TECHNICAL REPORT

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सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION
CENTRAL GROUND WATER BOARD

REPORT ON FEASIBILITY OF ARTIFICIAL RECHARGE TO GROUNDWATER IN UDHAM SINGH NAGAR DISTRICT, UTTARAKHAND

UTTARANCHAL REGION
DEHRADUN
OCTOBER – 2024

1. Introduction

The Udham Singh Nagar district occupies an area of 2908 sq. km and is located in the southern part of the Uttarakhand state. It lies between north latitudes 28.707 and 29.382 and east longitudes 78.725 and 80.087 and falls in parts of Survey of India toposheets 53 K/11, 53 K/15, K/16, 53 O/4, 53 O/8, 53 P/9, 53 P/13, 53 P/14 and 62D/2. The district comprises 7 blocks i.e Jaspur, Kashipur, Bazpur, Gadarpur, Rudrapur, Sitarganj and Khatima. The district is located mainly in the Terai region but some parts lie in Bhabar zone also, and is part of Kumaon Division. It is bounded on the north by Nainital District, on the northeast by Champawat District, on the east by Nepal, and on the south and west by Bareilly, Rampur, Moradabad, Pilibhit and Bijnor District of Uttar Pradesh state (Figure-1).

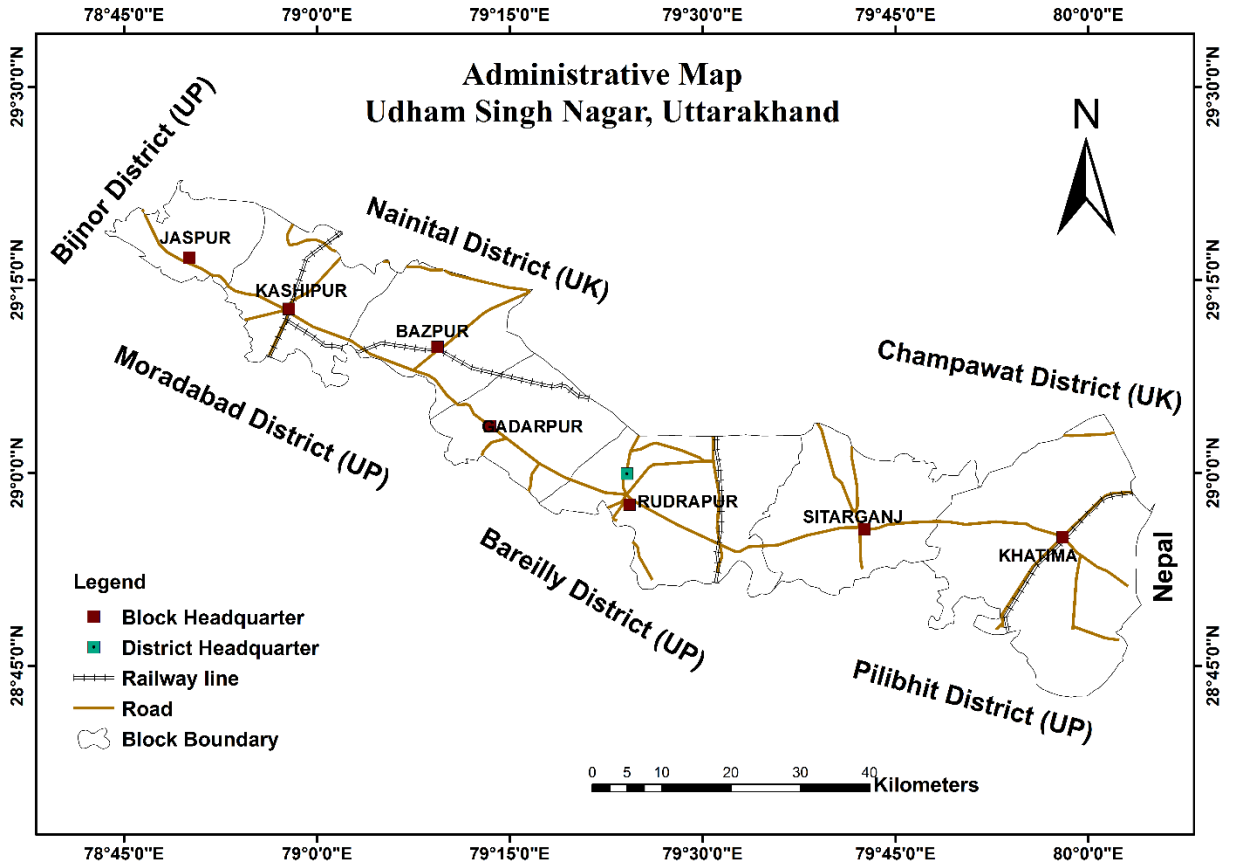

Figure-1 Administrative Map of Udham Singh Nagar

The total population of the district is 1648902 (Census: 2011) of which male and female are 858783 and 790119 respectively with population density of 570 persons/km^2. The decennial growth rate as per 2011 Census is estimated to be 33.45 %. The number of literates in the district is 1037839 (62.9%) of which 68.7% male and 55.6% female literates. Udham Singh Nagar district

represents sub-tropical and sub-humid with three distinct climatic seasons i.e. summer, monsoon (rainy season) and winter. The normal rainfall is 1396 mm where 90% of rainfall is received during the southwest monsoon that is during the period of June to September. The summer season starts from March and it goes up to June. The hottest months of the year are May and June. The temperature goes up to 45ºC during the summers and the minimum temperature is around 1 to 4ºC in winter season.

2. Objectives of the Scheme

In recent meetings of SARRA the construction of recharge shafts across various locations in the different districts was proposed by the Chair. This initiative aimed to enhance groundwater levels by replenishing shallow aquifers through rooftop rainwater harvesting. Following these discussions, a request was received from the Minor Irrigation, Department Uttarakhand, Dehradun dated September 23, 2024 (Ref: 1116/la.si./karya/SARRA/2024-25) seeking a feasibility assessment for the proposed recharge structures and specific recommendations on their construction depth. CGWB has received a list of 48 proposed sites from Minor Irrigation for the construction of recharge shafts in Udham Singh Nagar district. Based on geo-locations provided, nearly all these sites are situated in Rudrapur block of the district.

3. Hydrogeology

The district is characterized by two different hydrogeological units i.e. Bhabar and Tarai and form multi-aquifer system with varying depth and nature.

a) Bhabar Zone

The Bhabar is characterized by its high porosity and permeability by virtue of which they allow major part of the precipitation to infiltrate, within a very short span of time, leading to the formation of excellent groundwater reservoirs. Bhabars are poorly sorted unconsolidated sediments viz., boulders, cobbles, pebbles, and granules, coarse to fine sand, silt and clay. Due to arrest of flow velocity, change of topography, gradient, valley characteristics, the mighty streams emerging from the Himalayas shed their sediment load in the form of triangular alluvial fans and cones along the Siwalik foothills. The alluvial cones join together to form an extensive piedmont plain. It has NW-SE elongation and forms a highly potential hydrogeologic unit. The Bhabar merges gradually with the Tarai occurring in the south. The contact between these two hydro-

geomorphic units is characterized by the change in slope gradient and groundwater effluents, which forms the spring line. The Bhabar zone acts as a recharge front for the Tarai belt.

The aquifers in these zones are mostly unconfined but at some places perched aquifers also exist. Depth to water level progressively decreases towards south and water finally emerges at the surface as a line of spring. The depth to water level in Bhabar formation generally deep. Based on the aquifer parameters of exploratory drilling in the area; estimated hydraulic gradient in this zone is approximately 2.97 m/km. Based on the available exploratory drilling aquifer parameters data in the office, the Transmissivity values range from 3696 to 23860 m^2/day, whereas the values for hydraulic conductivity ranges from 56 to 825 m/day. The hydraulic gradient ranges between 4 and 16 m/km.

The groundwater body appears to be sustained and recharged by (1) direct infiltration from precipitation on the land surface, and (2) infiltration from turbulent streams flowing across the belt. Considerable amount of water is also discharged by perennial springs at the southern limit of Bhabar.

b) **Tarai Zone**

Tarai belt consists of finer segments of talus material brought down by the streams and sorted to some degree by fluvial action. It lies south of the Bhabar and predominantly comprises clays and silts with well-sorted granular material such as sand, gravel occasionally boulders and cobbles and pebble beds. The sands and gravels associated with the finer fractions are the major aquifers in this zone. The boundary between the Bhabar and the Tarai is defined by a spring line, which is characterized by auto-flow (free-flowing) zones. There are plenty of moist and waterlogged areas around the spring line particularly during monsoon season.

The groundwater occurs under unconfined and confined conditions. Water level in this zone generally shallow in respect of unconfined aquifer whereas, the groundwater in deeper confined aquifers occurs under artesian conditions. The artesian flow of individual wells may vary from just a trickle at the surface from the confined aquifer to that amounting to several hundred or in rare cases to even a thousand gallons per minute. Based on the aquifer parameters of exploratory drillings in the area, the transmissivity values range from 1180 to 2500 m^2/day, whereas the values for hydraulic conductivity ranges from 25 to 243 m/day. The hydraulic gradient ranges between 1.35 and 4.0 m/km.

The unconfined shallow groundwater of the Tarai may be charged by (1) the direct infiltration from rainfall on the land surface, (2) the infiltration from the streams when flooded, (3) return seepage from irrigation in cultivable fields, (4) lateral percolation from adjacent Bhabar zone and (5) by upward leakage from the upper most artesian horizon.

On the contrary, the confined Ground Waters are probable recharged by downward percolation and lateral flow from Bhabar belt. Bhabar, therefore, is also the intake area for Tarai as well**.**

c) Ground Water Conditions in Auto Flow Zone

Artesian conditions are restricted to the Tarai zone. In a well, penetrating through a confined aquifer, the water level will rise above the bottom of the confining bed. If the water level rises above the top of the upper confining layer, above the ground surface, free flowing /auto flow conditions result. In this zone confining conditions result due to intercalation of permeable materials like sand and gravel with impervious clay horizons. The difference in elevation of Bhabar and Tarai, together with the regional slope of the strata, appears to build the artesian head in the aquifers. Permeability of the Tarai aquifers is less than that of Bhabar, thereby playing a vital role in developing the pressure, as it impedes ground water flow (figure-2). The discharge of the tubewells is dependent of aquifer properties, and local ground conditions. Central Ground Water Board has constructed artesian wells at Pipaliya Bazpur, Kashipur, Pipaliya No.2 Gadarpur, Nagla and Rudrapur in the district. The drilled depth of ranging from 84.4 to 433.0 m bgl with free-flowing head upto 8.69 m above ground level and yield upto 3400 lpm (Jamloki and Gopikrishna 2010).

It is observed that the pressure head of the artesian aquifers drastically reduced over the two decades and some of the shallower depth wells lost its artesian conditions. The causes of reduction in discharge of artesian wells have been discussed in the coming chapters.

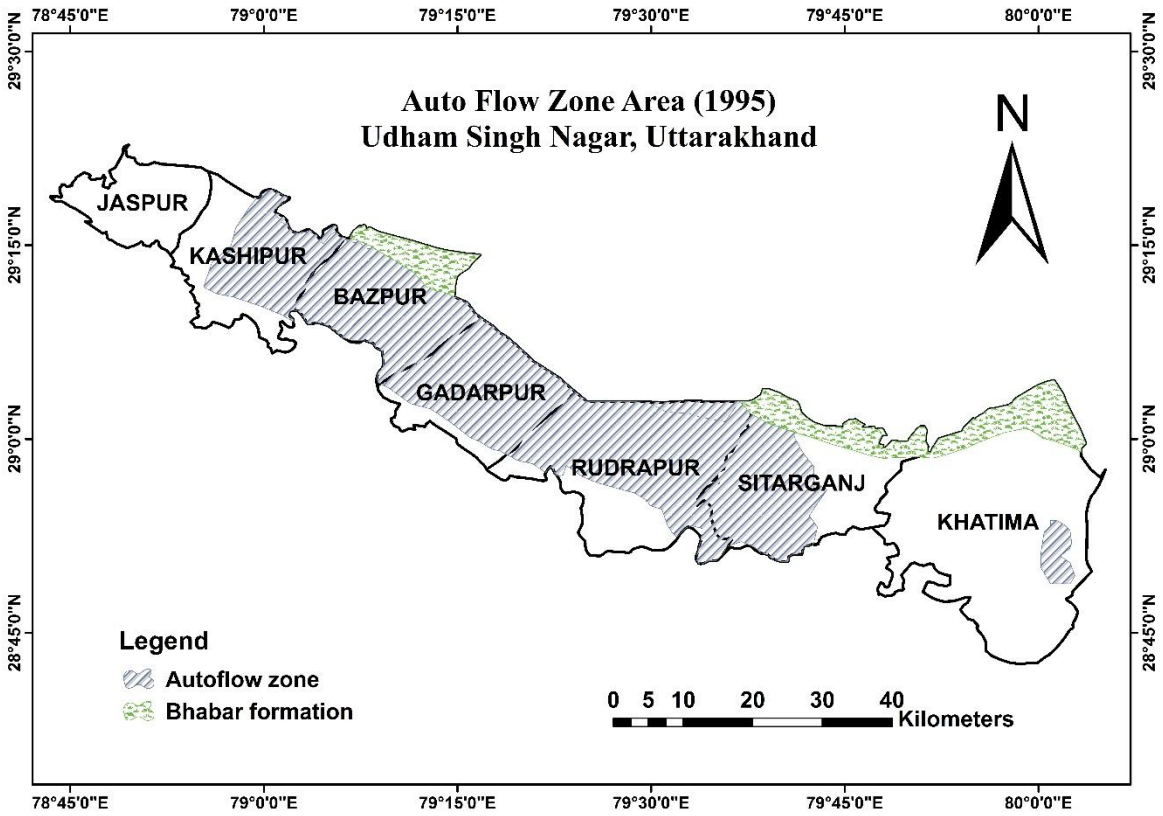

Figure-2 Map showing Groundwater Autoflow Zone in (1995)

4. Implementation of Measures for Artificial Recharge to Groundwater in Udham Singh Nagar District

Artificial recharge to groundwater through recharge shafts is a method aimed at replenishing depleted aquifers by directing surface runoff or collected rainwater into vertical shafts. These shafts are strategically positioned to facilitate efficient percolation of water into underlying aquifers, thus enhancing groundwater levels. Designed with filtration systems to maintain water quality, recharge shafts offer a sustainable solution to combat groundwater depletion. This approach not only improves water availability in regions prone to water scarcity but also contributes to environmental conservation by minimizing reliance on unsustainable water extraction practices. Effective implementation hinges on careful site selection based on hydrogeological conditions, ensuring optimal recharge rates and long-term water security benefits.

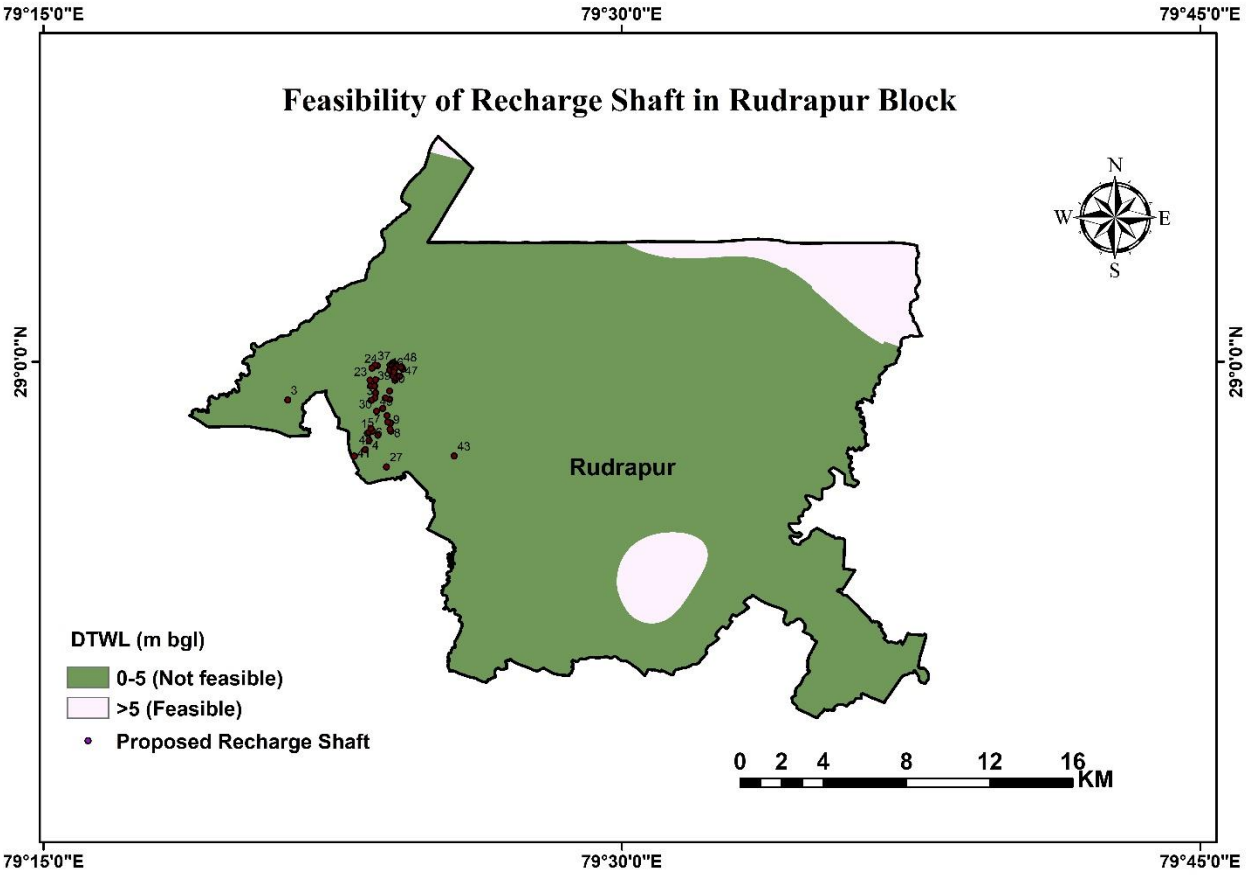

Figure-3 Depth to Water Level Map of Udham Singh Nagar district

Based on the post-monsoon groundwater level map (figure-3) of Rudrapur block for the year 2023, areas suitable for implementing recharge measures have been delineated, and corresponding depths for recharge structures have been specified. Adhering to established guidelines, it has been determined that groundwater recharge efforts are feasible in locations where post-monsoon water levels remain more than 5 meters. According to the water level contour map, all sites identified by the Minor Irrigation department for recharge initiatives does not meet this criterion, affirming their non-suitability for targeted interventions aimed at bolstering groundwater resources (figure-3). The proposed locations will have to shifted from current location to area of more than 5m water level which is feasible and marked in the map for sustainable aquifer recharge sites (figure-4) in Udham Singh Nagar district. It has been recommended that aquifer recharge initiatives should be taken in Jaspur and Kashipur blocks.

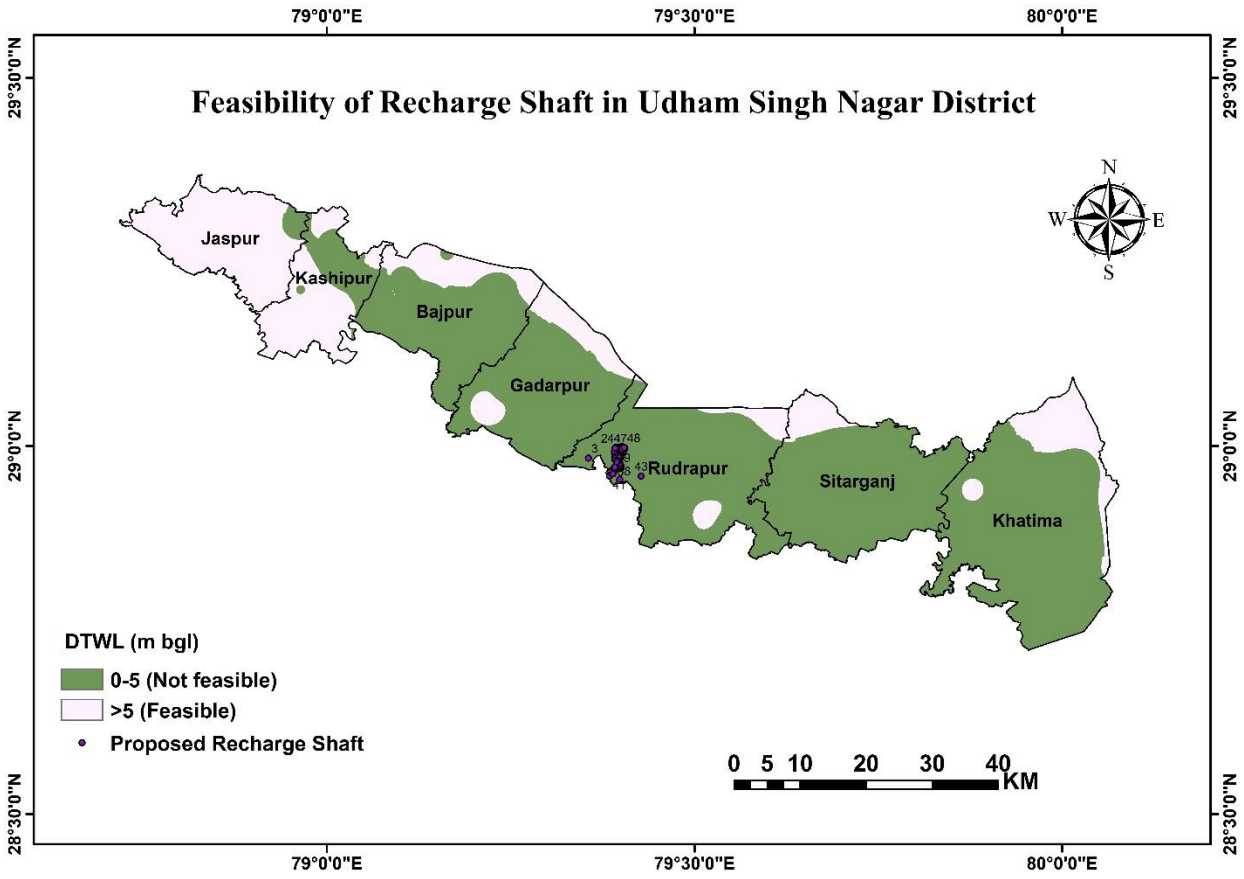

Figure-4 Depth to Water Level Map of Udham Singh Nagar district

5. Aquifer Disposition

The aquifer configuration in Kashipur and Jaspur block, where the recharge sites can be implemented, has been delineated using a lithological section (figure-5) based on CGWB exploration data. The diagram reveals the presence of a multi-tiered aquifer system that is primarily confined to unconfined. These aquifers predominantly consist of sand and gravel, indicating favorable conditions for groundwater recharge.

The potential zones exhibit promising yield prospects, as evidenced by significant discharge rates observed.

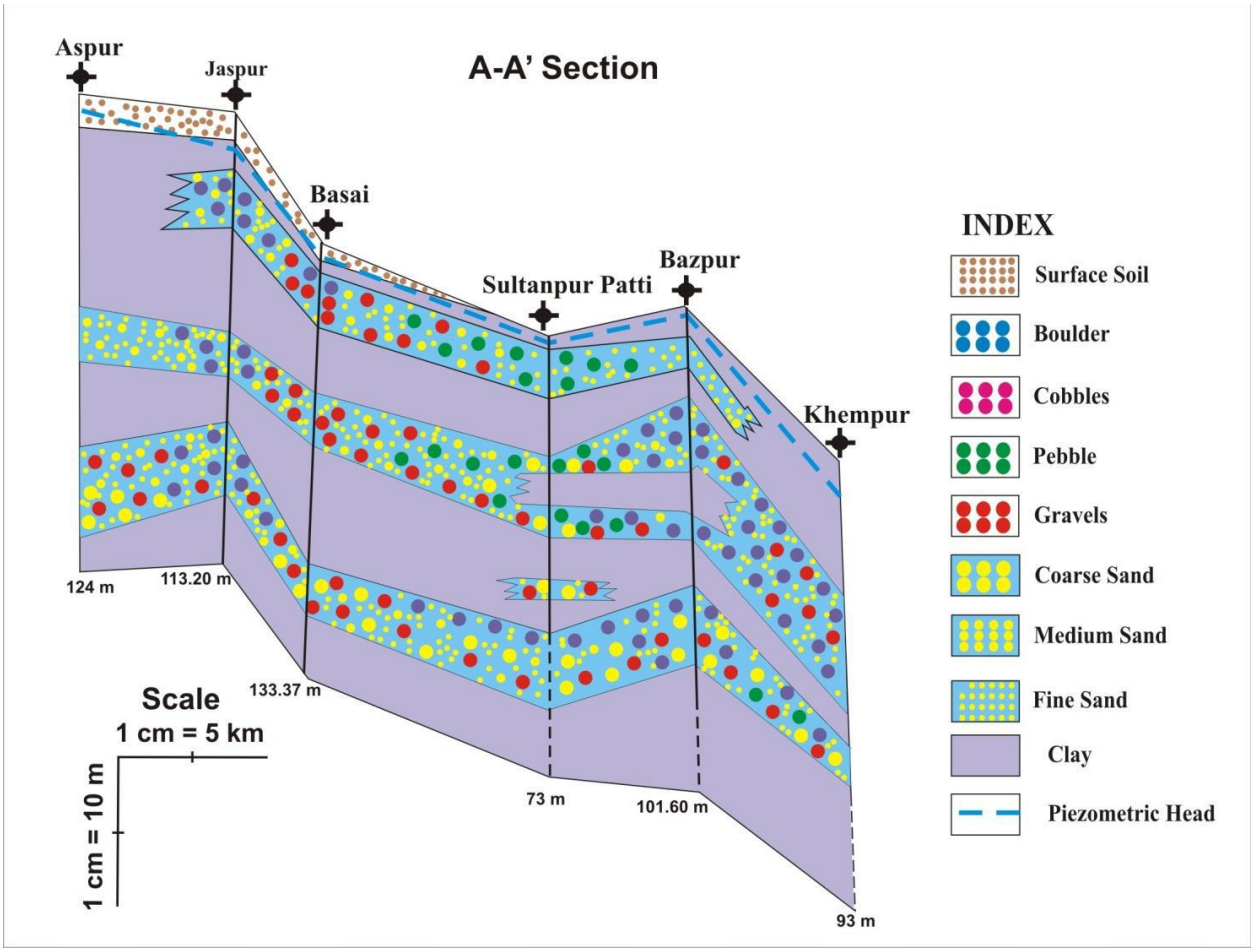

Figure-5 Lithological Section Depicting Sub-surface lithological variation.

6. Calculation of Rainfall Runoff from Rooftop for Artificial Recharge

Though no location provided by Minor Irrigation department is suitable for artificial recharge to ground water (Annexure-1) as all location fall in an area where depth to water level is below 5.00 m bgl during post monsoon, calculation for estimation of the recharge capacity of catchment area is furnished below.

The amount of rainwater harvested is computed as follows:

A * R * C

Where: A = Area of catchment (in sq.m), R = Rainfall (in m), C = Run off coefficient of catchment

As per the norms, the following coefficients are considered:

Sl No.	Type	Run off Coefficient
a	Rooftop	0.8
b	Road and Paved Area	0.6
c	Greenbelt	0.15

A model calculation for estimating the recharge potential of catchment area 1000 sq. m (0.1 hectare) comprising of rooftop and greenbelt has been demonstrated below:

Sl. No.	**Catchment type**	**Area (sq. m)**	**Annual Rainfall (m)**	**Runoff Co-efficient**	**Volume (m^3/yr)**
1	**2**	**3**	**4**	**5**	**6=3*4*5**
A	Rooftop	800	1.5	0.8	960
B	Greenbelt	200	1.5	0.15	45

The rainwater will be collected through piped drains and conveyed into rainwater harvesting system. Storm water drains should be designed for adequate size and slope such that there shall not be any flooding in the site. Water pipes should be UV resistant (ISI HDPE/PVC pipes) of required capacity. Water from sloping roofs could be caught through gutters and down take pipe. It shall be ensured that no wastewater shall enter into storm water drainage system. At terraces, mouth of each drain should have wire mesh to restrict floating material. The first shower of rains needs to be flushed-off to avoid contaminating storable/rechargeable water by the probable contaminants of the atmosphere and the catchment roof. Provisions of first rain separator should be made at outlet of each drainpipe. The water will be stored in a storage tank and then recharged through recharge well.

Considering a peak rainfall event with intensity of rainfall 25 mm/ hr, the amount of water that will be generated as runoff in one hour is calculated as below:

Catchment type	**Area (m^2)**	**Runoff Coefficient (C)**	**Rainfall Intensity (I) (m/hr)**	**Runoff Available (Q=CIA) (m^3/hr)**
Rooftop Area	800	0.8	0.025	16
Greenbelt	200	0.15	0.025	0.75
Total				**16.75**

Q = run off (discharge) in cubic meters per hour

Considering runoff generated from rooftop and greenbelt area, structures should be constructed to accommodate 16.75 m^3 of water. The storage cum recharge tanks are recommended of the dimensions 2m (Length) X 2 m (Breadth) X 1 m (Height) divided into 2 chambers- de-siltation chamber and recharge chamber. Effective storage area of each tank is **4 cubic meters**.

A recharge well (6-inch diameter) of approximately **10 m bgl depth** is recommended to be drilled. The pipe should be perforated for infiltration of the rainwater. The perforated area should be covered with a mesh cloth which will act as a filter. This mesh cloth should be periodically changed for maintaining the structure. Dual V wire screen filters can also be used to reduce maintenance costs.

Considering the discharge of the tubewells in the area is around 1200 lpm, the recharge capacity of the well is assumed to be 25 % of the discharge. Hence the recharge capacity of the well will be 18 m^3/hr.

The total capacity of the structure = 4 m^3+ 18 m^3= 22 m^3

Hence, a storage tank along with one recharge well having slotted (1.58 mm) pipe of 12 m length is recommended to accommodate the total runoff during peak rainfall as shown in schematic diagram (figure-6).

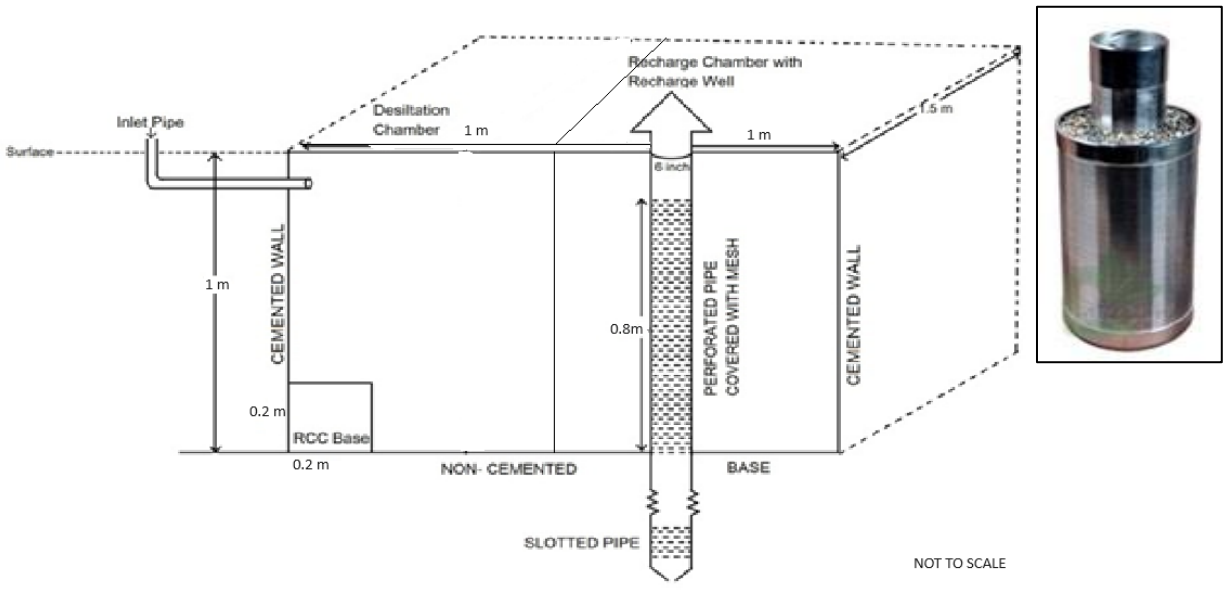

Figure-6 Schematic diagram of recharge well along with storage tank dual V wire screen filter displayed at the right

7. Recommendations

The proposed locations for construction of recharge shaft for aquifer recharge in Udham Singh Nagar given by Minor Irrigation department, Uttarakhand are not meeting the recharge criterion, hence, not suitable as a recharge sites. It is suggested that the Artificial Recharge schemes should only be taken up in those areas where water level is more than 5 m below ground level (post monsoon). In Udham Singh Nagar District, Jaspur Block, part of Kashipur, Bazpur and other area shown in (figure-4) is suitable for artificial recharge with recharge well/shaft. If artificial recharge in this area will be constructed, following measures should be taken during implementation of artificial recharge

- As per the directions of Hon'ble NGT, the Ministry of Jal Shakti, Govt. of India has directed to avoid Rain Water Harvesting System for the purpose of Artificial Recharge in the vicinity of sewerage system components/ landfill sites etc where chances of contamination are high through mingling of untreated sewerage water/domestic wastes. Therefore, it is suggested that only non-polluted rainwater from the rooftops has to be diverted to recharge structure through connection of downpipe.
- In areas prone to heavy traffic congestion, such as district transport offices, it is crucial to prevent rainfall runoff from open land. Similarly, at hospitals or clinics, it is essential that runoff from rooftop rainwater is directed exclusively to recharge structures to prevent groundwater contamination. These measures are vital for safeguarding groundwater quality in urban environments affected by high traffic and medical activities.
- There should be proper arrangements in place to prevent sewage water or contaminated water from paved area from mixing into run-off/ recharged water.
- The design of RWH should have provision to by-pass first rooftop harvested rainwater. Mixing of drain water with rooftop run off or with runoff from paved areas, where vehicular movement takes place, should be prevented.
- The water should be made silt free before it enters into the recharge well. For this purpose, first flush system should be installed in the RWH system.
- Development of the recharge well should be done with the air compressor as it will help to clear the screen of the well and surrounding formation material, if groundwater is encountered during construction of the recharge well.

- After development of the recharge well, intake capacity of the recharge well should be determined, using slug test.
- The catchments should be neat and clean. The rooftop/terrace of the building spaces should not be used for dumping of unwanted items and scrap material.
- Precaution should be taken to avoid domestic waste water entering into the recharge structures.
- Before the arrival of monsoon, the roof top as well as drains should be properly cleaned properly.
- Storage tank along with one recharge well having slotted (1.58 mm) pipe of 12 m length is recommended to accommodate the total runoff during peak rainfall.

For any technical guidance, below-mentioned office may be contacted as and when required

Regional Director, Central Ground Water Board, Ministry of Jal Shakti, Government of India, Uttaranchal Region, 419 – A, Kanwali Road, Balliwala, Dehradun – 248 001

Email: rdur-cgwb@nic.in

ANNEXURE 1

S.No.	Block	Proposed Location	Proposed Catchment Area (Ha)	Latitude	Longitude	WL Range during post-monsson 2023	Remark
1	रूद्रपुर	विकास खण्ड कॉलोन में रिचार्ज शॉफ्ट निर्माण	0.61	28.96910	79.39004	<5 m	Not Suitable for AR
2	रूद्रपुर	उत्तरा0 ग्राम्य विकास एवं पंचायतीराज संस्थान	0.274	28.96826	79.39458	<5 m	Not Suitable for AR
3	रूद्रपुर	उद्यान सचल दल केन्द्र में रिचार्ज शॉफ्ट निर्माण	0.148	28.98346	79.35565	<5 m	Not Suitable for AR
4	रूद्रपुर	रा0बा0इ0 कॉलेज फाजलपुर में रिचार्ज शॉफ्ट निर्माण	0.155	28.96597	79.39079	<5 m	Not Suitable for AR
5	रूद्रपुर	प्रसार प्रशिक्षण केन्द्र में रिचार्ज शॉफ्ट निर्माण	0.205	28.96954	79.39073	<5 m	Not Suitable for AR
6	रूद्रपुर	जिला पशु चिकित्सालय अस्पताल में रिचार्ज शॉफ्ट निर्माण	0.211	28.97004	79.3923	<5 m	Not Suitable for AR
7	रूद्रपुर	लघु सिंचाई विभाग कॉलोनी में रिचार्ज शॉफ्ट निर्माण	0.264	28.97116	79.39155	<5 m	Not Suitable for AR
8	रूद्रपुर	शव विच्छेदन ग्रह रूद्रपुर में रिचार्ज शॉफ्ट निर्माण	0.214	28.97006	79.40023	<5 m	Not Suitable for AR
9	रूद्रपुर	आयुर्वेदिक अस्पताल(ब्लड बैंक के पास) रिचार्ज शॉफ्ट निर्माण	0.208	28.97085	79.39984	<5 m	Not Suitable for AR
10	रूद्रपुर	सहा0अभि0 तृतीय सिंचाई विभाग कार्यालय के सामनें रिचार्ज शॉफ्ट निर्माण	0.353	28.97356	79.40001	<5 m	Not Suitable for AR
11	रूद्रपुर	अधीक्षण अभियन्ता सिंचाई विभाग कार्यालय के पास रिचार्ज शॉफ्ट निर्माण	0.456	28.97391	79.39884	<5 m	Not Suitable for AR
12	रूद्रपुर	गॉधी पार्क मैदान में रिचार्ज शॉफ्ट निर्माण	0.302	28.9767	79.39855	<5 m	Not Suitable for AR
13	रूद्रपुर	जवाहर लाल नेहरू जिला चिकित्सालय कें पास रिचार्ज शॉफ्ट निर्माण	0.118	28.99201	79.40191	<5 m	Not Suitable for AR
14	रूद्रपुर	जिला पंचायत कैम्पस के पास रिचार्ज शॉफ्ट निर्माण	0.247	28.99366	79.40118	<5 m	Not Suitable for AR
15	रूद्रपुर	रिजर्व पुलिस भर्ती ग्राउंड के किनारे रिचार्ज शॉफ्ट निर्माण	0.737	28.99289	79.40256	<5 m	Not Suitable for AR
16	रूद्रपुर	रिजर्व पुलिस लाईन गेट के पास रिचार्ज शॉफ्ट निर्माण	0.584	28.9937	79.404	<5 m	Not Suitable for AR
17	रूद्रपुर	मण्डी भवन के पास रिचार्ज शॉफ्ट निर्माण	0.407	28.9968	79.40532	<5 m	Not Suitable for AR
18	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 सी0ओ0 आवास के पास रिचार्ज शॉफ्ट निर्माण	0.652	28.99826	79.39441	<5 m	Not Suitable for AR
19	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 मैस के पास रिचार्ज शॉफ्ट निर्माण	0.668	28.99845	79.3933	<5 m	Not Suitable for AR

20	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 चिकित्सालय के पास रिचार्ज शॉफ्ट निर्माण	0.282	28.99212	79.39355	<5 m	Not Suitable for AR
21	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 गेट नं0–2 के किनारे रिचार्ज शॉफ्ट निर्माण	0.247	28.98948	79.39147	<5 m	Not Suitable for AR
22	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 गेट नं0–2 टाईप –02 आवास के पास रिचार्ज शॉफ्ट निर्माण	0.255	28.98946	79.39314	<5 m	Not Suitable for AR
23	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 परेड ग्राउंड द्वितीय के पास रिचार्ज शॉफ्ट निर्माण	1.128	28.99199	79.39117	<5 m	Not Suitable for AR
24	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 परेड ग्राउंड प्रथम के पास रिचार्ज शॉफ्ट निर्माण	1.64	28.9972	79.39199	<5 m	Not Suitable for AR
25	रूद्रपुर	46वीं वाहिनी पी0ए0सी0 प्रशासनिक भवन के पास रिचार्ज शॉफ्ट निर्माण	0.15	28.99848	79.39981	<5 m	Not Suitable for AR
26	रूद्रपुर	जिला सत्र न्यायालय बार भवन के पास रिचार्ज शॉफ्ट निर्माण	0.158	28.99627	79.39968	<5 m	Not Suitable for AR
27	रूद्रपुर	जिला सत्र न्यायालय के पास रिचार्ज शॉफ्ट निर्माण	0.151	28.95458	79.3983	<5 m	Not Suitable for AR
28	रूद्रपुर	31वीं0 वाहिनी पी0ए0सी0 प्रवेश द्वार के पास रिचार्ज शॉफ्ट निर्माण	0.5	28.98738	79.3996	<5 m	Not Suitable for AR
29	रूद्रपुर	31वीं0 वाहिनी पी0ए0सी0 वेरिकेट मैस के पास रिचार्ज शॉफ्ट निर्माण	0.368	28.98655	79.39369	<5 m	Not Suitable for AR
30	रूद्रपुर	31वीं0 वाहिनी पी0ए0सी0 छः ब्लॉक टाईप–1 आवास के पास रिचार्ज शॉफ्ट निर्माण	0.409	28.9844	79.39328	<5 m	Not Suitable for AR
31	रूद्रपुर	31वीं0 वाहिनी पी0ए0सी0 टाईप–2 आवास के पास रिचार्ज शॉफ्ट निर्माण	0.534	28.98327	79.39167	<5 m	Not Suitable for AR
32	रूद्रपुर	31वीं0 वाहिनी पी0ए0सी0 आवासीय परिसर कमान्ड हाउस के पास रिचार्ज शॉफ्ट निर्माण	0.647	28.9837	79.39962	<5 m	Not Suitable for AR
33	रूद्रपुर	31वीं0 वाहिनी पी0ए0सी0 परेड ग्राउंड के पास रिचार्ज शॉफ्ट निर्माण	0.989	28.98429	79.39786	<5 m	Not Suitable for AR
34	रूद्रपुर	विकास भवन जिला अग्रणीय कार्यालय के पास रिचार्ज शॉफ्ट निर्माण	0.35	28.99957	79.40113	<5 m	Not Suitable for AR
35	रूद्रपुर	विकास भवन रोड के पीछे रिचार्ज शॉफ्ट निर्माण	0.301	28.99927	79.40148	<5 m	Not Suitable for AR
36	रूद्रपुर	जिलाधिकारी, ऊ0सिं0नगर कार्यालय गेट नं0–2 के पास रिचार्ज शॉफ्ट निर्माण	0.65	28.99814	79.40277	<5 m	Not Suitable for AR
37	रूद्रपुर	जिलाधिकारी, ऊ0सिं0नगर कार्यालय गेट नं0–2 (द्वितीय छोर) के पास रिचार्ज शॉफ्ट निर्माण	0.701	28.99839	79.40075	<5 m	Not Suitable for AR

38	रूद्रपुर	जिलाधिकारी, ऊ0सिं0नगर कार्यालय मुख्य प्रवेश द्वार के पास रिचार्ज शॉफ्ट निर्माण	0.71	28.99714	79.40152	<5 m	Not Suitable for AR
39	रूद्रपुर	छण्भ्ण् हल्द्वानी के सामन जिलाधिकारी, ऊ0सिं0नगर कार्यालय गेट के पास रिचार्ज शॉफ्ट निर्माण	0.182	28.99647	79.40138	<5 m	Not Suitable for AR
40	रूद्रपुर	जिलाधिकारी, ऊ0सिं0नगर कार्यालय के पास रिचार्ज शॉफ्ट निर्माण	0.286	28.99681	79.4018	<5 m	Not Suitable for AR
41	रूद्रपुर	सरदार भगत सिंह रा0स्नातकोत्तर महाविद्यालय में रिचार्ज शॉफ्ट निर्माण	0.356	28.95925	79.38438	<5 m	Not Suitable for AR
42	रूद्रपुर	अटल उत्कृष्ठ अ0एन0झा0 इ0कालेज में रिचार्ज शॉफ्ट निर्माण	0.216	28.96206	79.38914	<5 m	Not Suitable for AR
43	रूद्रपुर	रा0बा0उ0मा0 विद्यालय रामनगर,रूद्रपुर में रिचार्ज शॉफ्ट निर्माण	0.201	28.95925	79.42756	<5 m	Not Suitable for AR
44	रूद्रपुर	जनता इण्टर कॉलेज में रिचार्ज शाफ्ट निर्माण	0.244	28.97982	79.39668	<5 m	Not Suitable for AR
45	रूद्रपुर	श्री गुरूनानक बालिका इण्टर कॉलेज में रिचार्ज शाफ्ट निर्माण	0.26	28.97868	79.39402	<5 m	Not Suitable for AR
46	रूद्रपुर	अधिशासी अभियन्ता,उत्तराखण्ड जल संस्थान कार्यालय में रिचार्ज शाफ्ट निर्माण	0.394	28.99554	79.40155	<5 m	Not Suitable for AR
47	रूद्रपुर	अधिशासी अभियन्ता, पेयजल निगम रूद्रपुर में रिचार्ज शाफ्ट निर्माण	0.281	28.99756	79.40492	<5 m	Not Suitable for AR
48	रूद्रपुर	मुख्य शिक्षा अधिकारी कार्यालय मे रिचार्ज शाफ्ट निर्माण	0.149	28.99768	79.40444	<5 m	Not Suitable for AR

AR = Artificial Recharge