UCR Project Concept Note & Monitoring Report (PCNMR)

Project Name: Rainwater Harvesting Project by SIIPL, Pune, India

PCNMR Version 1.0

UCR RoU Scope: RoU Scope 2

Date of PCNMR: 12/06/2023

1st RoU Crediting Period: 15/03/2017 to 31/12/2022 (05 years, 09 months)

1st RoU Monitoring Period: 15/03/2017 to 31/12/2022

UNDP Human Development Indicator: 0.645 (India)

National Water Security Index: 2 (India)

RoUs Generated During 1st Monitored Period: 1195057 RoUs

A.1 Location & Details of Project Activity

Title	Rainwater Harvesting Project by SIIPL, Pune India
Type and Scope of RoU Project Activity	Large Scale Project Type *Scope 2: Measures for conservation and storage of unutilized water for future requirements.* The project activity prioritizes and showcases best in class rainwater harvesting projects as a key corporate environmental intervention towards a more water secure India.
Address of Project Activity	SEZ Biotech Services Pvt Ltd Village: Manjri Taluka: Haveli
State	Maharashtra
District	Pune
Block Basin/Sub Basin/Watershed	Pune city is located in the North Bhima River Basin
Latitude & Longitude	Geo Tag: 18.514260, 73.960375 Latitude: 18°30'51.336"N, Longitude: 73° 57'37.35"E
Project Commissioning Date	15/03/2017
Catchment Area	Rainwater from the building terraces and ground runoff is harvested over 190,000 m^2 in total catchment area.
SDG Impacts	1 – SDG 1 No Poverty 2 – SDG 3 Good health and well being 3 – SDG 6 Ensure access to water and sanitation for all 4 – SDG 8 Decent work and economic growth 5 – SDG 13 Climate Action 6 – SDG 17 Partnerships for the goals
Climatic Conditions	Annual Mean Maximum Temperature: 39°C Annual Mean Minimum Temperature: 12°C Annual Mean Maximum Rainfall: 722 mm
Predominant Hydro-Geological Formations	Hydrogeology of the entire area of the district is underlain by the basaltic lava flows of upper Cretaceous to lower Eocene age. The shallow alluvial formation of recent age also occurs as narrow stretch along the major rivers flowing in the area.

Calculated RoUs per year	**Year**	**RoUs (1000 litres) /yr**
	2017	207903
	2018	152077
	2019	292761
	2020	211197
	2021	171228
	2022	159891
	Total	1195057

A.2. Project owner information, key roles and responsibilities

Project Proponent (PP):	**Project Owner**: Serum Institute of India Pvt Ltd (SIIPL), Pune, Maharashtra
UCR Project Aggregator	**Aggregator**: Egis India Consulting Engineers Pvt Ltd **UCR ID**: 467947294
Contact Information:	Email: sneha.k@egis-india.com
Date PCNMR Prepared	12/06/2023
External Links and Reports	Chapter 32 Trend Assessment of Rainfall Over Mumbai and Pune Cities Garv Saini, P. Jagadeesh, and G. Saikumar, Nov. 2022

A.2.1 Purpose of the project activity:

Serum Institute of India Pvt Ltd (SIIPL), the project proponent (PP), is an Indian biotechnology and biopharmaceuticals company founded in 1966 and since then it has established itself as the world's largest manufacturer of vaccines.

The project, **Rainwater Harvesting Project by SIIPL, Pune India** is located at Village: Manjri, District: Pune, State: Maharashtra, Country: India. The project activity by the PP, is the installation and operation of rooftop rainwater and ground surface runoff harvesting and storage systems that helps conserve unutilized water (rainwater) for future requirements.

Between 2017 and 2022, the project activity has harvested 1195 million litres of rain water runoff successfully with gainful end use of the same. The PP highlights the catalytic role that corporate India must play in reducing industrial water consumption by showcasing measures to **create safe drinking water from an unutilized water resource.** In 2017, the PP initiated an expansion of its manufacturing facility that resulted in an additional water requirement for the entire facility in Pune.

In the absence of the project activity, the options available were to use the local drinking water resources or deep borewells which would consume the areas groundwater resources, however, the PP opted to use the unutilized rainwater which would have discharged into the local canals and river systems outside the project boundary. Rainwater from the PPs corporate office building rooftops and ground surfaces serve as catchment surfaces to redirect the flow of rainwater to storage tanks within the project boundary for captive water requirements.

The project activity is an example of local stakeholders, especially corporates to reconnect and build positive sustainable water conservation actions. For any vaccine production, water is the most widely used substance, raw material or starting material in the production, processing and formulation of pharmaceutical products. As the neighboring areas to the project activity are residential, the PP did not want to reduce the drinking water level by diverting huge quantities of water daily either through bore wells or other local drinking water resources from the state water regulator- Pune Municipal Corporation (PMC). Further, the digging of numerous bore wells in the absence of the project activity would have also created acute ground water shortage for the local residents of Hadapsar, Pune.

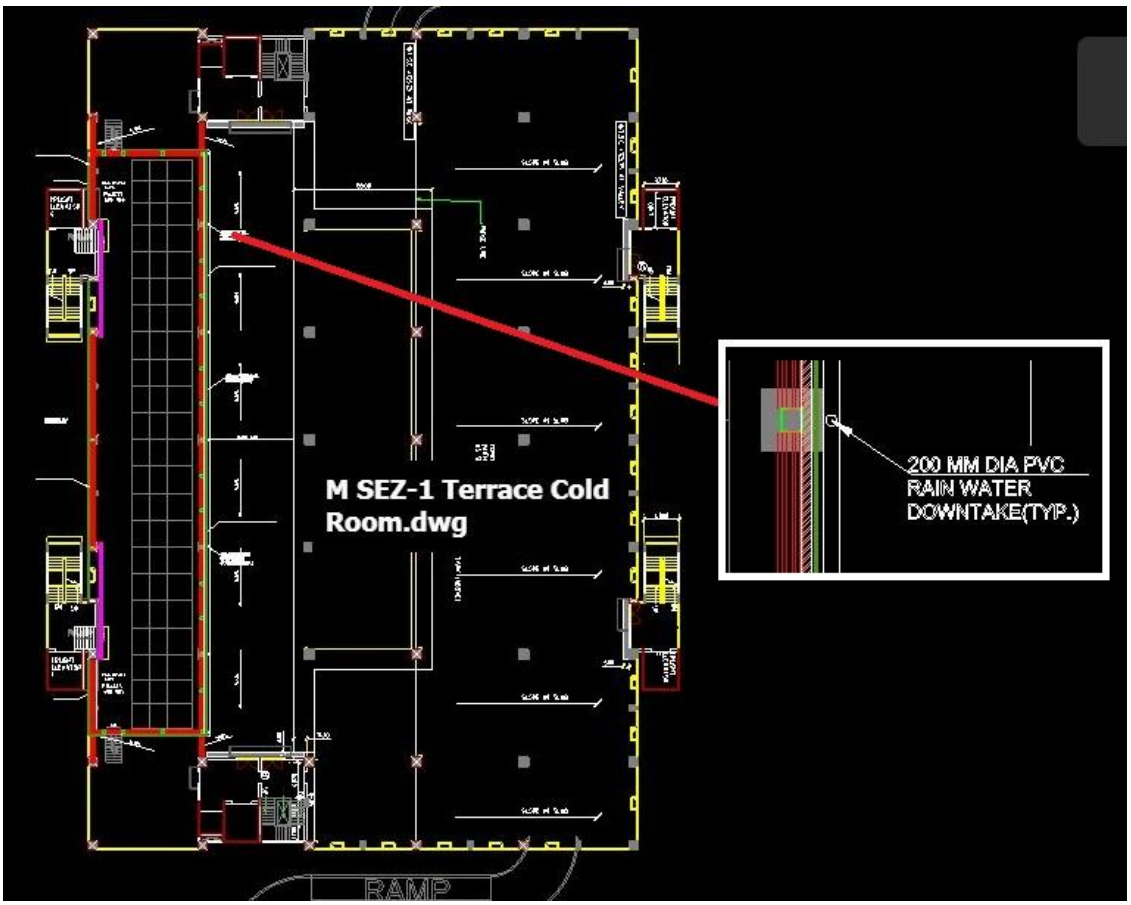
Hence the project activity is pre-approved under the UCR RoU program for the following scope:

- *Scope 2: Measures for conservation and storage of unutilized water for future requirements*

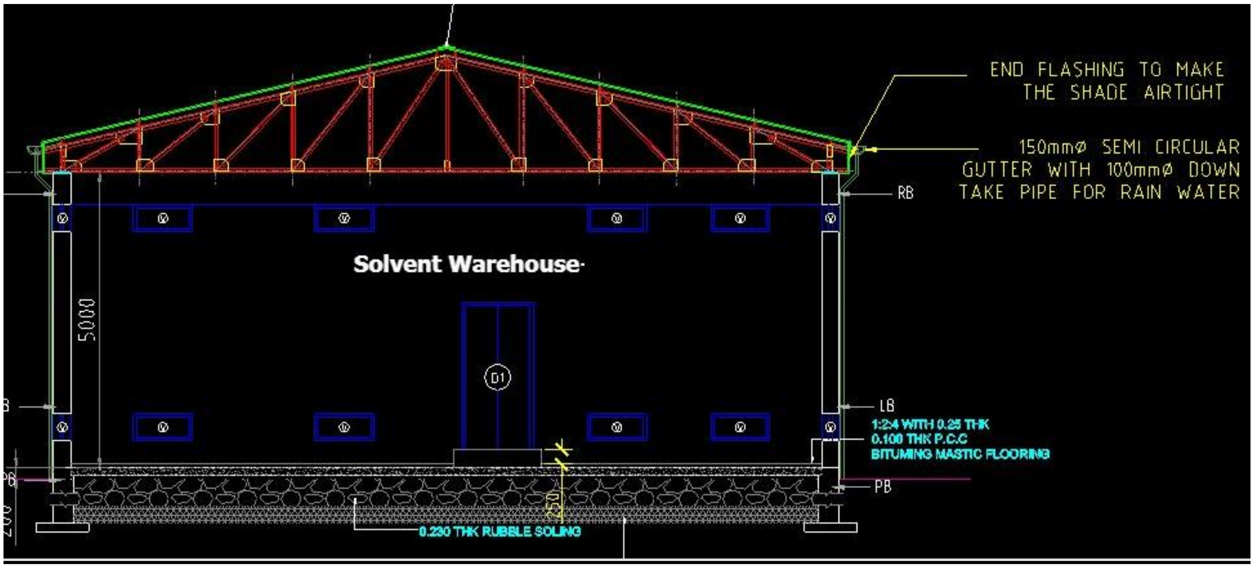
A few basic elements are common to all rainwater harvesting (RWH) systems

1. The catchment area, where the rain falls
2. The conveyance, or conduit, system that channels the flow of water in a given direction.
3. The storage area, consisting of tanks/receptacles

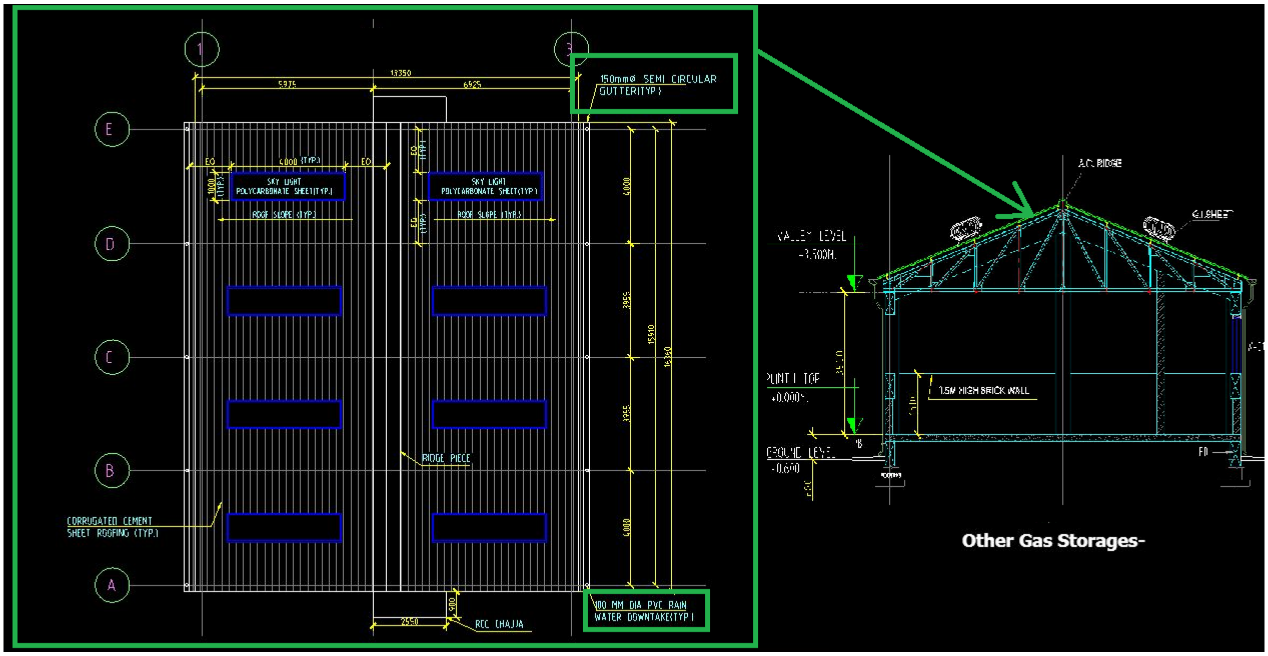
A.2.2 Description of Catchment Buildings/Collection Points/ Rainwater Piping Systems:



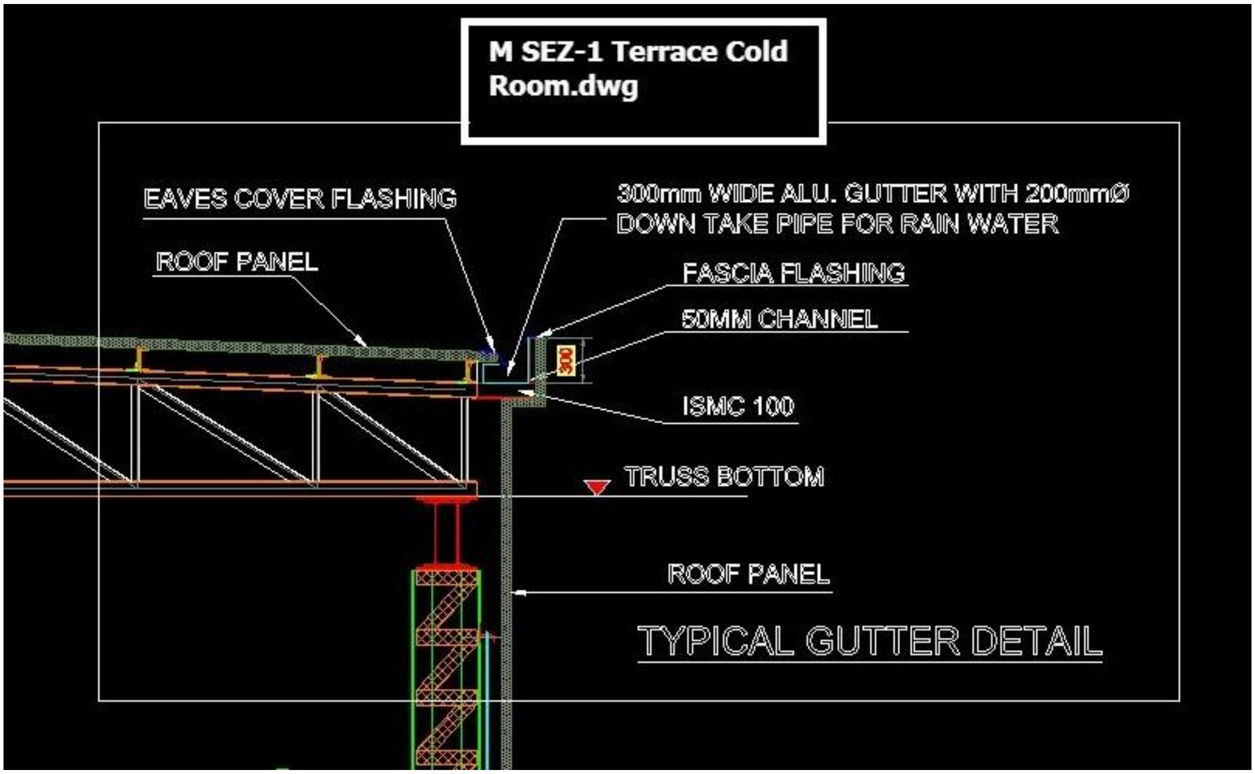
Rainwater Collection Piping System for M SEZ 1 terrace



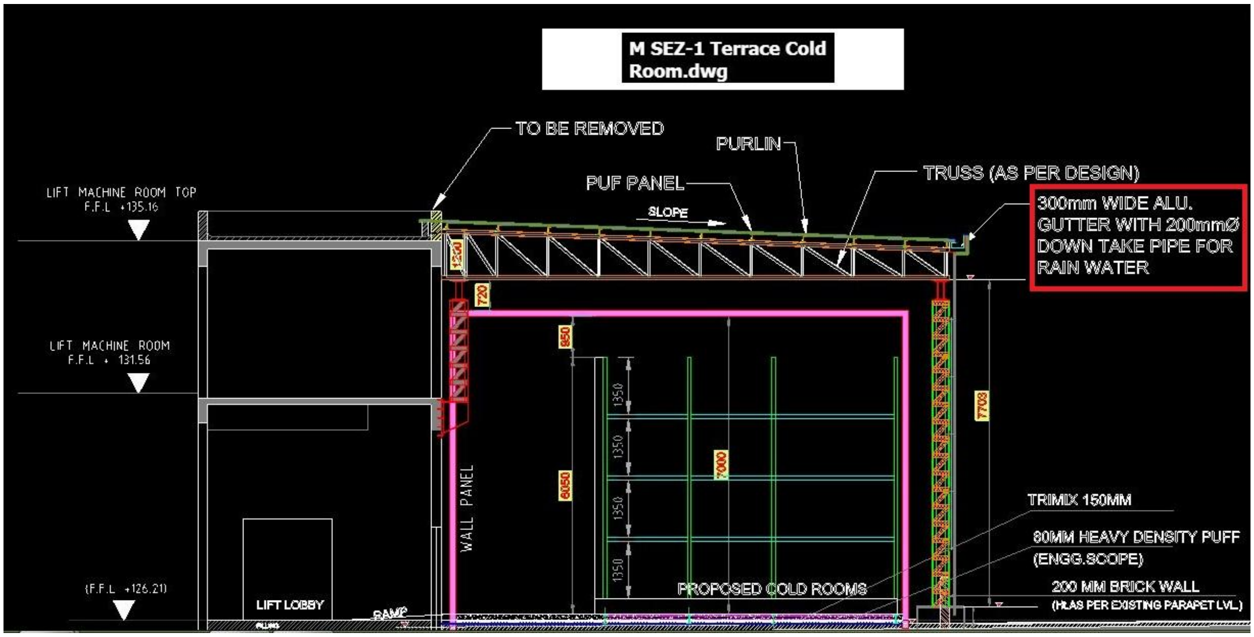
Rainwater Collection Piping/Gutter System for Solvent Warehouse terrace



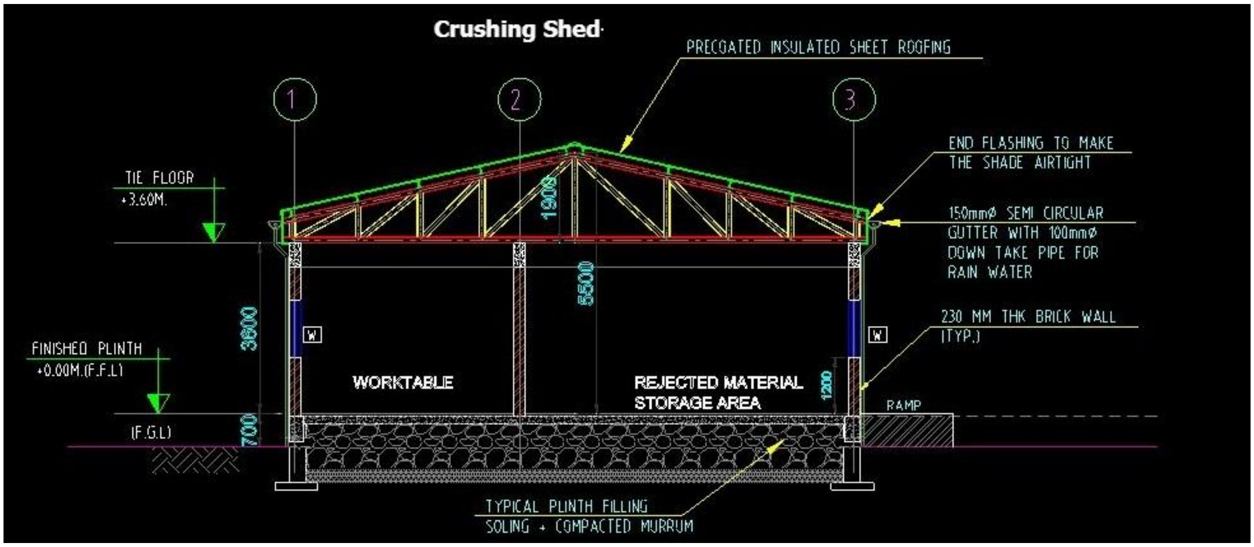
Rainwater Collection Piping/Gutter System for Other Gas Warehouse terrace



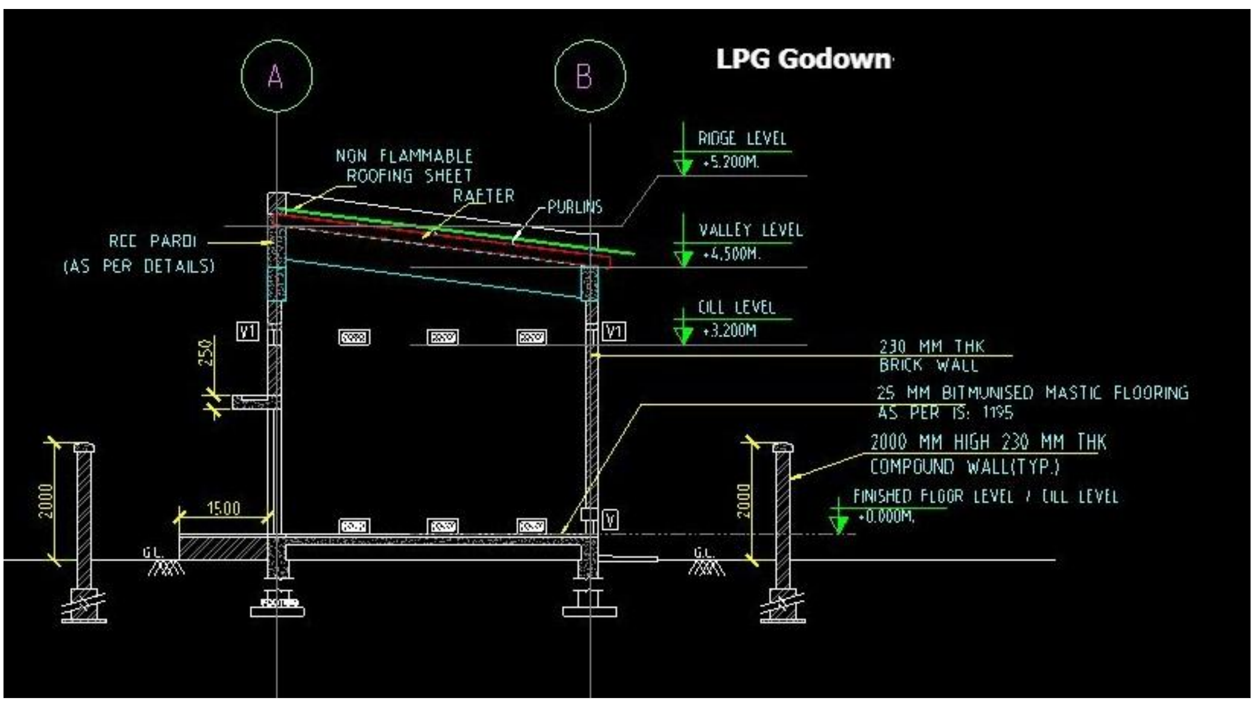
Rainwater Collection Piping/Gutter System for M SEZ-1 terrace



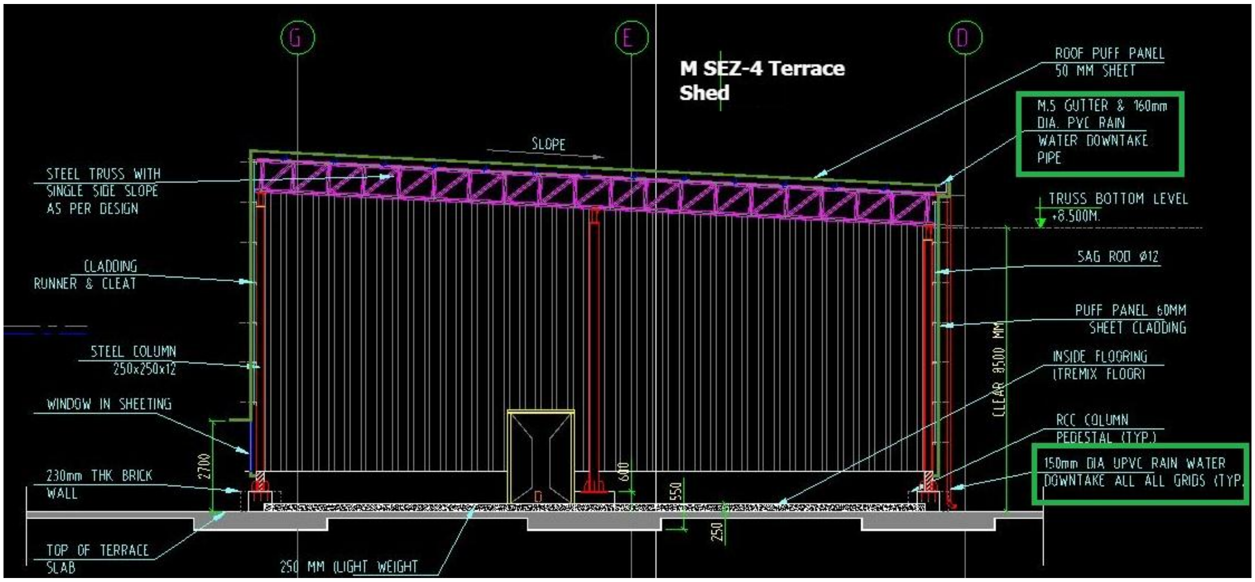
Rainwater Collection Piping/Gutter System for M SEZ-1 terrace



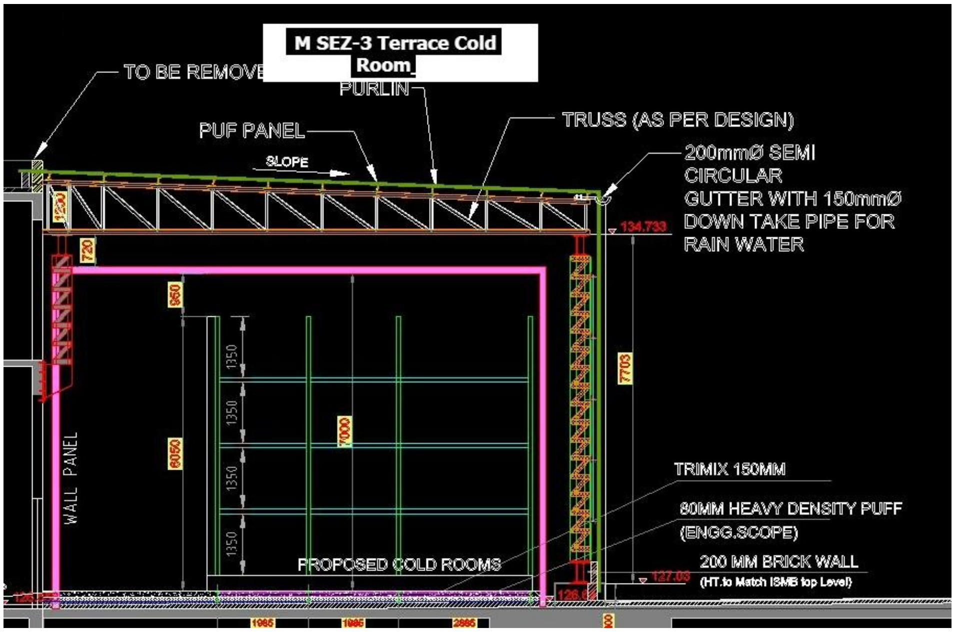
Rainwater Collection Piping/Gutter System for M SEZ-1 terrace



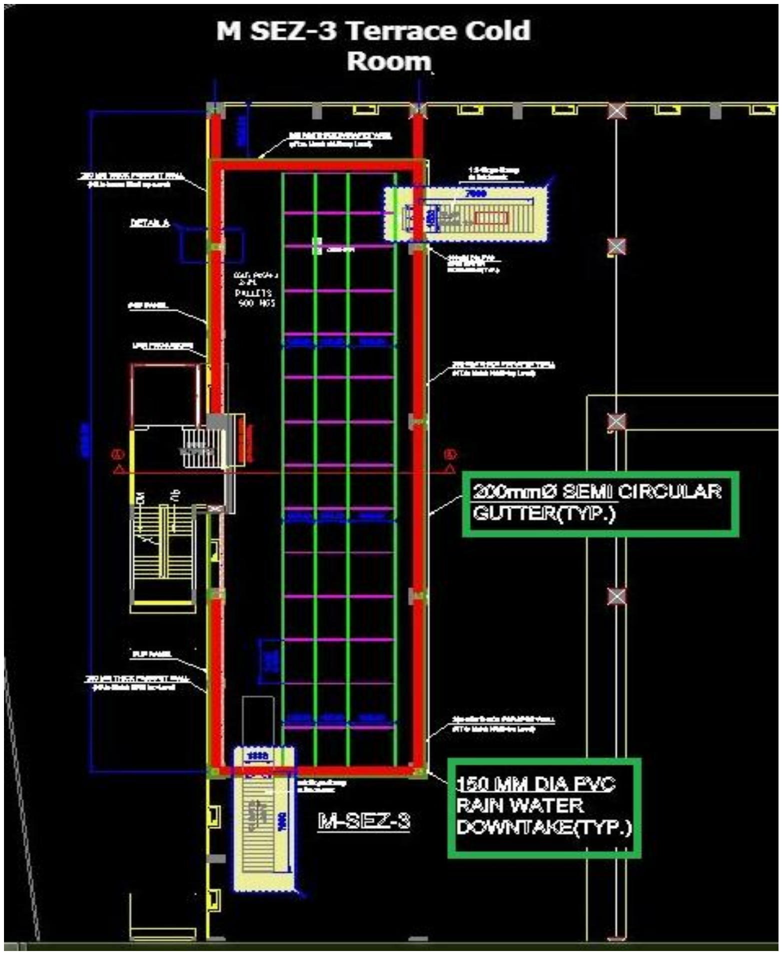
Rainwater Collection Sloping Roof LPG Godown



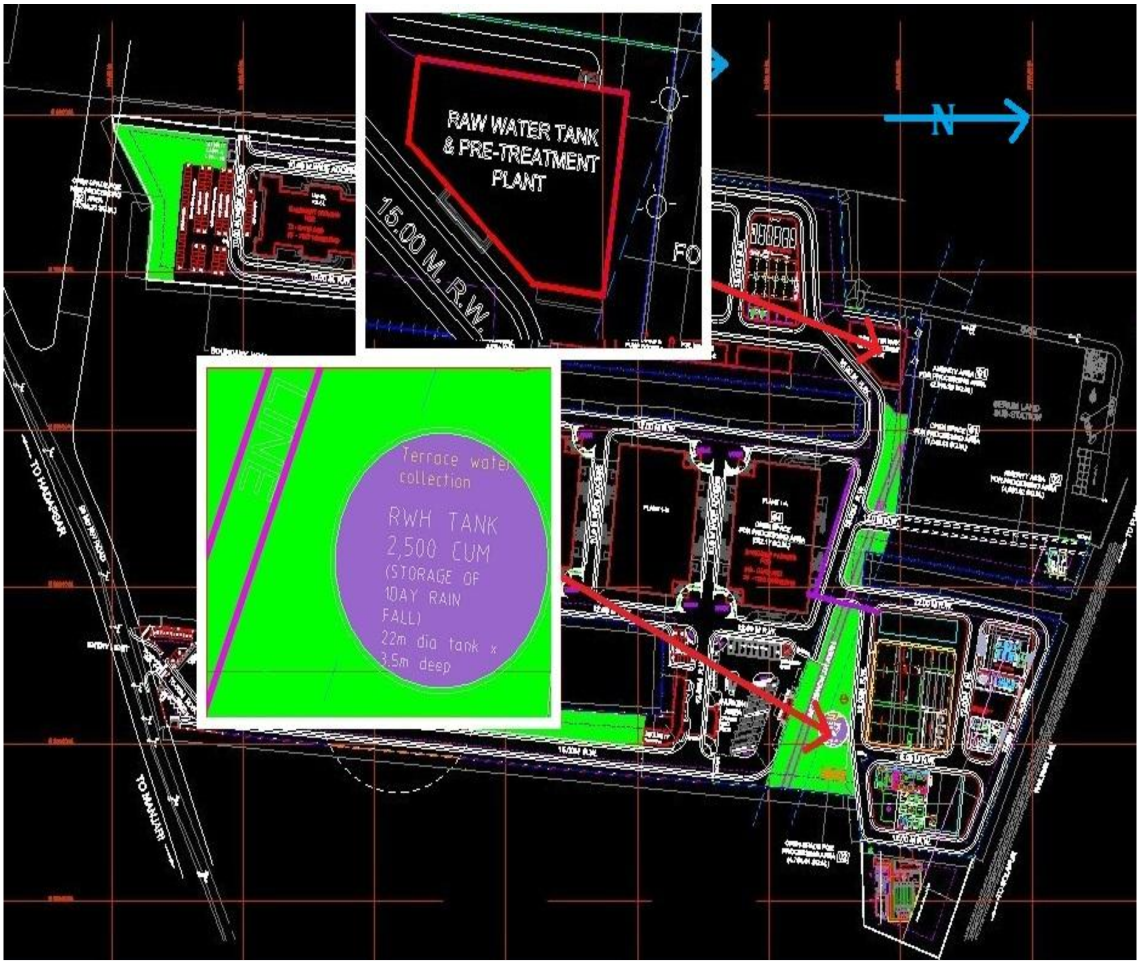
Rainwater Collection Piping/Gutter System for M SEZ-4 terrace



Rainwater Collection Piping/Gutter System for M SEZ-3 Cold Room terrace



Rainwater Collection Points/Gutter System for M SEZ-3 Cold Room terrace



<u>**Location of RWH Collection Tanks and Raw water Collection Tank for Overflow**</u>

S J CONTRACTS PVT LTD

Dt- 20/03/2017

To,

M/S SEZ Biotech Service Pvt. Ltd,

Poonawalla Biotech Park, SEZ,

At Manjari BK Taluka:-Haveli,

Dist Pune ,

India .

Project: -Proposed Construction Of Storm Water Tank & Terrace Water Collection Tank At Manjari Sez.

Subject: - Completion & handing Proposed construction of storm water tank & terrace water collection tank AT MANJARI SEZ

Respected Sir,

With respect to above subject, we would like to inform you that we have completed above mentioned project on 15th March 2017 with all activities up to your satisfaction as mentioned in tender documents as well as instructed by you on site time to time.

We are herewith handing over above-mentioned project for your further installation works, further we will not be responsible for the damages done by other agencies.

always Thanking you and assuring you best service all times.

Yours truly,

S.J. CONTRACTS PVT. LTD.

Authorized Signatory

S. J. Contracts Pvt, Ltd.

Commissioning of two (2) rainwater storage tanks in 2017

Building Trust

M/s. A. S. Ropalekar

Engineers & Contractors

Project Management Consultants

11, 'Arvind Enclave', Sr.No. 24, Plot No.42,43,44,
Near Moze College, Opp. Arogya Hospital,
Balewadi, Pune - 411045.
Mob. : 9764827221 / 9158885741
E-mail : asropalekar@gmail.com
admin@asrcon.com

To,

Date :- 21/05/2021

M/S SEZ Biotech Services Pvt. Ltd.

Poonawalla Biotech Park, SEZ,

At Manjari BK Toluca:- Haveli,

Dist Pune,

India.

Project :- Proposed Construction of Rain Water Collection Tank At MANJARI SEZ.

Subject:- Completion & handing Proposed Construction of Rain Water Collection Tank At MANJARI SEZ.

Kind Attn :- Mr. Rohit Shinde Sir,

Respected Sir,

With Respect to above subject, we would like to inform you that we have completed above mentioned project on 15 May 2021 with all activities upto your satisfaction as mentioned in tender documents as well as instructed by you on site time to time.

We are herewith handing over above mentioned project for your further installation works, Further we will not responsible for the damages done by other agencies.

Work Order No. :- Ref No.:-SBSPL/MANJARI/CIVIL/21

Work Order Date :- 10th June, 2020 **Work Start Date** :- 1 July 2020

Work End Date :- 15 May 2021 **Work Period** :- 10 Months, 15 Days.

Thanking you & assuring you best service at all time.

Yours truly,

For M/s A. S. Ropalekar

Authorized Signatory

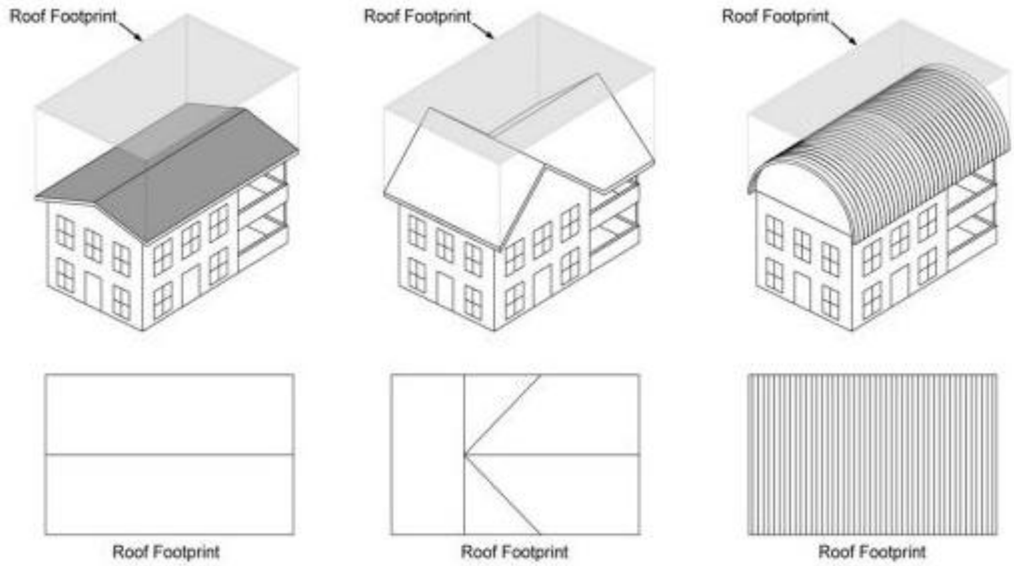
Commissioning of one (1) rainwater storage tank in 2021

Project Capacity (MLD / Cubic Meter)	06 MLD (02 MLD or 2000 m^3 each)
Name of Tank (Commissioning Date)	Rainwater Harvesting Tank-1 (15/03/2017), Rainwater Harvesting Tank-2 (15/03/2017), Rainwater Harvesting Tank-3 (15/05/2021)

2000 m3 Rainwater Collection Tanks

Catchment Area:

For the Roof Top Rain Water Harvesting systems, the catchment area is the total roof surface. The effective area of the roof surface used for computing volume of water captured for harvesting is called the roof foot print or roof catchment area. For horizontal rectangular or other shapes, the roof foot print is considered same as the plain roof and thus the effective area is the same. Followings are the example of other commonly available roof types and their corresponding roof foot print.



Rain runoff depends upon the area and type of the catchment over which it falls as well as surface features. For example, normal concrete roof and ground surfaces have the highest run off value than the area with heavy vegetation. The amount of rainfall contributing to the runoff of a given area must be known. The runoff coefficient is the value that represents the ratio of the volume of water that runs off a surface to the volume of rainfall that falls on the surface.

There are many parts of the hydrologic cycle that affect the runoff coefficient. For the project activity interception, infiltration and soil types are not applicable. The run-off coefficient depends on roof and ground type, slope, soil type, land use, degree of imperviousness, surface roughness and duration and intensity of rainfall.

In 2017, the PP initiated an expansion of its manufacturing facility that resulted in an additional water requirement for the entire facility in Pune. The options available were the local drinking water resources or deep borewells which would consume the areas groundwater resources, however, the PP opted to use the unutilized rainwater runoff for captive usage.

The project activity prioritizes and showcases large scale rainwater runoff harvesting techniques along with the reuse of the harvested water for captive industrial use as a key corporate environmental intervention towards a more water secure India. The key disadvantages of such systems are the operational process complexity and the cost for installation, hence the PP hopes that the sale of RoUs from this project activity will offset the installation costs and help make such projects viable for the industrial sector.

A.3 UCR RoU Scope & Project Details

UCR RoU Scope 2	*Measures for conservation and storage of unutilized water for future requirements.*

The PP initiated an expansion of its manufacturing facility in 2017, which resulted in an additional water requirement for the plants operated by the PP. Being the world's largest vaccine manufacturer and socially responsible corporate with excellent ESG credentials, the PP decided not to consume/burden the city's existing clean drinking water resources or construct deep bore wells to further deplete the surrounding groundwater aquifers, but instead opted to voluntarily capture and treat rainwater runoff from the warehouse, shed and building rooftops within the project boundary for its in-house water requirements.

The project, **Rainwater Harvesting Project by SIIPL, Pune, India** is located at Village: Manjri, Tehsil: Haveli, District: Pune, State: Maharashtra, Country: India. The project activity is the rooftop rainwater and ground surface runoff harvesting measures involving the collection and storage of the collected runoff in three (3) water storage tanks of 2000 m3 capacity each with runoff storage overflow from the tanks being diverted to raw water holding tanks. Hence the total installed capacity of the project activity is six (6) MLD. In the absence of the project activity, the PP would have installed bore wells that would have depleted the local groundwater resources and/or continued to use existing drinking water resources in the surrounding area.

The PPs daily water requirement is as follows:

Activity	Water Requirement (KL/d)
Potable water (for further purification)	2000
Cooling Tower	1800
Boiler	500
Domestic Use (washrooms, canteen, drinking)	150
Gardening	600
Total	**5050 KL/d (~5MLD)**

The harvested rainwater runoff is further purified through Ultrafiltration + Reverse Osmosis + UV to generate safe drinking water. This potable water complies with all national and international standards like USEPA/WHO/BIS-10500.

The project activity achieves the following key water and sanitation related Sustainable Development Goals under the United Nation (UN-SDGDs):

- ensures universal and equitable access to safe and affordable drinking water for all by 2030,
- substantially increases water-use efficiency across all sectors and ensures sustainable withdrawals and supply of freshwater to address water scarcity and reduces water stress impact on people likely to suffer from water scarcity by 2030, and;
- expands capacity-building support within India in water and rainfall harvesting related activities and programs, including water efficiency, wastewater treatment, recycling and reuse technologies by 2030.

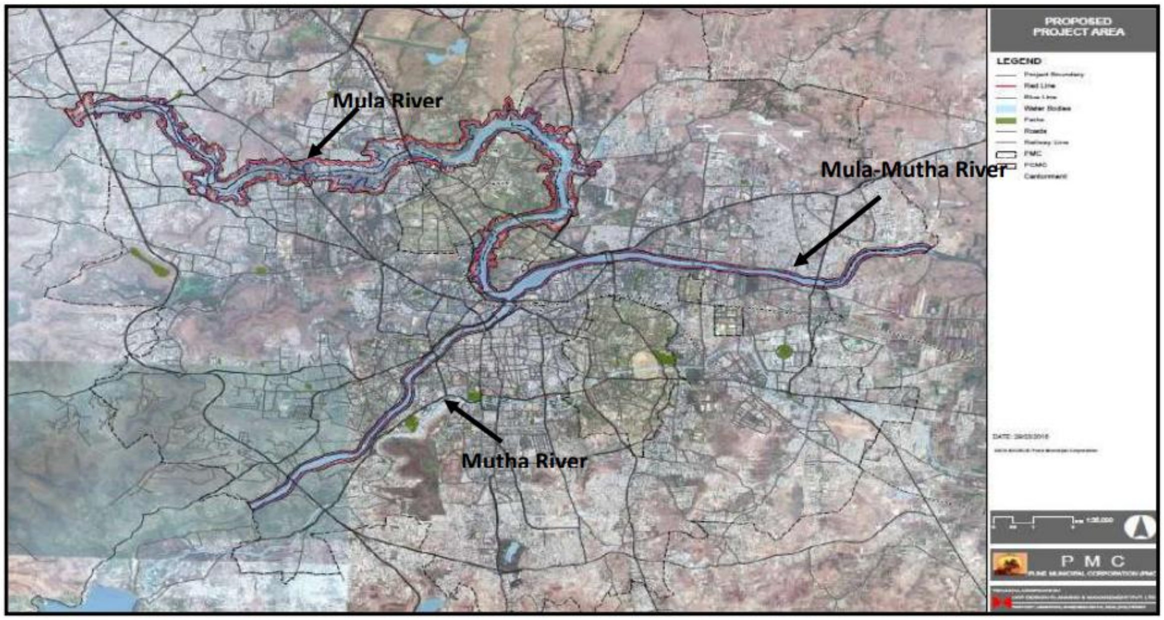
Climatic Conditions:

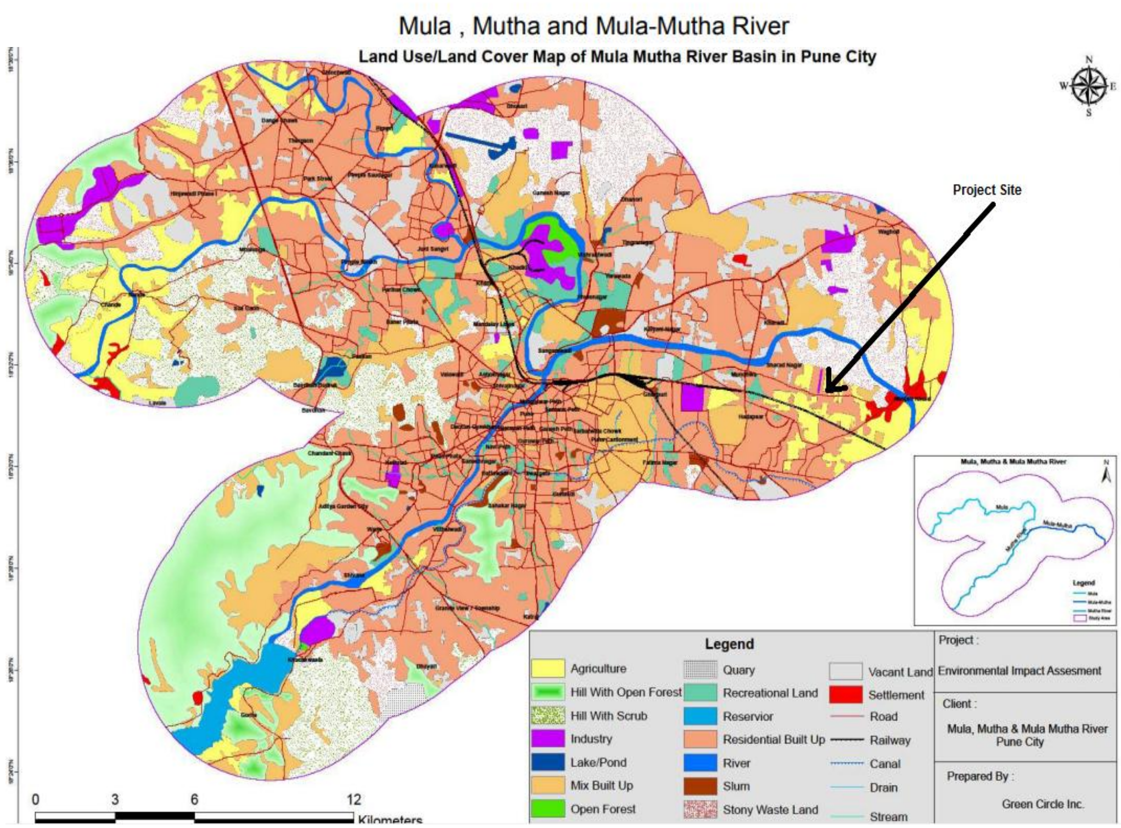
The climate of Pune has changed during the past 3 decades, especially since the rapid expansion of the industrial belts. Pune has a hot semi-arid climate (BSh) bordering with tropical wet and dry (Aw) with average temperatures ranging between 19 to 33 C.

Pune experiences three seasons: summer, monsoon, and winter. Typical summer months are from March to June often extending till 15 June, with maximum temperatures sometimes reaching 42 C. The warmest month in Pune is between 20 April and 20 May; although summer doesn't end until May, the city often receives heavy dusty winds in May (and humidity remains high). Even during the hottest months, the nights are usually cool due to Pune's high altitude.

The highest temperature ever recorded was 43.3°C on 30 April 1897. The monsoon lasts from June to October, with moderate rainfall and temperatures ranging from 22 to 28°C. Most of the 722 mm (28.43 in) of annual rainfall in the city falls between June and September, and July is the wettest month of the year. Hailstorms are not unheard of in this region. Winter traditionally begins in November; November in particular is referred to as the Rosy Cold (literal translation) (Marathi: गुलाबी थंडी) which can be experienced typically during the festive season of Diwali. The daytime temperature hovers around 26 C while night temperature is below 9°C for most of December and January, often dropping to 5 to 6 C. The lowest temperature ever recorded was 1.7 C on 17 January 1935 (source: https://www.pmc.gov.in/en/pune-weather-0)

A.4. Land use and Drainage Pattern





LAND USE & GEOLOGY

Pune is the second largest district of Maharashtra State in respect of area. The district has a geographical area of 15642 sq.km which is 5.08% of the total area of State. It is situated in the western part of the State and lies between north latitude 17°54’ and 19°24’ and east longitudes 73°29’ and 75°10’. The population of the district is 3124458 as per 2011 census with density of 462 persons/sq.km.

There are 25 towns and 1866 villages in the district, out of which 18 villages are not habited. The district has 13 Panchayat Samitis, 11 Nagar Parishads, 2 Municipal Corporation and 1407 Gram Panchayats. The district has an area of 1720 sq.km occupied by forest. The gross cultivable area of district is 10150 sq.km whereas net sown area is 9920 sq.km.

The land use & land cover (LULC) classification consists of

- Reservoir (1.05%),
- River (8.05%),
- Hill with Scrub (7.87%),
- Hill with Open Forest (9.44%),
- Village Settlement (0.52%),
- Agriculture (7.90%),
- Open Forest (0.28%),
- Slum (0.68%),
- Residential Built up (37.82%),
- Recreational Land (2.80%), etc.

The subsurface comprises of mainly three horizons -

• Stratum 1 This overburden stratum consists mainly of alluvial and residual soils. This stratum is superficial and has thickness of about 0.5 to 2.5m. The thickness of over burden increases and reaches up to about 5m at certain locations. Soils are typically saturated. The general consistency of the soil is soft becoming stiff towards depth.

• Stratum 2 This consists of moderate to highly weathered and fractured rock with soil infilling. This stratum does not exist all over Pune, but at random locations.

• **Stratum 3** This stratum consists of moderate to slightly weathered, moderately weak to moderately strong and massive Amygdaloidal Basalt.

PHYSIOGRAPHY

The district of Pune forms part of Western Ghat and Deccan Plateau. Physio-graphically the district can be divided in to three distinct belts i.e.

- (1) The western belt stretching from 16 to 31 km east of Sahayadri- an extremely rugged country cut by deep valleys, divided and crossed by hill ranges.
- (2) The central belt extending for about 30 km east of western belt across the tract whose eastern belt is roughly marked by a line drawn from Pabal in the north to south up to Purandhar through Pune. In this belt a series of small hills stretch in to valleys and large spurs from Plateaux and
- (3) The eastern belt with a rolling topography and low hills sinking slowly in to the plains with relatively broader valleys.

Therefore, the physiography of the district has given rise to four major characteristic land forms namely;

- (1) The hills and Ghats
- (2) The foot hills
- (3) The plateau and
- (4) The plains.

The district has three major drainage systems namely (i) The Bhima River System in northern, northeastern and eastern part of which Bhima River has a total length of about 355 km and Ghod river has a drainage of about 196 km. (ii) Mula-Mutha River System covering the central part and having total length of 242 km in the district. (iii) Nira River system covering south, south-east and eastern part and has total length of about 231 km in the district. The other Important rivers that are flowing through the district are Bhima, Andhra, Karna, Shivganga, Pushpavati, Pawane and Indrayani. All the rivers have mostly semi-dendritic drainage pattern and the drainage density is quite high. Based on geomorphological setting and drainage pattern the district is divided into 71 watersheds.

HYDROGEOLOGY

Hydrogeology of the entire area of the district is underlain by the basaltic lava flows of upper Cretaceous to lower Eocene age. The shallow alluvial formation of recent age also occurs as narrow stretch along the major rivers flowing in the area.

Deccan Trap Basalt: Basaltic lava flows occupies more than 95% of the area of the district. These flows are normally horizontally disposed over a wide stretch and give rise to table land type of topography also known a plateau. These flows occur in layered sequences ranging in thickness from 7 to 45 m and represented by massive unit at the bottom and vesicular unit at the top of the flow. These flows are separated from each other by marker bed known as ‘bole bed’. The water bearing properties of these flows depend upon the intensity of weathering, fracturing and jointing which provides availability of open space within the 8 rock for storage and movement of ground water. The thickness of weathering in the district varies widely up to 20 m bgl. However, the weathered and fractured trap occurring in topographic lows forms the potential aquifer in the district. The ground water in the district occurs under phreatic, semi – confined and confined conditions.

Generally the shallower zones down to the depth of 20 to 22 m bgl form the phreatic aquifer. The water bearing zones occurring between the depth 20 and 40 m bgl when weathered or having shear zones yield water under semi-confined condition. The deep confined aquifers generally occur below the depth of 40 m bgl. The vesicular unit of lava flow when exposed or lying just few meters below the surface forms a potential aquifer in the district. However, the vesicular portion of different lava flows varies in thickness from few m to 10 m and nature and density of vesicles, their distribution, interconnection and weathering are the decisive factors for occurrence and movement of water in these units. The massive portions of basaltic flows are normally devoid of water, but when it is weathered, fractured and jointed forms potential aquifer. In Deccan Trap Basalt, the yield of the dug wells in different formations ranges from 30 to 150 lpm/day depending upon the local hydrogeological conditions. The yields of borewells also show wide variations and it ranges from traces to 30.62 lps (Lavle) a seen from CGWB exploration data.

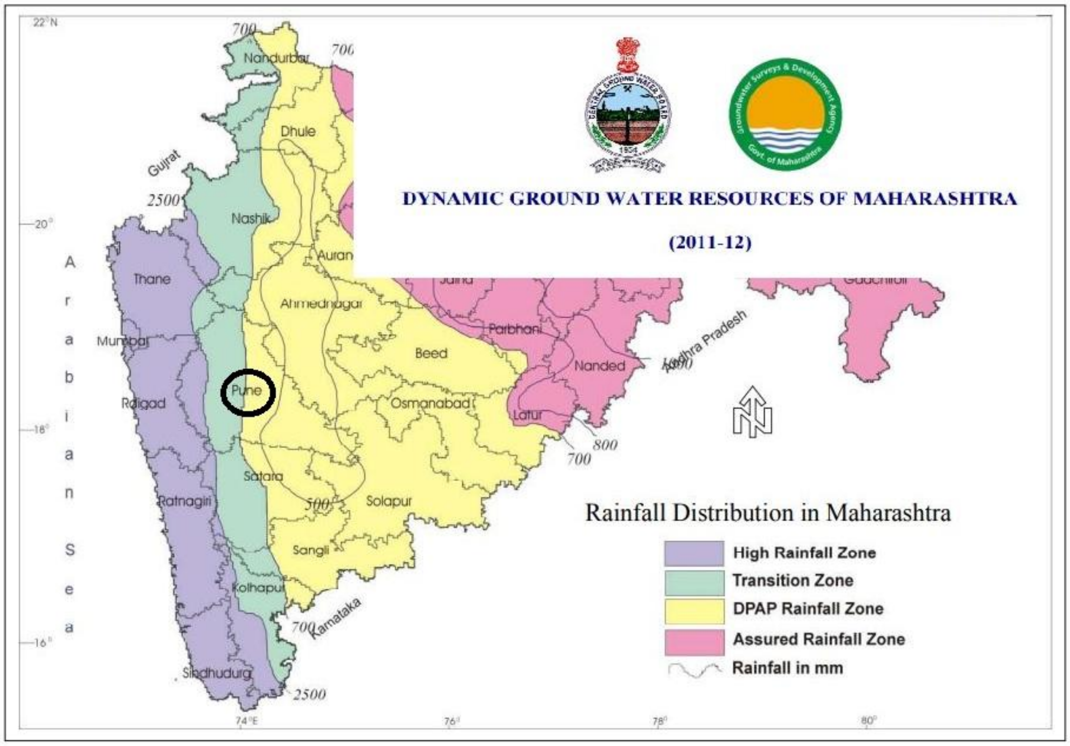
Alluvium: Alluvium occurs in small areas along banks and flood plains of major rivers like Bhima, Ghod, Mula, Mutha and their tributaries. In alluvium the granular detrital material like sand and gravel usually occurring as thin layer in the district yields water. But due to its limited extent the ground water potential in this formation is negligible.

In general it can be said that after about 1.5 to 2m from bed level rocky stratum is encountered.

WATER LEVEL

Shallow water level of less than 2 mbgl is reported in almost entire western part, in central part and in southeastern part of the district. In a major part of the district in central, northern and southern parts, the water level occurs between 2 to 5 m bgl. Deeper water levels of more than 10 m bgl are restricted in extreme northern parts of the district.

A.5. Rainfall and Recharge



Rainfall Distribution Map

(High Rainfall : 2000 to 3500 mm DPAP Area : 400 to 700 mm Assured Rainfall : 800 to 1250 mm)

Monthly rainfall data of Pune cities from 2000 to 2020 were analyzed, while annual and seasonal rainfall are statistically analyzed and available for research.

The outcomes are as follows:

- In Pune, the average annual rainfall is 1700.89 mm.
- The southwest monsoon has contributed the most, accounting for 89.9 percent in Pune.
- In Pune, a rising tendency has been noted in the annual period, non-monsoon, southwest monsoon, and northeast monsoon. However, a diminishing tendency has been noted throughout the pre-monsoon season.

- The annual rise in Pune is 40.08 mm/year in the S-W monsoon season, followed by a 5.76 mm/year increase in the N-E monsoon season and a 0.28 mm/year increase in the non-monsoon season.

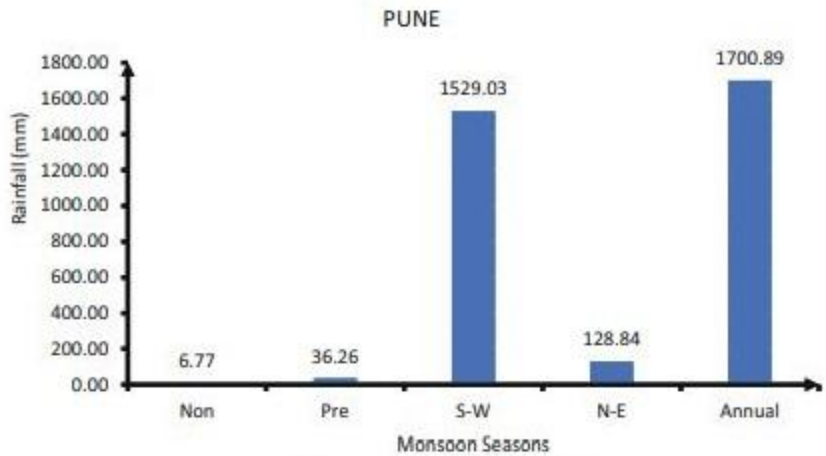
- During the pre-monsoon season, there was a 1.40 mm/year decline. A rise of 46.21 mm/year has been noted on a yearly basis. The dependable rainfall (90% or 75%) varies widely between the months and it is the highest in the southwest monsoon season. These values slightly decrease in the following months during northeast monsoon season. Thereafter, the rainfall reduces drastically and 90% and 75% rainfall are almost nil for non-monsoon and pre-monsoon season. Thus, this shows the need for very careful planning in the design of water related schemes for drinking, irrigation or industry. This also highlights the need for creation of storage to meet the demand in these months, such as the activities undertaken by the PP.

DYNAMIC GROUND WATER RESOURCES OF MAHARASHTRA

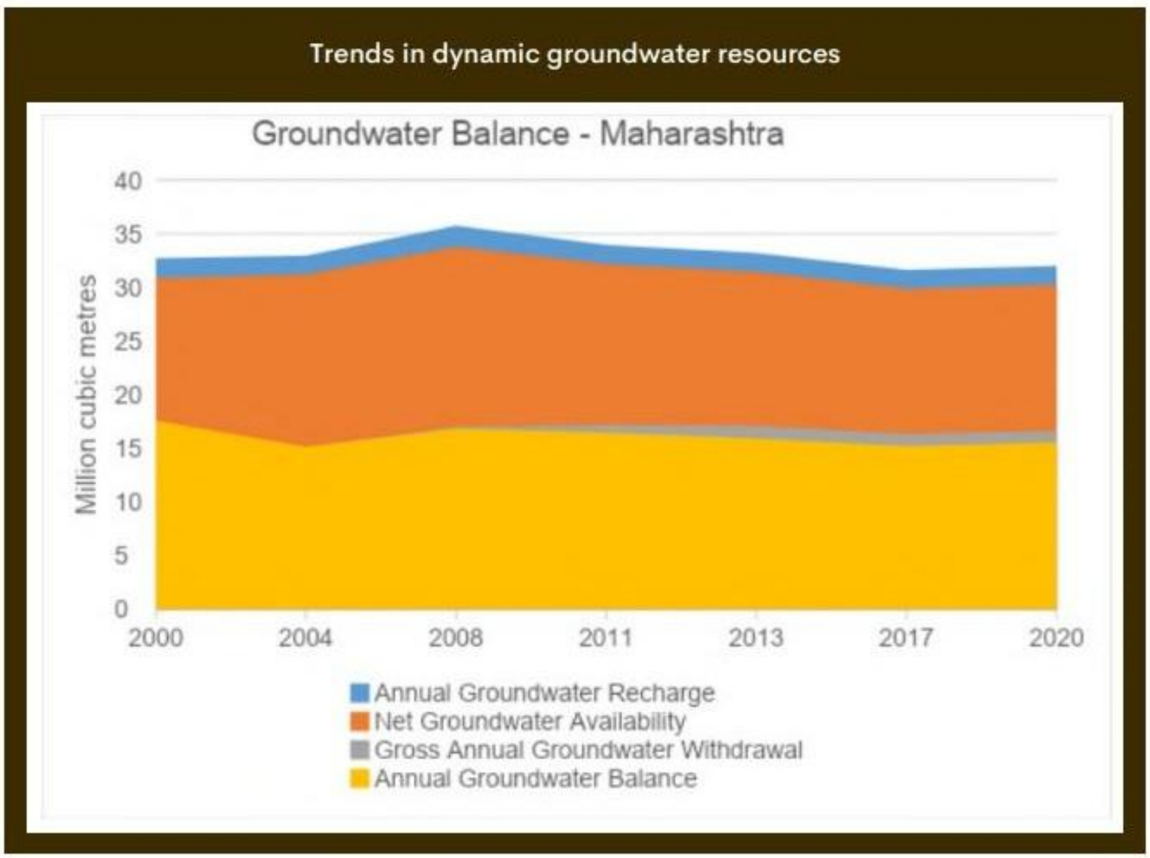
(2011-12)

Sr No.	District	Administrative Unit	Command / Non-Command / Total	Recharge from rainfall during monsoon season	Recharge from other sources during monsoon season	Recharge from rainfall during non-monsoon season	Recharge from other sources during non-monsoon season	Total Annual Ground Water Recharge (4+5+6+7)	Provision for Natural Discharges	Net Annual Ground Water Availability (8-9)
1		2	3	4	5	6	7	8	9	10
705	Pune	Daund	Total	7023.81	1234.42	644.49	7202.70	16105.41	805.27	15300.14
706	Pune	Haveli	Command	1091.25	306.66	0.00	1238.23	2636.14	131.81	2504.33
707	Pune	Haveli	Non Command	8028.84	417.87	0.00	3039.06	11485.77	574.29	10911.48
708	Pune	Haveli	Total	9120.09	724.53	0.00	4277.29	14121.91	706.10	13415.81
709	Pune	Indapur	Command	5751.62	2746.18	9.14	13316.27	21823.20	1091.16	20732.04
710	Pune	Indapur	Non Command	2789.17	317.84	10.99	2630.79	5748.79	287.44	5461.35
711	Pune	Indapur	Total	8540.79	3064.02	20.13	15947.06	27572.00	1378.60	26193.40

Groundwater Recharge Potential (ham)



Mean annual rainfall data of Pune



DYNAMIC GROUND WATER RESOURCES OF MAHARASHTRA

(2011-12)

Sr No.	District	Administrative Unit	Command / Non-Command / Total	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for irrigation	Existing Gross Ground Water Draft for domestic and industrial water supply	Existing Gross Ground Water Draft for All uses (11+12)	Provision for domestic and industrial requirement supply to 2025	Net Ground Water Availability for future irrigation development (10-11-14)	Stage of Ground Water Development {13/10 * 100}%
1		2	3	10	11	12	13	14	15	16
704	Pune	Daund	Non Command	7248.75	4471.24	146.37	4617.62	[illegible]	[illegible]	[illegible]
705	Pune	Daund	Total	15300.14	11035.81	379.89	11415.71	755.63	3503.34	74.61
706	Pune	Haveli	Command	2504.33	1842.32	180.54	2022.86			
707	Pune	Haveli	Non Command	10911.48	4812.25	377.79	5190.04			
708	Pune	Haveli	Total	13415.81	6654.57	558.32	7212.89	1119.20	5661.66	53.76
709	Pune	Indapur	Command	20732.04	14674.85	1101.53	15776.38			

Groundwater Availability Near Project Site (ham)

DYNAMIC GROUND WATER RESOURCES OF MAHARASHTRA

(2011-12)

Sr No.	District	Administrative Unit	Command / Non-Command / Total	Recharge from rainfall during monsoon season	Recharge from other sources during monsoon season	Recharge from rainfall during non-monsoon season	Recharge from other sources during non-monsoon season	Total Annual Ground Water Recharge (4+5+6+7)	Provision for Natural Discharges	Net Annual Ground Water Availability (8-9)
1		2	3	4	5	6	7	8	9	10
705	Pune	Daund	Total	7023.81	1234.42	644.49	7202.70	16105.41	805.27	15300.14
706	Pune	Haveli	Command	1091.25	306.66	0.00	1238.23	2636.14	131.81	2504.33
707	Pune	Haveli	Non Command	8028.84	417.87	0.00	3039.06	11485.77	574.29	10911.48
708	Pune	Haveli	Total	9120.09	724.53	0.00	4277.29	14121.91	706.10	13415.81
709	Pune	Indapur	Command	5751.62	2746.18	9.14	13316.27	21823.20	1091.16	20732.04
710	Pune	Indapur	Non Command	2789.17	317.84	10.99	2630.79	5748.79	287.44	5461.35
711	Pune	Indapur	Total	8540.79	3064.02	20.13	15947.06	27572.00	1378.60	26193.40

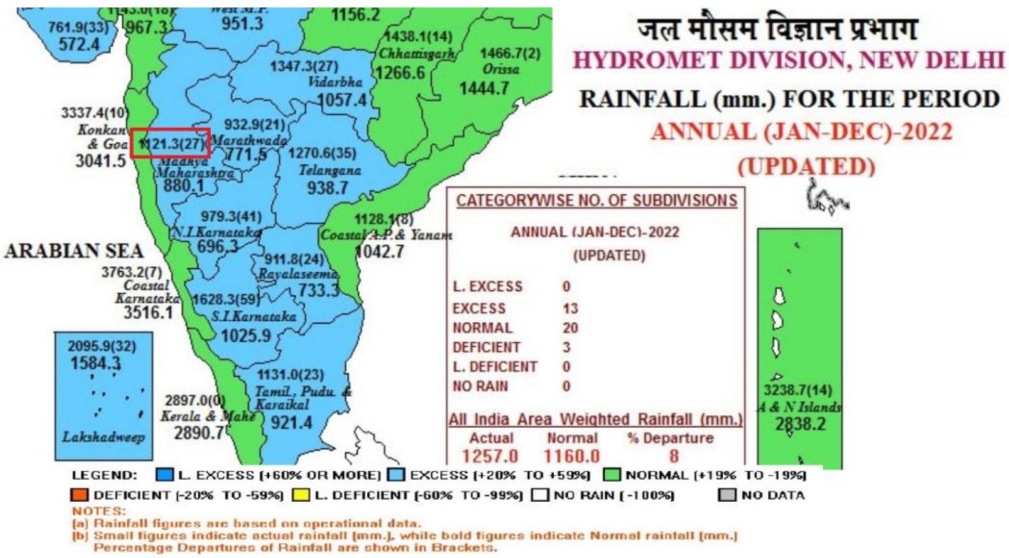
Rainfall Recharge of Groundwater Near Project Site (ham)

District : PUNE

Note :(1) The District Rainfall in millimeters (R/F) shown below are the arithmatic averages of Rainfall of Stations under the District.
(2) % Dep. are the Departures of rainfall from the long period averages of rainfall for the District.
(3) Blank Spaces show non-availability of Data

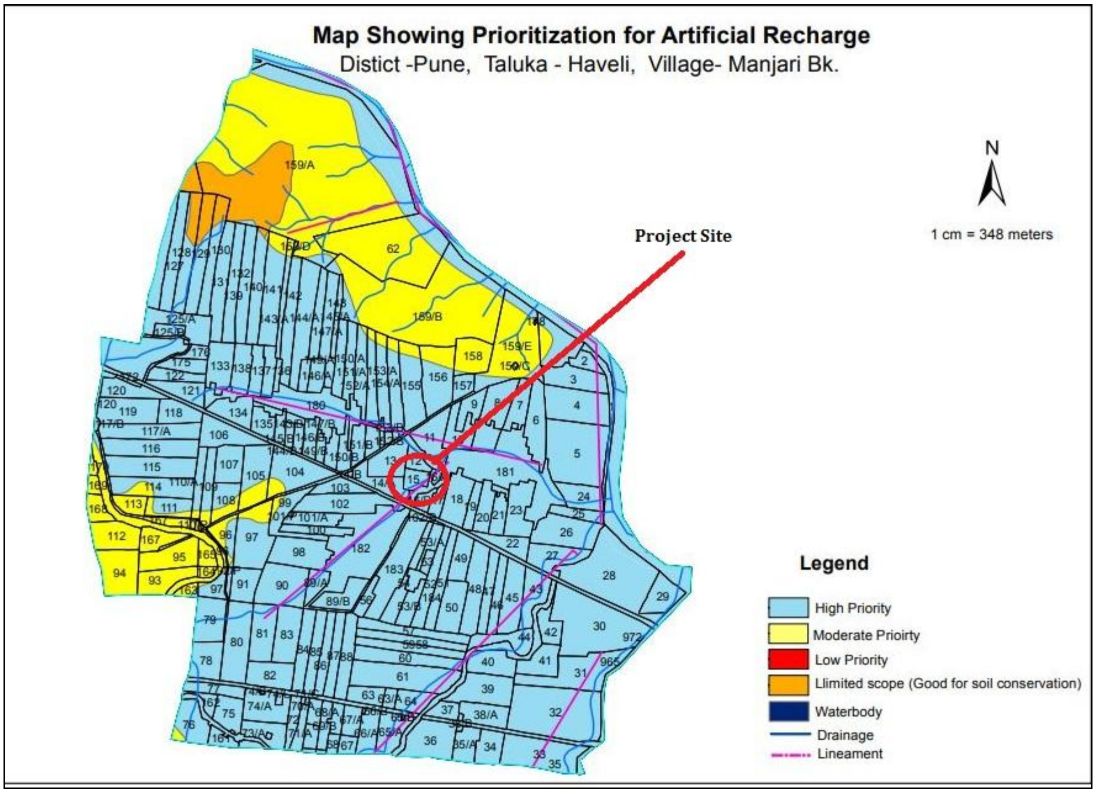
Customized Rainfall Information System (CRIS)
Hydromet Division
India Meteorological Department
Ministry Of Earth Sciences
New Delhi-110 003

YEAR	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEPT		OCT		NOV		DEC	
	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP	R/F	%DEP
2017	0.0	-100	0.0	-100	0.0	-100	0.0	-100	24.6	-10	289.1	84	512.5	64	290.2	29	211.0	27	116.0	33	13.9	-43	0.7	-88
2018	0.0	-100	0.0	-100	0.7	-58	5.4	-29	6.8	-75	185.6	18	486.6	55	268.9	19	58.7	-65	33.8	-61	20.0	-18	0.0	-100
2019	0.0	-100	0.0	-100	0.0	-100	7.0	14	0.0	-100	193.1	10	770.4	149	521.4	137	318.7	104	209.1	167	32.7	40	0.7	-90
2020	0.0	-100	0.0	-100	5.9	266	0.2	-98	31.2	39	260.4	48	218.8	-29	534.6	143	187.1	20	236.2	201	2.7	-89	4.0	-37
2021	30.4	4241	2.1	320	2.5	53	16.8	175	51.5	130	227.1	29	389.0	26	83.3	-62	194.8	25	94.8	21	40.4	73	68.1	964



Year	Rainfall (mm)
2017	1458
2018	1066.5
2019	2053.1
2020	1481.1
2021	1200.8
2022	1121.3

A.6. Alternate methods to the Project Activity



Project Activity Lies in High Priority Zone

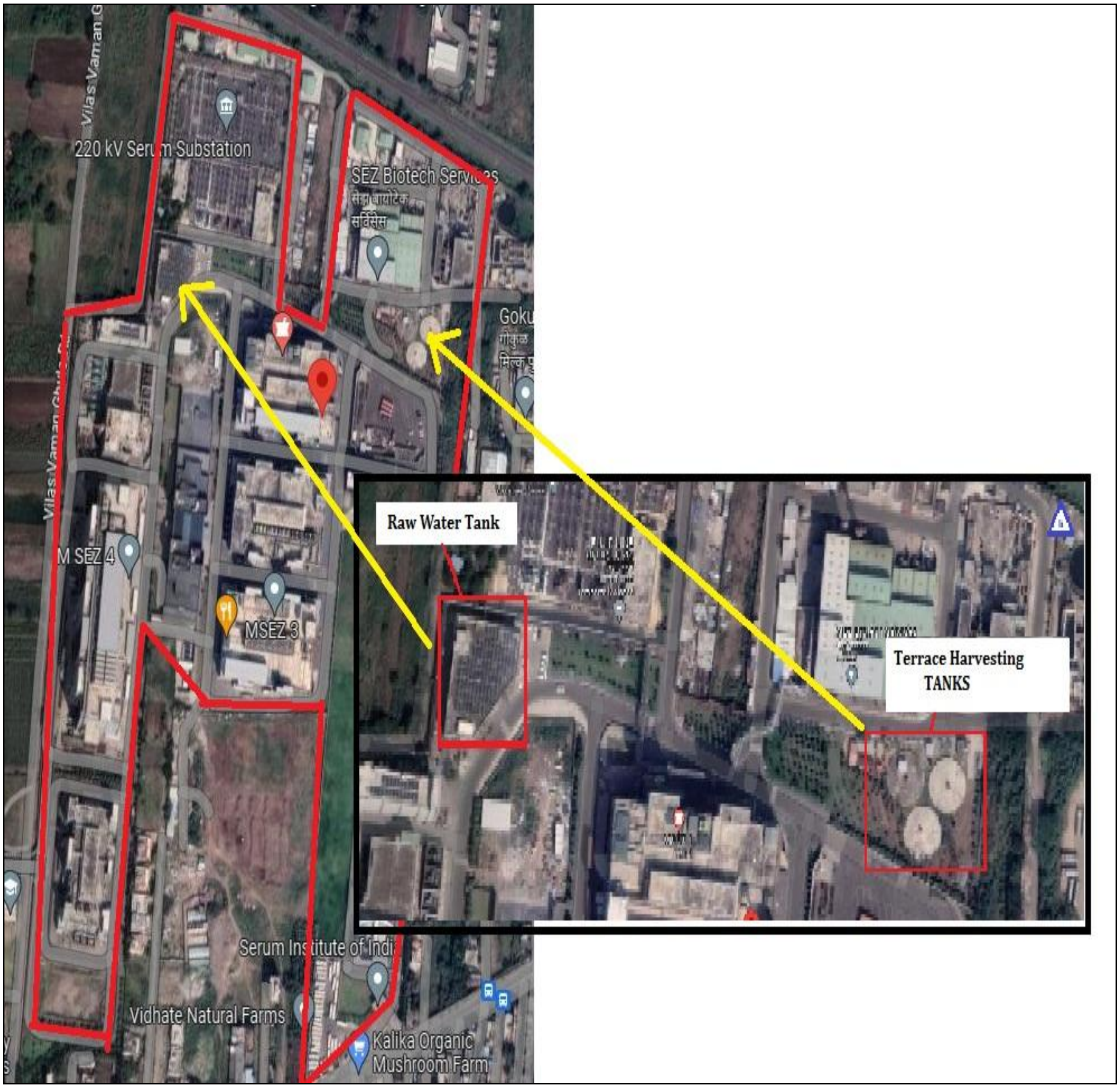
Pune is one of the major cities of Maharashtra with urban population of 31 Lakhs (as per 2011 census) living in 243.96 Sq. km of municipal corporation area. Pune Municipal Corporation (PMC) is responsible to provide water supply and sewerage services to the city.

नकाशा वाचनाकरीता उपयुक्त सूचना (Guidelines for Map Readings).

नकाशातील रंग	प्राधान्याने घ्यावयाच्या उपाययोजना
	या क्षेत्रामध्ये प्राधान्याने मुख्यत: नाला सिमेंट नाला बांध (Nala Bund), चेक डॅम (Check Dam), पुनर्भरण विहिर (Recharge well), पुनर्भरण विंधन विहिर (Recharge Shaft), भूमिगत बंधारा (Underground Bundara), विरुध्द दिशेने उतार असलेले नाला खोलीकरण, इ.
	या क्षेत्रामध्ये प्राधान्याने मुख्यत: नाला सिमेंट नाला बांध (Nala Bund), चेक डॅम (Check Dam), पुनर्भरण विहिर (Recharge well), पुनर्भरण विंधन विहिर (Recharge Shaft), भूमिगत बंधारा (Underground Bundara), विरुध्द दिशेने उतार असलेले नाला खोलीकरण, शेततळे (Farm Pound), पाझर तलाव (Percolation Tank), बांध बंधिस्ती (Farm Bunding), इ.
	या क्षेत्रामध्ये मुख्यत: १ मी. x १ मी. खोलीचे सलग समतल चर, पाझर चर (Water Absorbing trench), इ.
	या क्षेत्रामध्ये मुख्यत: दगडी बांध (Loose Boulders), सलग समतल चर, इ.
	या क्षेत्रामध्ये मुख्यत: पुनर्भरण कुपनलिका, पुनुर्भरण विहिरी, पुनर्भरण चर, शेततळे, १ मी. x १ मी. खोलीचे सलग समतल चर, पाझर चर (Water Absorbing trench), इ.

Alternate methods of groundwater recharge or water conservation such as Nala Bunds or Check Dams are not applicable to the PP. The revenue for the PP from the UCR RoU program could encourage the setup of recharge wells within the project boundary at a later stage.

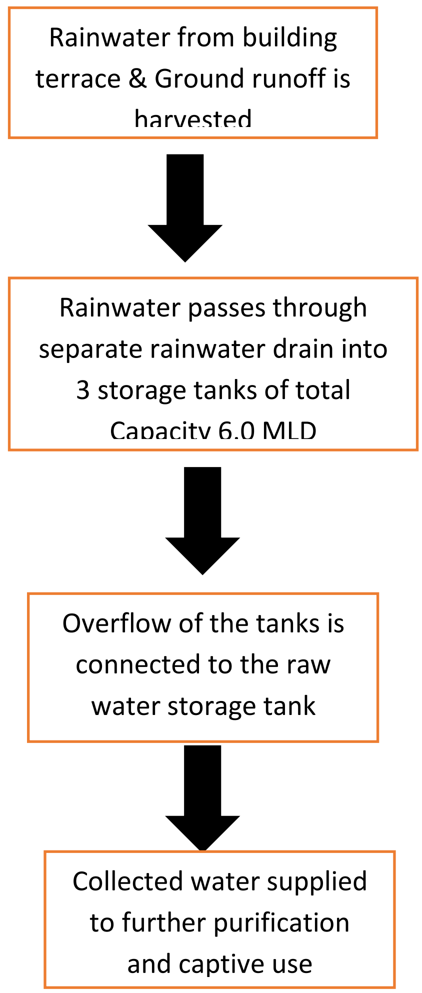
A.7. Design & Flow Specifications



Project Capacity (MLD / Cubic Meter)	06 MLD (02 MLD or 2000 m^3 each)
Commissioning Dates	Rainwater Harvesting Tank-1 (15/03/2017), Rainwater Harvesting Tank-2 (15/03/2017), Rainwater Harvesting Tank-3 (15/05/2021)
Catchment Area/Roof Top Locations	Crushing Shed Roof, LPG Godown Roof, M SEZ 1 Cold Room Roof, M SEZ-3 Cold Room Roof, M SEZ-4 Roof, Other Gas Storage Shed Roof, Solvent Warehouse Roof

The details of the rooftop piping and allied harvesting systems are showcased in **Section A.2.2**. The project activity system flow is as below:

Flow Chart



Treatment Process

The quality of the treated rainwater is checked regularly by in-house labs. This rainwater run off is further purified through a combination of ultrafiltration, reverse osmosis and UV light to create safe drinking water that complies with all national and international standards such a like USEPA/WHO/BIS-10500.

TÜV INDIA

TÜV NORD GROUP
TUV INDIA PRIVATE LIMITED
TUV India House,
Survey No: 42, 3/1 & 3/2,
Sus, Tal. Mulshi,
Dist. Pune - 411 021
CIN : U74140MH1989PTC052930
Tel. : 020 - 67900000 / 01
Toll free : 1800-209-0902
Email : pune@tuv-nord.com
Website : www.tuv-nord.com/in

TEST REPORT

Report No : TUV(I)/3732/22-23/0062202054
Date : 27 Jun 2022

Name & Address of Customer	: SEZ Biotech Services Pvt Ltd Cyrus Poonwalla Group Manjari Bk., Tal. Haveli, Pune Pin Code: 412207
Reg No.	: 3732/22-23
CA No.	: 0062202054
Date of sample receipt	: 09 Jun 2022
Date(s) of analysis	: 15 Jun 2022 - 27 Jun 2022
Sample Drawn by	: TUV Representative Mr.Nilesh G.Shinde (SOP No. TUV/04/SOP/017)

SINo	Test Name	Results	Unit	LOQ	Test Method
	Sample Name : RAW WATER Sampling Location: DMF Feed (Phase II), Sampling Date : 09.06.2022 Discipline : Chemical & Biological				**CA No : 0062202054** Product Category : Water
	Non Accredited Tests				
	Food Chemical				
1	Carbonate Alkalinity	82.6	mg/l	-	IS 3025 Part 23
2	Carbonate as CO3	82.6	mg/l	-	In house methode
3	Bicarbonates	103.1	mg/l	-	APHA 23rd Edition
4	Free CO2	6.0	mg/l	-	IS 3025 Part 61 (RA 2008)
5	Total nitrogen by Kjeldahl method	< 0.1	mg/l	-	TUV/02/SOP/002
	Heavy Metals				
6	Silica	25.68	mg/L	0.01	AS PER APHA 3125,23 RD EDITION
7	Strontium	0.13	mg/L	0.01	AS PER APHA 3125,23 RD EDITION
	Minerals				
8	Phosphate	6.30	mg/L	0.01	AS PER APHA 3125,23 RD EDITION
	Water Analysis				
9	Temperature	26.0	deg .cel	-	IS 3025 Part 9
10	Reactive Silica	6.0	mg/l	-	IS 3025 Part 35
11	Total organic carbon (TOC) **	Nil	%	0.00010	HS/NABL/WA/13
12	Colloidal Silica	19.7	mg/l	-	IS 3025 PART 35
13	COD	<10	mg/l	-	IS 3025 Part 58 (2006)
14	BOD	< 10	mg/l	-	IS 3025 Part 44 (2003)

Page 3 of 4

Registered & Head Office : 801, Raheja Plaza-1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086
Phone : (022) 6647 7000 • Fax : (022) 6647 7009 • e-mail : mumbai@tuv-nord.com • website : www.tuvindia.co.in
TÜV NORD GROUP

Lab Test Reports-Water Quality Sampling Data

A.8. Implementation Benefits to Water Security and/or SDG Impact

Access to safe water, sanitation and hygiene is the most basic human need for health and well-being. Billions of people will lack access to these basic services in 2030 unless progress quadruples. Demand for water is rising owing to rapid population growth, urbanization and increasing water needs from agriculture, industry, and energy sectors.

Decades of misuse, poor management, over extraction of groundwater and contamination of freshwater supplies have exacerbated water stress worldwide. In addition, countries are facing growing challenges linked to degraded water-related ecosystems, water scarcity caused by climate change, underinvestment in water and sanitation and insufficient cooperation on trans boundary waters.

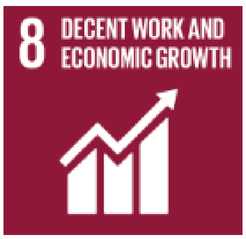
The project activity showcases best-in-class water conservation and rainfall runoff harvesting methods including recycling and reuse technologies.

The project activity achieves the sustainable management and efficient use of India's natural resources since the PP had the option to install bore wells that would have depleted the local groundwater resources and/or continued to use existing drinking water resources in the surrounding area. The PP has instead chosen to harvest rainfall runoff voluntarily, thus saving millions of liters of safe drinking water for the city.

The project activity also encourages companies, especially large and transnational companies in the biotechnology and biopharmaceuticals sector, to adopt similar sustainable practices in regards to captive water requirements and groundwater management.

Sustainable Development Goals Targeted	Most relevant SDG Target/Impact	Indicator (SDG Indicator)
13 CLIMATE ACTION 13 Climate Action (mandatory)	13.2: Integrate climate change measures into national policies, strategies and planning	Rainwater harvesting is an effective solution for climate change adaptation because it helps mitigate the impacts of droughts, floods, and other extreme weather events that are becoming increasingly common due to climate change. The quantity of rainwater being harvested and reused by the PP

		is the SDG indicator.
 1 - End poverty in all its forms everywhere	1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	The PP prevents unequal distribution of natural groundwater resources- which prevents poverty of natural economic resources (groundwater). The PP ensures that the citizens of Pune get a chance to preserve their natural groundwater resources for future generations since PP is harvesting rainwater runoff which is currently unutilized by the local industry. The PP could have alternately dug fresh borewells or used existing drinking water sources for their captive water requirements.
 3 – Ensure healthy lives and promote well-being for all at all ages	3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	The PP showcases how rainwater harvesting can prevent depletion of natural water reserves and prevent water scarcity during droughts. The PP ensures water availability in water-scarce zones that help promotes healthy lives and well-being.

 **6-**Ensure access to water and sanitation for all	6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	The PP has showcased recycling and safe reuse of 1195 million liters within the industry of rainwater runoff during this monitored period.
 8 – Promote inclusive and sustainable economic growth, employment and decent work for all	8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value 8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training	Number of jobs created Number of people trained
 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development	17.7: Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms including on concessional and preferential terms, as mutually agreed	PP will monetize the water credits via the virtual water footprint market internationally.

A.8.1 Objectives or Outcomes

The impact assessment or objectives of this project activity can generally be enumerated as follows:

- It highlights the catalytic role that corporate India must play in reducing industrial water consumption as well as water pollution per unit of industrial output.
- It reduces soil erosion, storm-water runoff, flooding, and pollution of surface water with fertilizers, pesticides, metals and other sediments. It is an excellent source of water for landscape irrigation with no chemicals, dissolved salts and free from all minerals.
- It minimizes the impacts of flooding by funneling the off water into large tanks for recycling and helps reduce the load placed upon drainage systems.
- Aging water infrastructure is expensive to update; and groundwater and reservoirs are often overdrawn. The project activity does not impact the local water infrastructure.

A.8.2 Interventions by Project Owner / Proponent / UCR Member

It is very much obvious that over extraction of ground water over years without any compensatory replenishment is affecting large tracts of land adversely in Maharashtra. The non-replenishment of the shallow aquifers and depletion of the deeper aquifers on account of unregulated sinking of deep borewells/tubewells, almost amounting to "water-mining" unmindful of the adverse ecological effects, is one of the contributory causes for recurring droughts. Concerted action, therefore, is needed to reverse the present trend of periodic occurrence of droughts.

In 2007, the Pune Municipal Corporation made rainwater harvesting mandatory for new buildings for building permissions and developers have showcased these provisions in all their upcoming projects. There is also a 10% property tax rebate for a society which has a rainwater harvesting system. But, there has been no strict monitoring of the utilisation.

State town planning officials said such is the state that most societies are heavily dependent on tankers. Local authorities have failed to follow up with the developers on whether these systems are in a working condition, while some societies, in spite of having the facility, are unable to use it as the systems are defunct. A housing complex in Dhanori area, Pune, was unable to use the system as it had fallen into disuse forcing the society to pool in finances to repair it. Housing societies spend lakhs per year buying water from private tankers instead of repairing existing rainwater harvesting systems (*News Report Dated May 2022, source*). Other reports indicate that most residential rainwater harvesting systems are choked up with borewells full of mud (source).

The PP showcases that generating and monetizing UCR water credits can help pay for O&M and repair costs of water conservation and harvesting systems, including capacity expansions planned in the future. Housing complexes wouldn't need to pool in society finances since the water credits trade would provide the necessary funding for such repair activities.

Pune's water mafia runs a flourishing estimated Rs 100 crore annual business by supplying water tankers and bottled water to fringe localities of the city (source).

The project activity hence achieves the sustainable management and efficient use of India's natural resources since the PP had the option to install bore wells that would have depleted the local groundwater resources and/or continued to use existing drinking water resources in the surrounding area. The PP has instead intervened and chosen to harvest and reuse rainwater runoff, thus saving millions of liters of safe drinking water for the city.

Increase in population density and improvement in quality of life has resulted in an increase in demand of natural resources like water. Groundwater being the major source of water supply catering to about 85% of rural water supply, the stress on groundwater is ever increasing. It has resulted in over-exploitation of the resources at places. The situation demands for a reorientation of the strategy for its development and management. Scientific understating of the hydro geological conditions and the aquifer systems are the important inputs for sustainable management of ground water resource so that the requirement of present generation is met without compromising the ability of future generations to meet their own needs.

The intervention of the PP has had a direct impact on the water security of the area. Over-development of the ground water resources results in declining ground water levels, shortage in water supply, intrusion of saline water in coastal areas and increased pumping lifts necessitating deepening of ground water structures and increase in power costs.

A.8. Feasibility Evaluation

The installed rainwater harvesting systems by the PP are robust and can handle excessive rainfall patterns. The run off catchments areas are sloping and the storage systems are of high quality.

A.9. Ecological Aspects:

The project activity achieves the sustainable management and efficient use of India's natural resources since the PP had the option to install bore wells that would have depleted the local groundwater resources and/or continued to use existing drinking water resources in the surrounding area. The PP has instead chosen to harvest and reuse rainwater runoff, thus saving millions of liters of safe drinking water for the city.

The project activity also encourages companies, especially large and transnational companies in the biotechnology and biopharmaceuticals sector, to adopt similar sustainable practices in regards to captive water requirements and groundwater management.

Ecological Issues addressed by the project activity in terms of

Inundation of habitated land	The project does not lead to inundation of residential land. Project activity minimizes the impacts of flooding by funneling the runoff rainwater into large tanks for storage and helps reduce the load placed upon drainage systems.
Creation of water logging and vector disease prevention mitigation	Reserving rainwater can help recharge local aquifers, reduce urban flooding and most notably, ensure water availability in water-scarce zones. Project activity reduces soil

	erosion and flood hazards by collecting rainwater and reducing the flow of storm water to prevent urban flood
Deterioration of quality of groundwater	Harvesting rainwater allows the collection of large amounts of water and mitigates the effects of drought. Most rooftops provide the necessary platform for collecting water. Rainwater is mostly free from harmful chemicals, which makes it suitable for captive usage purposes. By avoiding the use of borewells the project activity does not deplete aquifers and hence prevents the depletion of groundwater resources.

A.10. Recharge Aspects :

A.10.1 Solving for Recharge

Water Budget Component	Typical Estimated Uncertainty (%)	Description
Surface Inflow	1%	Accuracy from delivery and diversion measurement devices. Rainwater runoff is channelized directly to a separate rainwater drain and then connected to 3 rainwater harvesting storage tanks of total Capacity 6.0 MLD
Precipitation	10%	Typical range of accuracy from field-level rain gauges to extrapolation of local weather station data
Surface Outflow	NA	NA
Evapotranspiration	10%	Clemmens and Burt, 1997; typical accuracy based on free water surface evaporation coefficient.
Change in Storage	NA	NA
Deep Percolation	NA	NA
Total	21%	

A.11. Quantification Tools

Baseline scenario

The baseline scenario is the situation where, in the absence of the project activity, unutilized water flows uncollected into drains and is not conserved/harvested into storage systems within the project boundary and remains unutilized. Baseline scenario, if not directly measurable, is calculated by using

Option 1: *Harvested water or Volume of water utilized (m^3) = Area of Catchment/Roof/Collection Zone (m^2)* ***X*** *Amount of rainfall (mm)* ***X*** *Runoff coefficient *Uncertainty Factor (1-0.21 = 0.79).*

Different Surfaces	Runoff Coefficient (K)
Roof inclined (Sloping)	0.95

The baseline scenario is the situation where, in the absence of the project activity, the PP would have utilized water from multiple bore wells within the project boundary which would have depleted the local groundwater resources (aquifers) and/or diverted existing safe drinking water resources from the surrounding residential area.

Hence the baseline scenario, is:

"the net quantity of rainwater runoff harvested and stored per year"

Quantification

Year	RoUs (1000 litres) /yr
2017	207903
2018	152077
2019	292761
2020	211197

2021	171228
2022	159891
Total	1195057

A.12. UCR Rainwater Offset Do No Net Harm Principles

According to the UCR RoU Standard principles, the project activity accomplishes the following:

- *Increases the sustainable water yield in areas where over development has depleted the aquifer*

According to the data released by the Central Groundwater Board in 2021, the total amount of groundwater that can be utilised in India in a year is 398 billion cubic meters (BCM), of which, approximately 245 BCM is currently being utilised, which is about 62 per cent of the total. But the level of exploitation of groundwater is very high in States like Punjab, Rajasthan, Haryana, Delhi and Tamil Nadu. This project activity was commissioned in 2017, and the PP has showcased harvesting, recycling and safe reuse of rainwater run off within the industry from unutilized water resources. Revenue from the sale of UCR RoUs will enable scaling up of such project activities.

- *Collect unutilized water or rainwater and preserve it for future use*

In India, at the district level, in 24 states/UTs, as many as 267 districts had stages of groundwater extraction more than 63 per cent, ranging from 64 per cent to 385 per cent (source: https://www.business-standard.com/article/current-affairs/from-58-to-63-india-pumped-more-groundwater-between-2004-and-2017-121122101377_1.html). This project activity serves as an example to recycle and reuse unutilized rainwater and encourages companies, especially large and transnational companies in the biotechnology and biopharmaceuticals sector, to adopt similar sustainable practices in regards to captive water requirements and groundwater management.

- *Conserve and store excess water for future use*

The project activity decreases the dependence on groundwater, thereby preventing excessive depletion. Between 2017 and 2022, the project activity has harvested **1195 million litres** of rainwater successfully with gainful end use of the same. Rainwater harvesting helps conserve freshwater resources by reducing reliance on groundwater and surface water sources. Collecting and using rainwater lowers the water extracted from groundwater sources, which can help preserve them for future generations. It significantly reduces corporate water bills by providing a water source for non-potable uses such as irrigation, flushing toilets, and washing clothes. Also, it helps manage storm-water by reducing runoff and preventing flooding. By capturing rainwater on-site, the PP reduces the amount of water that flows into storm drains and reduce the risk of flooding. Rainwater is generally free from chemicals and contaminants found in tap water. Rainwater harvesting is a sustainable practice that promotes environmental stewardship and reduces the industrial water footprint. By conserving water and reducing their reliance on traditional water sources, the PP has created a more sustainable future for India's future generations.

A.13. Scaling Projects

Reports indicate that in Pune, more than 5000 bore wells are possibly sunk in the city every year. Borewell rigs are operational for about eight months between November to June and drill up to an average depth of 200 to 300 ft.

While cities in India are facing water supply and demand issues, India’s water sources – groundwater, rivers and other water bodies – are facing contamination from domestic and industrial pollution leading to deteriorating water quality. Direct disposal of untreated wastewater and fecal sludge into the open, increases the burden of cities to provide drinking water supply to its residents.

Rainwater harvesting is an important alternative to conserve water for future usage. The NITI Aayog Report 2018 has said that India’s water demand will exceed water supply by a factor of two by 2030. Hence, under the rapidly depleting groundwater table, rain water harvesting is an ideal solution.

In India, may residents claim that one of the key factors hampering the implementation of the RWH systems is the high initial cost of construction and regular maintenance, which becomes cumbersome for individual plot owners. Besides, the lack of enforcement and inspections by the authorities concerned is also to blame. According to experts, constructing an RWH structure in a 500-sq-yard plot costs around Rs 1.7 lakh, with an annual maintenance of Rs 12,000 to Rs 15,000. Contractors and developers of plotted colonies admit that a majority of the RWH structures in independent houses are built only to meet compliance norms, and once authorities issue occupancy certificates, the harvesting pits are forgotten. In fact, many of these rainwater harvesting pits had been converted into sewerage pits after getting occupancy certificates (source).

With countless predictions that most major cities around the world are on the brink of running out or exhausting their groundwater supplies in the near future, it is extremely important to look beyond the conventional sources of sustenance and look towards adopting and adapting the non-conventional, renewable sources, essential for our survival. Rainwater is a renewable source prevalent in areas with little to no rainfall, and needs to be purified further in order to make it fit for drinking or use in the production of vaccines, showcased via this project activity.

While the Indian government has started initiatives in reviving the lost water bodies or making recharge pits (e.g. Aravallis), but rainwater harvesting infrastructure in many cities needs a revamp. The majority of the rainwater recharge pits are also defunct. ***Revenue from water credits (RoUs) could provide a much needed incentive to encourage rainwater harvesting systems to be built or repaired at scale and with faster payback on investments undertaken for such O&M, repairs or new installations.***

Appendix 1

Human Development Index (HDI) Ranking

From the 2020 Human Development Report

India

-	Rank	Country	HDI value (2019)	Life expectancy at birth (years) SDG3	Expected years of schooling (years) SDG 4.3	Mean years of schooling (years) SDG 4.6	Gross national income (GNI) per capita (PPP $) SDG 8.5
	131	India	0.645	69.7	12.2	6.5	6,681

Source: **Human Development Report Office 2020.** • Created with **Datawrapper**