STATUS REPORT ON INFILTRATION WELLS ALONG THE TAWI RIVER AT JAMMU

NATIONAL INSTITUTE OF HYDROLOGY

WESTERN HIMALAYAN REGIONAL CENTRE

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1. BACKGROUND

NIH has signed an MoU in the month of April, 2011 with the University of Applied Sciences, Dresden, Germany to establish and operate an "Indo-German Competence Centre for Riverbank Filtration (IGCCRBF)" at NIH Roorkee. As followup of this MoU, NIH has participated in a collaborative R&D project sponsored by the European Commission titled **"Saph Pani - Enhancement of natural water systems and treatment methods for safe and sustainable water supply in India"** for duration of 36 months from October, 2011 involving a consortium of 20 partners from India, European Union, Switzerland, Sri Lanka and Australia**.** Saph Pani builds on already existing Indian projects for natural treatment and storage of water identifying potential for their improvement by applying hi-tech measurement equipment and conducting field trials. The Saph Pani project aims to study and improve natural water treatment systems such as river bank filtration (RBF), managed aquifer recharge (MAR) and wetlands in India building local and European expertise in this field. The project aims to enhance water resources and water supply particularly in water stressed urban and peri-urban areas in different parts of the Indian sub-continent.

To fulfil the requirement of the MoU signed in the context of "IGCCRBF" and to follow up the tasks of 'Saph Pani' project, NIH has to prepare a database of existing water supply schemes (may be known as infiltration wells/intake wells) located along different streams/rivers in the country. In this regard, a meeting was held in the office of the Director, NIH on 18th May, 2012 and all the regional centres were asked to prepare the database of infiltration wells for the streams lying in their area of jurisdiction (Ref. Letter No. NIH/GWD/SPP(ERC)/8.2 dated 18th May, 2012).

In this connection, the communications with the Public Health Engineering Deptt. (J&K) and Irrigation and Public Health Deptt. (Himachal Pradesh) were made by WHRC, Jammu and it was found that the infiltration wells are located along the Tawi river at Jammu (J&K). Therefore, the

field visits were made by Dr. Pradeep Kumar and Mr. Manish K. Nema to collect the information on infiltration wells located along the Tawi river. As no water quality data was available with the concerned departments, water samples from the infiltration wells, streams and supplied water were also collected for water quality analysis at NIH, Roorkee. The details of collected baseline information are given in the following sections:

2. WATER SUPPLY AND DEMAND STATUS OF JAMMU

The present potable water requirement of Jammu city as formulated by the PHE Department for Jammu is of the order of 63 million gallon daily (MGD). Against this total demand, the water supply to the Jammu is only 51 MGD which was only 81% of the total requirement to the city. Thus the city faced shortfall of 12 MGD of water per day. At present, the source of water supply to Jammu is surface water pumped from Tawi river and ground water (aquifers recharged by Tawi river only) tapped through tubewells. Tubewells are the main source of water supply which constitute 62% of the total water supply. The remaining 38% water supply is met from surface water. As on April, 1999, there were 125 tubewells in Jammu, of which 115 were functional and 10 tubewells were sick and under revival by PHED. Total water supply from tubewells was 31.50 MGD. The surface water supply of 19.5 MGD is being tapped from Tawi River at two lift stations at Sitlee (15.0 MGD), Dounthly (2.5 MGD) and Tawi filtration plant at Panchtirthi (2 MGD).

Besides shortage of water supply, there are various other problems.

(i) Faulty distribution system: Water distribution system in the old city is age old with faulty mains and leakage.

(ii) Less storage capacity.

(iii) Elevated reservoirs

(iv) Age old conventional water plants especially at Dhauntly and Sitlee.

(v) Low supply of surface water from Tawi river resulted in tapping ground water by tube-wells which is adversely affecting ground water level.

(vi) Tubewell boring in area falling under Kandi belt is not feasible.

(vii) As such, acute water shortage in some zones, identified as Old City area, Bhagwati Nagar, Mohinder Nagar, Talab Tillo, Indra Colony, Patel Nagar, Canal Road area, Sarwal, Reheri, Ambphalla, Shaktinagar, New plots, Shiv Nagar, Subash Nagar, Muthi etc.

3. FIELD SURVEY OF INFILTRATION WELLS ALONG TAWI RIVER

For the collection of information regarding infiltration wells, a meeting was held with the Chief Engineer (Jammu), Public Health Engineering Deptt. (J&K). He informed that there are approximately 20 wells located along the bank of Tawi river. As per his suggestions, we met with Mr. N. K. Khajuria, Executive Engineer, PHE, Panjteerthi, Jammu. He informed that these infiltration wells are located on both the banks of the river and these are maintained by two sub-divisions (one at Company Bag & one at Panama Chowk). Further, we met with Mr. Rakesh Bhatti, AEE (Company Bag) who appointed Mr. Anil Bhardwaj for the field survey of infiltration wells on the right bank. For the survey of left bank, we met with Mr. R. K. Rakhwal, AEE (South Division, Panama Chowk) who appointed Mr. Raman for the field visit. The survey of infiltration wells located along the bank of Tawi river at Jammu was carried out with the help of GPS for identification of lat-long and digital camera for taking photographs. Other information such as discharge, depth of well, no. of running hours, year of construction, purpose being served etc. were collected from the respective offices. After pumping, the water is conveyed to a reservoir from where the water after proper treatment is lifted to over head tank and then supplied to the public. These reservoirs are separately located for left bank and right bank infiltration wells. Hence, the population being served from individual infiltration wells could not be identified. The data collected has been summarized and presented in Table 1 and the location of infiltration wells is shown in Fig. 1. These divisions deal with other tubewells also that is why the numbers are not continuous. In the present report, only the wells located near the river bank has been covered.

Table 1: Summary of River Bank Filtration Wells located in Jammu Province

S. No.	Well ID	Lat-Long	Alt.	Location	City/ Town/ Village	District	River/ Stream on which well is located	Distance of infiltration well from river/ stream	Purpose being served	No. of hours being operated in a day	Year of construction	Rate of pumping	Depth of tube well
												GPH	ft
Right Bank													
1	TR 03	N32 43 23.3 E74 51 25.4	295 m	PHE Office, Company Bagh	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1954	40000	170
2	TR 08	N32 43 21.1 E74 51 18.9	300 m	M A Stadium	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1960	25000	250
3	TR 02	N32 43 20.2 E74 51 22.2	300 m	Pool Side, M A Stadium	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1954	40000	260
4	TR 17	N32 43 18.1 E74 51 11.7	301 m	CRPF Camp, MA Stadium	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1980	30000	290
5	TR 05	N32 43 17.5 E74 51 09.5	301 m	M A Stadium	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1956	30000	200
6	ERA 1	N32 43 26.6 E74 51 02.0		Science College	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	2006	40000	406
7	ERA 2	N32 43 20.2 E74 51 06.3		Science College	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	2006	30000	551
8	ERA 3	N32 43 14.8 E74 51 56.8		Science College	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	2006	35000	551
9	TR 11	N32 43 26.6 E74 51 37.1	309 m	Samadhia	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1960	30000	250
10	TR Exhib^{n} Ground	N32 43 22.1 E74 51 36.7	306 m	Exhibition Ground	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	2000	25000	300
11	TR 04	N32 43 21.1	291 m	Samadhia	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1955	30000	300

		E74 51 28.0											
12	TR 07	N32 43 26.2 E74 51 42.5	309 m	Samadhia	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1960	25000	270
Left Bank													
13	TL 03	N32 43 16.0 E74 51 56.8	305 m	Left bank (Tawi River)	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1986	35000	229
14	TL 05	N32 43 10.2 E74 51 45.7	295 m	Left bank (Tawi River)	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1989	20000	180
15	TL 07	N32 42 56.1 E74 51 59.0	290 m	Astroturf Stadi. Jammu University	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1993	20000	200
16	TL 08	N32 43 39.8 E74 52 52.3	294 m	Har Ki Pauri	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1990	10000	190
17	TL 01	N32 43 20.1 E74 52 21.2	292 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1983	40000	175
18	TL 10	N32 43 13.2 E74 52 24.1	299 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1997	15000	262
19	TL 11	N32 43 18.9 E74 52 21.3	290 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1997	15000	240
20	TL 12	N32 42 55.1 E74 51 01.9	302 m	Belicharana	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1995	10000	180
21	TL 13	N32 43 18.3 E74 52 24.0	292 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1995	10000	190
22	TL 14	N32 43 17.2 E74 52 22.9	292 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1995	10000	175
23	TL 15	N32 42 54.6 E74 51 56.2	305 m	Astroturf Stadi. Jammu University	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1998	20000	160
24	TL 02	N32 43 20.6 E74 52 19.5	286 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1984	25000	162
25	TL 06	N32 43 15.0 E74 52 28.4	298 m	Boria Colony	Jammu	Jammu	Tawi	< 100m	Drinking	20-22 hrs/day	1980	10000	170

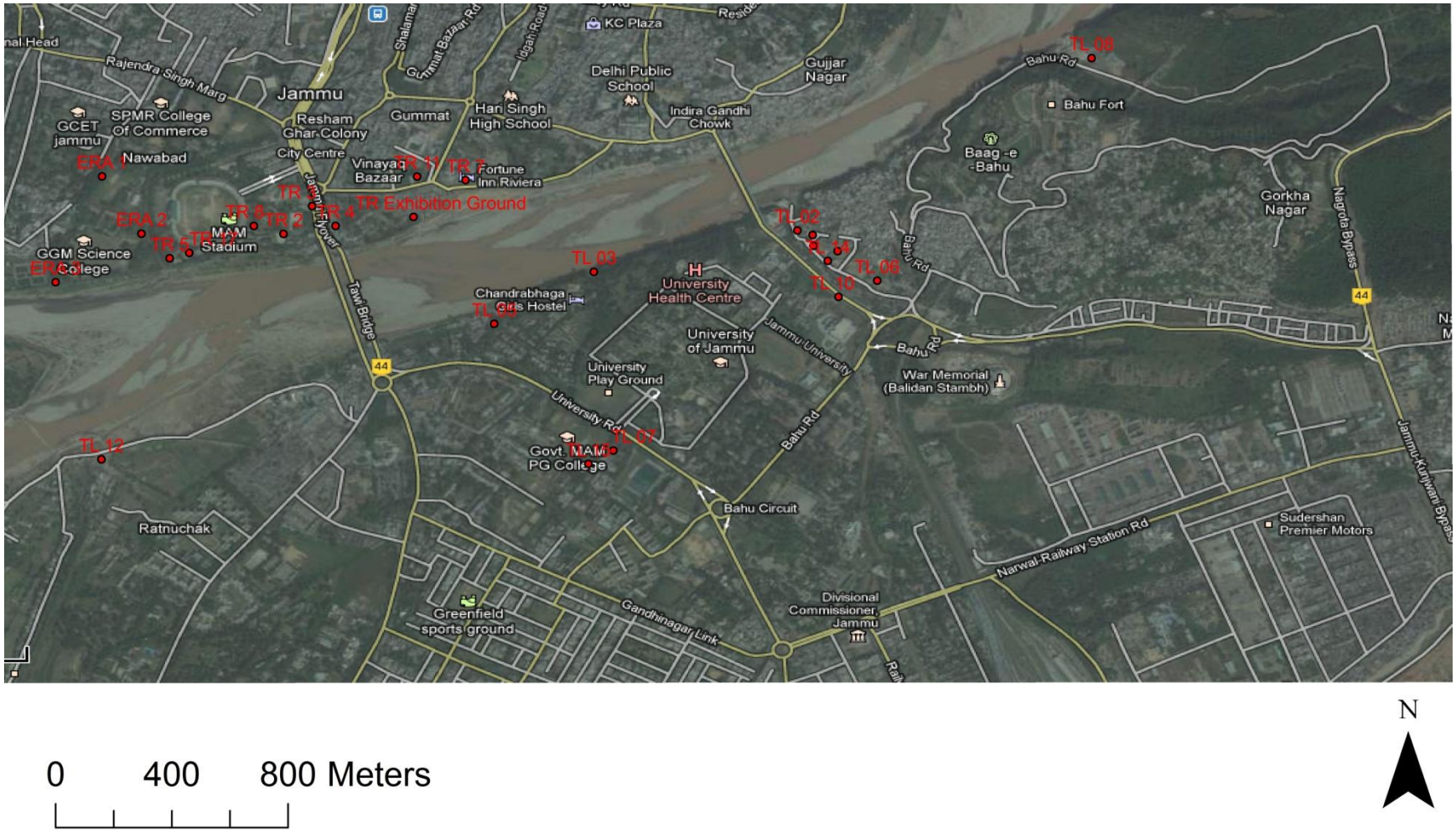


Fig. 1: Map showing location of river bank filtration wells located along left and right bank of Tawi river

3.1 Field Survey of Infiltration Wells on Right Bank of Tawi River

The physical verification and survey of the infiltration wells on the left bank of Tawi river were carried out by WHRC Team on 26/10/2012. There are a total of 12 infiltration wells on the right bank of Tawi river. All the wells are being used for drinking water supply by PHE Deptt. (J&K). These wells are operational and running for approx. 20-22 hours per day. The year of construction of the oldest well is 1954 (TR 03 & TR 02) and that of the latest is 2006 (ERA 1, 2, 3). The rate of pumping of these wells varies from 25000 to 40000 Gallons per hour. The depth of these wells varies from 170 to 551 ft. The photographs showing the infiltration wells are as below:

Infiltration well (TR 03) at Company Bagh

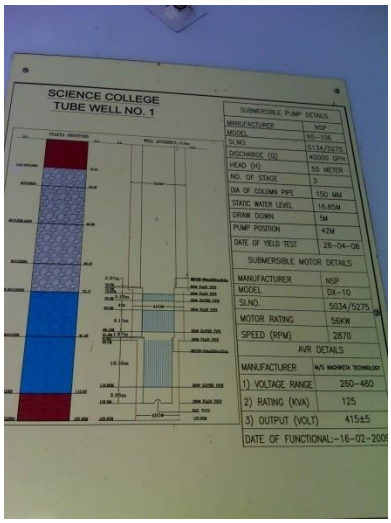
Infiltration well (TR 08) at M A Stadium

Infiltration well (TR 02) at Pool Side, M A Stadium

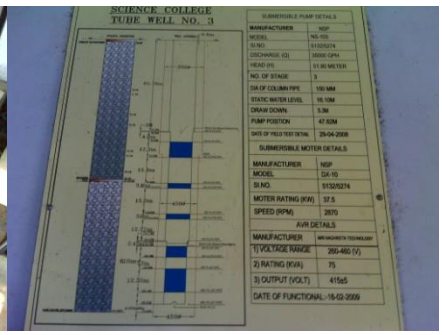
Infiltration well (TR 17) at CRPF Camp, MA Stadium


Infiltration well (TR 05) at M A Stadium

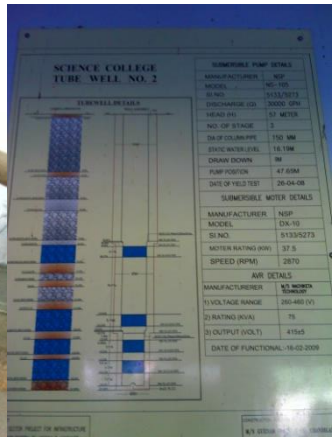




Infiltration well (ERA 01) at Science College alongwith the discharge measuring device and Strata chart

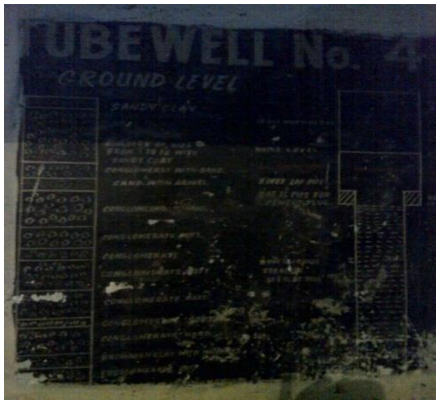
Infiltration well (ERA 03) at Science College alongwith the Strata chart



Infiltration well (ERA 02) at Science College alongwith the Strata chart

Infiltration well (TR 11) at Samadhia alongwith the Strata chart

Infiltration well (TR Exhibition Ground)

Infiltration well (TR 04) at Samadhia alongwith the Strata chart

3.2 Field Survey of Infiltration Wells on Left Bank of Tawi River

The physical verification and survey of the infiltration wells on the left bank of Tawi river were carried out by WHRC Team on 29/10/2012. There are a total of 13 infiltration wells on the left bank of Tawi river. All the wells are being used for drinking water supply by PHE Deptt. (J&K). The wells on the left bank are also operational and running for approx. 20-22 hours per day. The year of construction of the oldest well is 1980 (TL 06) and that of the latest is 1998 (TL 15). The rate of pumping of these wells varies from 10000 to 40000 Gallons per hour. The depth of these wells varies from 160 to 262 ft.

The wells located on the right bank are comparatively older and still having higher rate of pumping than the wells of left bank.

Infiltration well (TL 06) at Boria Colony

Infiltration well (TL 10) at Boria Colony alongwith the strata chart

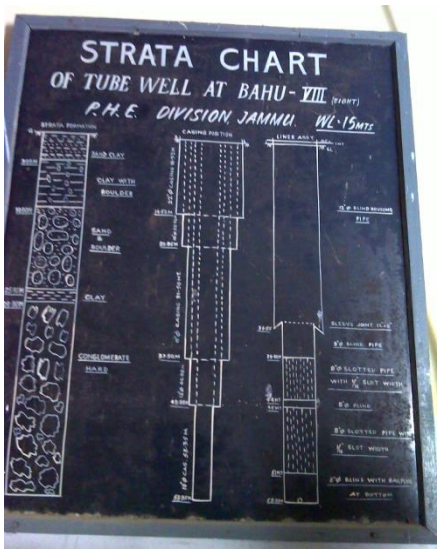
Infiltration well (TL 11) at Boria Colony alongwith the strata chart

Infiltration well (TL 01) at Boria Colony

Infiltration well (TL 02) at Boria Colony

Infiltration well (TL 13) at Boria Colony

Infiltration well (TL 14) at Boria Colony



Infiltration well (TL 08) at Har ki paodi alongwith the strata chart

Infiltration well (TL 07) at Astro Turf Stadium, Jammu University

Infiltration well (TL 15) at Astro Turf Stadium, Jammu University


Infiltration well (TL 05) very near to the river bank

Infiltration well (TL 03) very near to the river bank


Infiltration well (TL 12) at Belicharana

4. COLLECTION OF WATER SAMPLES FOR WATER QUALITY ANALYSIS

A total of 27 samples (3 samples from each locations i.e. one for COD, one for metals and one for other parameters) have been collected from 9 locations as listed in the Table 2.

Table 2: Details of sampling locations for water quality analysis

S. N.	Source of water	Sampling Location	Lat- Long	Altitude
1	Infiltration Well (Max) – Right Bank	TR ERA1 at Science College	N32 43 26.6 E74 51 01.9	301 m
2	Infiltration well (min) – Right Bank	TR 03 at PHE Office, Company Bag	N32 43 23.3 E74 51 25.4	295 m
3	Supply water – Right Bank	Sitli Filtration Plant supply line at Panchtirthi	N32 44 35.7 E74 52 14.5	379 m
4	Infiltration well (max) – Left Bank	TL 07 near to Boy's Hostel MA collage	N32 42 56.9 E74 51 59.7	306 m
5	Infiltration well (min) – Left Bank	TL 03 near to left bank	N32 43 16.0 E74 51 56.7	294 m
6	Supply water – Left Bank	Boria Filtration Plant supply line at Boria	N32 43 15.3 E74 52 26.6	309 m
7	Tawi river u/s	Har ki Podi	N32 43 42.7 E74 52 49.8	295 m
8	Tawi river m/s	Bridge at Vikram Chowk	N32 43 14.5 E74 51 31.9	289 m
9	Tawi river d/s	New Bridge at Belicharana	N32 43 11.7 E74 50 47.3	278 m

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