial Potential Survey report 2017-2018

A survey is conducted in the district including all the ULB's to collect the details of the inventory and the collated information is shown in **Table 12.2**. Details of compliance to environmental conditions are presented in **Table 12.3** and the Mining related environmental complaints are presented in **Table 12.4**.

Table 12.2: Inventory of mining in Sri Ganganagar district

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghna gar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar	Total including Rural Area
Population	[Nos as per 2011 census]	224532	30877	9995	21297	14010	18420	28330	24980	70536	18425	1969168
Population (Projected)	[Nos as per 2021]	263349	37454	11375	23737	15513	21754	32669	29318	85071	20532	2313016
Type of Mining Activity	[Sand Mining] / [Iron Ore] / [Bauxite] / [Coal] / Other [specify]Multipl e selection in order of magnitude of operations	No mining activity in the ULB area										All mining activities are in rural areas do not fall in any ULB
No of Mining licenses given in the District	[Nos]	No mining activity in the ULB area										11 Gypsum licences + 407 brick earth permits
Area covered under mining	[Sq Km]	No mining activity in the ULB area										6.7927
Area of District	[Sq Km]	Not applicable										11154.66
Sand Mining	[Yes] / [No]	No sand mining in the district										
Area of sand Mining	[River bed] / [Estuary] / [Non -river deposit]	Not applicable										

Table-12.3: Compliance to Environmental Conditions

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Population	[Nos as per 2011 census]	120157	35683	19744	27419	59193	71124	12841	95911	101523	32640
No of Mining areas meeting Environmental Clearance Conditions	[Nos]	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located
No of Mining areas meeting Consent Conditions of SPCBs / PCCs	[Nos]	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located	No Mining Cluster Located

Table-12.4: Mining related environmental Complaints

Attributes	Unit	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar	Total in the district
No of pollution related complaints against Mining Operations in last 1 year	[Nos]	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
No of Mining operations suspended for violations to environmental norms	[Nos]	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
No of directions issued by SPCBs	[Nos]	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

From the data collected, it is noticed that mining activity in Sri Ganganagar is not prominent. Therefore, the chance of air quality degradation is not pronounced. However, the current mining of gypsum, Brick Earth, and Calmyshora may impart air and noise pollution and also cause water pollution. Some of the areas in the district experience water logging problems due to the availability of gypsum. Currently, there are eleven mining leases of gypsum. Also, 91 permits are given for excavation of gypsum up to 2.0m depth from the ground surface for improving agricultural land. Four hundred seven brick earth permits are also issued for making bricks. To minimize the impact of these activities, the following actions may be taken.

Measures to control air pollution

- Spraying of haulage/mine roads with water, use of dust extractors.
- Road carrying capacity studies shall be carried out in the mining belt area as well as the junctions wherein heavy movement of trucks carrying ores will be there.
- Trucks of larger carrying capacity shall be used for transport of ores to reduce air pollution and traffic congestion.
- Designated routes shall be provided or plan for transport of ores avoiding environmental sensitive areas.
- Water logging area should have appropriate drainage systems to arrest excess water in the region.
- LSG, ULB in association with RSPCB should multiply the resources and increase the numbers of Ambient air monitoring locations. Since only one monitoring station is planned in Sri Ganganagar district, it should be imperative to plan for various others locations.
- A dedicated mining manager has been assigned the task of monitoring of mining activities. Transport department in coordination with RSPCB should also monitor the activity.

Measures to control noise pollution

Though only JCB and light machineries are being used for excavation of gypsum and brick earths, there is no drilling and blasting activities are practiced in the region. As such there is no need of these activities as gypsum being considered as a soft rock. Regular maintenance of machinery should be ensured.

Measures to control water pollution

The effluents from the mining plants should be treated before releasing from the plants.

The action points for the effective management of mining activities is presented in **Table 12.5**.

Table 12.5: Mining activity Management Plan

Action area	Objective	Responsibility	Present status	Time schedule
Inventory of mining in Sri Ganganagar district	To maintain the record and status of mines and mining lease area	Mining Engineer/Manager, Sri Ganganagar,	Already maintained. However, all information should be accessible to the public through interactive website of mining department	June 2022
Monitoring	To restrict the illegal mining activities and to check if the emissions are within the permissible limits	Mining Engineer/Manager, Sri Gangangar,	Regular checking is done by the mining department to prevent the illegal mining and illegal transportation of minerals.	-

Chapter 13: Noise Pollution Management Plan

Noise can be defined as unwanted or undesired sound, and Noise pollution simply means when there is much noise in the environment, which is consequential harms the environment and public wellbeing. Like smoking, noise pollution affects active and passive recipients when noise levels cross certain safe boundaries. Noise pollution affects both human health and behavior. Noise is among the most pervasive pollutants today. But it is an inescapable by-product of urbanization and industrialization. CPCB set standards for noise pollution in 1989, and the Ministry of Environment and Forests (MOEF) formulated Noise Pollution Rules only in 2000.

Noise pollution is caused in the areas of mining, i.e., during the time of blasting, operation of power drillers, and while cutting the stones. The level of noise pollution may become intense during the festive seasons, especially during Diwali.

13.1 Status and Inventory of noise pollution in Sri Ganganagar district

A detailed information regarding inventory available for measuring the noise pollution is collected and the obtained information is shown in **Tables 13.1 and 13.2**.

Table 13.1: Inventory of Noise levels monitoring equipment

S.No	Attributes	No. of noise measuring devices with district administration	No. of noise measuring devices with SPCBs
1	Nagar Palika Raisinghnagar	0	01
2	Nagar Palika Sadulshahar	0	0
3	Nagar Palika Suratgarh	0	0
4	Nagar Palika Vijaynagar	0	0
5	Nagar Palika Raisinghnagar	0	0
6	Nagar Palika Sadulshahar	0	0
7	Nagar Palika Suratgarh	0	0
8	Nagar Palika Vijaynagar	0	0
9	Nagar Palika Raisinghnagar	0	0
10	Nagar Palika Sadulshahar	0	0

Table 13.2. Inventory of Capability to conduct noise level monitoring by State agency / District authorities

S. No.	Attributes	Capability to conduct noise level monitoring by State agency / District authorities	No of complaints received on noise pollution in last 1 year
1	Nagar Palika Raisinghnagar	0	0
2	Nagar Palika Sadulshahar	0	0
3	Nagar Palika Suratgarh	0	0
4	Nagar Palika Vijaynagar	0	0
5	Nagar Palika Raisinghnagar	0	0
6	Nagar Palika Sadulshahar	0	0
7	Nagar Palika Suratgarh	0	0
8	Nagar Palika Vijaynagar	0	0
9	Nagar Palika Raisinghnagar	0	0
10	Nagar Palika Sadulshahar	0	0

The monthly noise monitoring has been carried out by the State Board Laboratory for Residential, Commercial, and Industrial Purpose in Sri Ganganagar. A sample of the same is given in **Table**

13.3. From the attributes of **Table 13.3**, it is evident that the noise level on all the measured locations is within the acceptable limits, i.e., 85dBA. Drawing conclusive remarks regarding the noise level in the Sri Ganganagar district may not be credible. Therefore, there is a great need to conduct studies at multiple locations in Sri Ganganagar district. A short survey is conducted to collect the information of noise pollution management information and inventory in Sri Ganganagar District, and the collated information is shown in **Table 13.4**.

13.2. Implementation strategy for Noise Pollution Management Plan

The details of measurable and quantifiable targets, with timelines for completing the tasks are presented in **Table 13.5**.

Table 13.3: Details of monthly noise monitoring data carried out by the State Board Laboratory in Sri Ganganagar

Sr. No.	Location	September 2020		October 2020		November 2020		December 2020		January 2021		February 2021	
		Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time	Day Time	Night Time
		Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq	Leq
1	Ambedkar Circle, Sriganganagar (Commercial Zone)	67.9	62.9	75.9	69.8	72.1	58.3	70.2	66.2	71.6	65.8	70.6	66.7
2	Gandhi Park, Sriganganagar (Residential Zone)	62.5	61.8	65.6	63.3	67.0	51.7	68.9	63.8	69.9	64.5	68.3	64.5
3	Govt. Hospital, Suratgarh Road, Sriganganagar (Silent Zone)	58.4	52.5	67.4	63.6	67.0	61.7	70.2	63.4	69.9	63.5	67.7	63.5
4	Near RIICO Office, Udhyog Vihar, Sriganganagar (Industrial Zone)	71.1	66.3	69.5	70.4	72.0	61.5	69.6	64.7	71.4	65.4	71.1	66.4

*ND= Not Done. Acceptable noise limits = 85 dBA

Table 13.4: Compliance to ambient noise standards

Attributes	Unit	Total Nos. in the district	ULB-1 Ganganagar	ULB-2 Anupgarh	ULB-3 Gajsinghpur	ULB-4 Karanpur	ULB-5 Kesrisinghpur	ULB-6 Padampur	ULB-7 Raisinghnagar	ULB-8 Sadulshahar	ULB-9 Suratgarh	ULB-10 Vijaynagar
Implementation of Ambient noise standards in residential and silent zones	[Regular Activity] / [Occasional] / [Never]	-	-	-	-	-	-	-	-	-	-	-
Noise monitoring study in each ULB of the district	[carried out] / [not carried out]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sign boards in towns and cities in silent zones	[Installed] / [Partial] / [Not Installed]	-	-	-	-	-	-	-	-	-	-	-

Table 13.5: Action plan for Noise Pollution Management

Action area	Objective	Responsibility	Action to be taken	Timeline
Noise measuring devices	To measure the noise at the desired locations	ULB, RSPCB	Since only one noise measuring device is available in Sri Ganganagar, conducting studies in all ULB's at regular intervals would be challenging. Therefore, noise measuring devices are to be procured	By Sept, 2022
Noise level Monitoring	For establishing the ambient noise level	ULB, RSPCB	Noise levels should be monitored in each ULB on regular basis	By Sept 2022

Compliances of standards	To maintain the noise levels below the standards set by CPCB	ULB, RSPCB	1. Proper Categorization of areas into industrial, commercial residential or silence areas/zones has to be done. 2. Sign boards are to be installed in Silent zones even at panchayat levels. 3. Loudspeaker or a public address system should not be allowed to be used without obtaining written permission from the authority and not allowed to be used at night (between 10.00 p.m. to 6.00 a.m.) 4. Special team for monitoring during festivals season has to be formed. 5. Transport department will have to take steps for monitoring/ checking of vehicles to ensure environmental norms are followed by the vehicles 6. Complaints record and redressal system should be made in place.	By Sept 2022
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Chapter 14: Forest Conservation Practices

This chapter covers the general information regarding types of forest found in Sri Ganganagar district, forest land and the current management practices being adopted. The threats to forest

/ forest land in context to this district have also been identified and discussed. Finally, different afforestation activities proposed in forest land as well as city/town area are listed along with a brief action plans.

14.1 General information regarding types of forest in the district

The district comprises of 11097.10 sq. kms of geographical area, out of which 633.44 sq. kms is covered with forest, which is around 5.71% of the total district. This includes 23844.074 sq.kms protected forest and 39502.023 sq. kms under unclassified forest.

The terrain of the district is generally plain. Apart from these, the rest of the area is covered with sand dunes, making it the eastern boundary of the Thar desert. In the Sriganganagar district, one seasonal river is Ghaggar river.

The district has the very adverse climatic condition as the temperature varies from 0 degrees in winters to 50 degrees in summers. The average annual rainfall in this area is around 25mm. Primarily this area has vegetation that is mainly found in desert areas like trees of Acacia, Ber/Ziziphus, Tortalis, Khejri and Kumtha etc. and shrubs of Thor, Phog, etc.

The details of the local vegetation are given below:

1. Vegetation found on sand dunes:

- *Phog (Calligonum polygonoides)*
- *Bui (Aerva pseudotomentosa^{1/2})*
- *Aak (Calotropis procera^{1/2})*
- *Kheenp (Leptadenia pyrotechnica)*
- *Saniya (Crotalaria burhia),*
- *Tumba (Citrullus colocynthis),*
- *Thor (Euphorbia spp)*

2. Vegetation found on loamy sand:

- Khejri (*Prosopis sineraria*),
- Rohida (*Tecomella undulata*),
- Neem (*Azadiracta indica*),
- Ber (*Zizyphus spp*),
- Jaal (*Salvadora spp*),
- Kankeda (*Maytenus emarginata*),
- Hingot (*Balanites aegyptica*),
- Kair (*Capparis decidua*),
- Pharash (*Temarix articulata*),

Forests are subjected to tremendous biotic pressure everywhere, and despite the advancement of science, rural populations still depend on these resources. Unscientific and often over exploitation has left these forests degraded along with all their components. These forests might be under degraded condition due to illegal cutting of trees and land encroachment. The income from forest produce is low. Thus, protecting and restoring such patches are essential to improve the environment, increase biodiversity, and sustain forest produce. In addition, plantations done on nonforest land, especially community lands, are being taken up to increase forest cover in the district.

The different ranges covered under Sriganaganagar Forest Division are Ganganagar, Suratgarh, Birdwal, Raisinghnagar, Srivijaynagar, Gharsana, Rawla & Anupgarh, the details of which are given in **Table 14.1**:

Table 14.1: Details of forest cover range- wise

Range	Forest Area (in hectares)
Ganganagar	0.820
Vijaynagar	5148.305
Suratgarh	6088.104
Birdhwal	1188.00
Raisinghnagar	2019.120
Anupgarh	9972.985
Gharsana	16287.083
Rawla	13733.315
Total	63344.097

The forestry development project in this area mainly focuses on Sand Dune Stabilisation under the climate change scheme of the state government. In addition, in the past, the Canal Side development project was taken up in addition to the Government of Japan aided project to promote greenery. As per statistics of 2019-20, there are 13 nurseries in the Sri Ganganagar district, and the details are given in **Table 14.2:**

Table 14.2: Number of plants raised in nurseries (in lakhs) during 2020-21

Range Name	Name of Nursery	Permanent/ Temporary	Number of Plants (in Lakhs)		
			For Distribution	For Departmental Plantation	Total
1	2	3	4	5	6
Ganganagar	Circuit House	Permanent	0.12	0.00	0.12
Ganganagar	Sahuwala	Permanent	0.12	0.10	0.22
Ganganagar	Chunawadh Kothi	Temporary	0.12	0.10	0.22
Ganganagar	Sadul Shahar	Permanent	0.04	0.45	0.49
Vijaynagar	Jaitsar	Permanent	0.00	0.34	0.34
Vijaynagar	14 BLD	Permanent	0.15	0.30	0.45
Suratgar	Hanumanji ki Khejari	Temporary	0.12	0.24	0.36
Birdhwal	Birdhwal	Permanent	0.11	0.90	1.01
Birdhwal	10 RD AS	Temporary	0.04	0.20	0.24
Rawla	Rawala	Permanent	0.12	0.30	0.42
Rawla	Desali	Permanent	0.04	0.00	0.04
Gharsana	237 RD AS	Permanent	0.04	0.00	0.04
Gharsana	3 STR	Permanent	0.04	0.33	0.37
Raisinghnagar	Bajuwala	Permanent	0.12	0.20	0.32
Raisinghnagar	Sameja kothi	Permanent	0.00	0.00	0.00
Raisinghnagar	Ghamudwali	Permanent	0.04	0.00	0.04
Anupgarh	Banda	Permanent	0.04	0.30	0.34
Anupgarh	5 K	Permanent	0.11	0.19	0.30
Total			1.37	3.95	5.32

Practices to Increase Green Cover in Sri Ganganagar District

The forest department has also initiated various forestry activities in recent times through mitigation efforts to reduce environmental pollution, some of which are summarized in Tables 14.3 and 14.4:

Table 14.3: Different forestry activities initiated by the forest department

Activity	Action Plan
Afforestation	Details given below
Development of Urban Forest	Details given below
Reclaiming of Degraded Forest Land	Details given below
Road side plantation	Details given below
Forestry activities to increase environmental awareness among people.	Details given below
Any other activity (District Specific)	Details given below

The existing status and forest development practices done in different ranges of Sri Ganganagar district can be observed through **Figures 14.1 to 14.6**:

Table 14.4: Actions taken/ Planned for the development of forest cover range-wise during Year 2020-21

Actions taken	Status of Progress
Afforestation has been done in 442.03 Ha land located in Sri Ganganagar, Suratgarh, Birdwal, Raisinghnagar, Srivijaynagar, Gharsana, Rawla and Anupgarh ranges.	Completed
MGNREGA: Under MGNREGA scheme, 62 number of works have been sanctioned.	Under Progress

The range wise afforestation work planned under different schemes during 2020-21 has been summarized in **Table 14.5**. Similarly, the details of distribution of plants under farm forestry for the year 2020-21 are also given in **Table 14.6**.

Table 14.5: Range- wise Planning of plantation under different schemes in the year 2020-21

Sr.No.	Scheme Name	Site Name	Allotted Area in Ha.	Number of plants to be planted
1	2	3	5	6
1	Replanting	CSP DD 35-45 RD (B/S)	3.33	2500
		Total	3.33	2500
2	Replanting	CSP KWM 35-46 RD (R/S)	21.67	16250
3	Replanting	CSP ZWM 20-45 RD (L/S)	25.00	18750
4	Replanting	CSP RJM 15-30 RD (R/S)	9.16	6875
5	Replanting	CSP PM 5-10 (B/S)	3.33	2500
6	Replanting	CSP LSM 0-5 RD (B/S)	4.33	3250
7	Replanting	CSP PGM 9-20 RD (L/S)	5.00	3750
		Total	68.49	51375
8	Replanting	BP 2 RM	12.00	9600
9	Replanting	BP 2 DOL	12.00	9600
10	Replanting	BP 3 STR	4.00	3200
11	Replanting	BP TPP 28 AS (C)	12.00	9600
		Total	40.00	32000
		Replanting Total	111.82	85875
12	Gang Canal	CSP LNP NO. 8 RD 24-Tail (L/S)	6.67	5000
13	Gang Canal	CSP BAROR MINOR 3-16 RD (B/S)	8.33	6250
		Total	15.00	11250
14	Gang Canal	CSP Karani Ji Vitrika 105-117 RD (L/S)	5.00	3750
15	Gang Canal	CSP RB LOWER 54-63 RD (R/S)	6.67	5000
16	Gang Canal	RB LOWER 72-80 RD (R/S)	5.00	3750
		Total	16.67	12500
17	Gang Canal	CSP J MINOR 0-7 RD (B/S)	5.00	3750
18	Gang Canal	CSP G MINOR 0-12 RD (R/S)	4.00	3000
19	Gang Canal	CSP LNP (1) 0-11 RD (B/S)	6.67	5000
20	Gang Canal	CSP BAROR MINOR 16-29 RD (B/S)	8.33	6250
21	Gang Canal	CSP BIJNOR MINOR 3-15 RD (B/S)	8.33	6250
22	Gang Canal	CSP BIJNOR MINOR 16-30 RD (B/S)	9.50	7125
		Total	41.83	31375
		Gang Canal Total	73.50	55125
23	Bhakhra Canal	CSP KSD 45-55 RD (B/S)	6.67	5000
24	Bhakhra Canal	CSP KSD 55-65 RD (B/S)	6.67	5000

25	Bhakhra Canal	CSP KSD 65-75 RD (B/S)	6.67	5000
26	Bhakhra Canal	CSP KSD 75-85 RD (B/S)	6.67	5000
27	Bhakhra Canal	CSP KSD 85-96 RD (B/S)	6.67	5000
28	Bhakhra Canal	CSP KSD 96-109 RD (B/S)	6.67	5000
29	Bhakhra Canal	CSP KRW 30-46.5 RD (B/S)	11.33	8500
		Bhakhra Canal Total	51.35	38500
30	SDS	SDS 1 RJM I	25.00	15000
31	SDS	SDS 5 UDM	25.00	15000
		Total	50.00	30000
32	SDS	SDS 4 ND	25.00	15000
33	SDS	SDS 9 ND	25.00	15000
34	SDS	SDS 14 K	25.00	15000
35	SDS	SDS 22 AA-C	25.00	15000
36	SDS	SDS 156 RD	25.00	15000
37	SDS	SDS 4 MC	25.00	15000
		Total	150.00	90000
		SDS Total	200.00	120000
38	Campa	Campa DFL 2 SPM	3.20	2240
39		Gurunank Samriti Van	2.169	150
		Total	5.37	2390.00
		Grand Total	442.03	301890.00



Figure 14.3: SDS Plantation in Range Gharsana Division, Sri Ganganagar



Figure 14.4: BP Plantation in Range Birdhwal Division, Sri Ganganagar

Table 14.6: Distribution of plants under farm forestry for the year 2020-21

District	District Target		Division	Division Target		Division-wise Achievement							
	Area Covered under Public & forest lands	No. of seedlings in lakhs planted on public and forest land		Area Covered under Public & forest lands	No. of seedlings in lakhs planted on public and forest land (Number)	Pt. No.51(a) Area Covered under Public & forest lands		Area Covered under Public & forest lands (8+9)	No. of seedlings in lakhs planted on public and forest land (Number)				
						by Forest Dept.	by other Dept.		by planting saplings		by seeds sowing/cutting		Total
									by Forest Dept.	by other Dept.	by Forest Dept.	by other Dept.	by planting sowing/ cutting
	Ha.	No. in Lakhs		Ha.	No. in Lakhs	Ha.			No. in Lakhs		No. in Lakhs		No. in Lakhs
Sriganganagar	1093	7.1	SGNR	1093	7.1	442.03	189.9	631.93	3.0189	1.183	2.4	0	6.602

District Specific - Plantation through Ring-Pit method by NREGS funding

Having sandy soil and saline water, along with extreme temperatures in the district, it is not easy to grow vegetation in this region. To combat the adverse climatic conditions, the ring-pit technique has been used in the district to grow trees with excellent results. This technique provides an avenue for regular watering and protection from grazing.

A network of nurseries has been established to support the plantation drive in the district with a significant funding component from the NREGS scheme.

During the year 2020-21, two roadside work was covered under plantation by ring-pit method through NREGA funding, and around 1900 plants were planted with a survival rate of more than 90%.



Figure 14.3: Ring-pit plantation under MNREGA Scheme, Range Gharsana, Sriganganagar

Development of Urban Forests

Park has been developed Named as **Guru Nanak Samriti Van** to promote healthier lifestyle and environmental awareness as shown in **Figure 14.4**. It attracts many of visitors every year and acts as green lungs of the city.

Green spaces in form of Vriksh Kunj have been developed.

गुरु स्मृति वन



Figure 14.4: Guru Nanak Samriti Van, Raisingnagar, Dist. Sri Ganganagar
Forestry activities to increase environmental awareness among people

The Forest Department also organized time to time different awareness programs, a glimpse of these activities is shown in **Figure 14.5**.



Figure 14.5: Awareness programme, Sri Ganganagar

Forest Department and Water Conservation

One of the most important works done by the department is the construction of water bodies for water storage, groundwater recharge, and wildlife consumption with funds from the forest department and NREGS. During FY 2020-21, a total of eight water storage ponds were constructed by the forest department.

Road side Plantation

To develop a green belt along the national and state highways, the forest department takes up roadside plantation works, in consonance with National Forest Policy goals. During FY 2020-21, a total of 1900 plants were planted in a stretch of 12 km in the Sri Ganganagar district. A glimpse of these activities is shown in **Figure 14.6**.



Figure 14.6: Road side Plantation, Sri Ganganagar

Social Forestry - Plantations by Forest Department outside Forest Areas

The Forest Department has planted a total of 3,01,890 saplings in 439.87 hectares, and a total of 1,12,742 saplings have been distributed to farmers, village dwellers, government, non- government institutions, and others.

Activities carried out by Other Departments

Eco Club

Every year, on the occasion of Van Mahotsav, saplings are planted in the year 2020-21. They also adopt appropriate measures to conserve all the planted plants and to protect them from watering, hoeing, weeding, and cold. Works are being done by CO Scout Guides to spread awareness regarding eco-club for environmental awareness, seminar, sanitation campaign, public consciousness rally, eradication of polythene and non-use of plastic in polythene in cities. In addition, they do different activities every month, such as rallies, organizing different environment days, making and distributing free-of-cost clothes bags through competition, waste management, manufacture of compost manure, wildlife conservation campaign, and water conservation activities.

District Collector, Sri Ganganagar closely monitors the 18 targets given by the Honorable National Green Tribunal (NGT) to combat all kinds of pollution and promote sustainable development. In addition, the promotion of polythene / plastic eradication, tree plantation work, and environment development activities are being promoted in association with all the District Education Officers and the Eco Club.

However, there is a greater need to integrate the functioning of various departments, clubs with forest department work to have a long-term impact.

Future Action Plan

1. Afforestation activities to be taken up on non-forest land as well as city/town area

To increase green cover, afforestation should be carried out to increase the green cover and create harmony with nature. The area should be afforested with a variety of local saplings. This will help to have polyculture.

Keeping in view of these facts, this region has been afforested with a variety of local saplings. Afforestation activities will be proposed in the forest land as well as city/town area, and more **urban green spaces** will be developed.

2. Road side plantation

Roadside plantations will be carried out in the next ten years on National Highways, State Highways, Major District Roads (MDRs), Village roads in different schemes & will try to cover all roads in the district.

3. Soil & Water Management Zones to be Developed

- Adequate soil water conservation measures will be taken up in areas adjacent to habituated areas, and old water bodies will be restoring, and green belts will be developed around water bodies.
- New water harvesting structures at appropriate places will be constructed, and renovation of existing structures will be taken up so that rainwater harvesting is done in an effective manner.
- Artificial water holes/guzzlers will be provided wherever necessary.

Eco-System Services Centered Approach of Conservation

To shift the focus of forest development from courses of tangible goods like timber, grasses, fodder, etc., to provide invaluable intangible services like clean air, groundwater recharge, micro-climate regulation, temperature stabilization, and aesthetical value to the society. This would require dedicated study to ascertain the monetary value of forests in this arid region.

Issues

Issues that are to be considered while managing these forests and grasslands are summarized as under:

1. Land encroachment
 2. Grazing and fodder pressure from the villages
 3. Implications of the past management
 4. Lack of inventory on grasslands
 5. Spread of unpalatable grasses and weeds
-

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