

CONCEPT PLAN FOR PROJECT DESIGN OF ROOFTOP RAIN WATER HARVESTING STRUCTURE AT SITE OF SITAPURA INDUSTRIAL AREA, JAIPUR,,DISTRICT JAIPUR, RAJASTHAN

INTRODUCTION

Basic Information of Proposed Area:

- 1 Location : At site of Sitapura Industrial area Jaipur, District Jaipur, Rajasthan.
- 2 Area : Urban Area
- 3 Agriculture : Soil type:Fine sand with clay and Kankar.
- 4 Climate
 - i. **Type of Climate:** – Semi arid.
 - ii. **Rainfall:-**
 - (a) Normal Monsoon rainfall: 512.00 mm)
 - (b) Average Monsoon Rainy Days: 32
 - (c) Normal Annual Rain fall: 543.64 mm

OBJECTIVE:

In Jaipur urban area, the withdrawal of ground water is greater than recharge to aquifers which resulted into depletion of water level about 18.12metres (2005 to 2015) i.e. @ 1.81 m/year as the water demand has increased many fold with expanding population due to urbanisation, expansion of industries, etc. Thus, the proposed rain water harvesting structures for artificial recharge would help to restrict the rate of decline in water level and augmentation of the ground water resources substantially.

JUSTIFICATION:

Nature of problem
requiring Artificial
Recharge to Ground
water.

i. Quantity Problem:

(a) Extent of Area showing water level depletion on long term basis:

The alluvial aquifers of Jaipur area covers an area of about 3000 Sq.Km. in which proposed sites fall under the category of "Over Exploited" Ground Water Development is 259% (as on 01.01.2011)

(b) Average decline in water level . 1.81m. per year.

HYDROGEOLOGY

i. Geological Formation: Thick Quaternary formations underlain by the quartzite's of Delhi Supergroup.

ii. Nature of Unsaturated zones: Aeolian sand and Quaternary Alluvium, moderately porous and permeable.

iii. Aquifer System: Unconfined to Semi-confined

iv Depth to water level: 61.00-65.00 metres

V Long term fluctuation in Water Level:
(-) 1.81m/year

vi. LithoLog:



Ground Water Sub
Surface Potential
for Ground Water
Recharge

- i. Thickness of unsaturated zone: (below 3 metres below ground level): 58.00metres.
- ii. Surplus water available for recharge 312 m³/year water from roof top rainwater runoff available for groundwater recharge.

AVAILABILITY OF SURPLUS RUN-OFF

S.N.	Place(Building)	Area in Sq.mts.	Annual rainfall(mm.)	Runoff coefficient	Available of rainwater runoff in cubic Mts.
1	Building and shade	450	512	0.75	172.80
2	Paved area	150	512	0.50	38.4
	Total	600			211.20

Consumption of water by industry: 100 cubic mts /year

OPTIMUM STORAGE AND RECHARGE CAPACITY OF THE SYSTEM DESIGNED

<u>S.No.</u>	<u>Item</u>	
(i)	Rainfall intensity for which the system has been designed	25 mm/hour
(ii)	Quantum of run-off likely to be available for artificial recharge from the concerted area taken into consideration at 25mm/hr rainfall intensity.	10.50 m ³ /hour
(iii)	Storage capacity of the Harvesting system designed:	
	a DeSilting Pit	2.25 m ³
	b. Filter pit	6.00 m ³
	c. Recharge Tubewell	3.64m ³

ARTIFICIAL RECHARGE STRUCTURES PROPOSED:

It is proposed to recharge ground water through Recharge Tubewell.

Scheme wise constructions of structures proposed are as below:

<u>S.No</u>	<u>Structures proposed</u>	
(i)	Construction of Desilting pit	1No.
(ii)	Construction of Filter chamber	1No.
(iii)	Construction of recharge Tube well	1No.
(iv)	Reference figure.	

DESIGN & DETAILS OF STRUCTURES /WORK PROPOSED

<u>S.No.</u>	<u>Details of Structures / Works</u>	<u>Dimensions</u>
(i)	Desilting pit (Brick Masonary 0.35m)	1.50(L)x1.00(W)x1.50(D)metres (0.25m AGL)
(ii)	Filter pit (Brick Masonary 0.35m)	2.00(L)x1.50.(W)x3.00(D)metres (0.25m AGL)

(iii)	Construction of recharge tubewell	200 mm. diameter Tubewell with depth 50.00 mts. With slotted pipe assembly up to 55.00 mts depth.
(iv)	Providing porous filter media in the filter Chamber	Providing porous filter media in the filter pit for 1.0m.height from bottom upward as below: Sand 0.5-1.0mm (0.33m) Sand 1.0-2.0mm (0.33m) Gravel 3 - 5mm (0.33m).
(v)	Laying of inflow pipe from proposed water catcher trench to silting pit.	RCC Non pressure pipe of 150 mm Diameter
(vi)	Installation of overflow pipe from silting pit to road side.	RCC Non pressure pipe of 100mm Diameter
(vii)	Estimated Cost of Recharge Structure:	Rs. 60000 -70000
(Viii)		

Note:

(i)The Plant Waste water should be treated and only treated water use for the ground water recharge.

(ii) A provision for adding bleaching powder is to be kept for prevention of pollution in Roof Top Rain Water.

(iii)The design is based on the existing hydrogeological condition of the site which is specific in nature.

(v) Roof top rainwater should be channelized through drains to the structure.

ANTICIPATED LIFE OF RECHARGE STRUCTURE: 20 years

EXPECTED BENEFITS :

i. Quantity of water likely to recharge annually : 211.20 m³

ii. Quantity of water likely to recharge during: 4224.00m³

Life span (20 years).

It will check the declining trend of water level

Substantially.