

Christine de Wijk

Rob Wijdevans 11/4/98

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WATER SUPPLY AND

13.04.95 06992

RAIN WATER HARVESTING IN LDPE LINED PONDS

TAL: DHANDHUKA DIST: AHMEDABAD

L. Vignog

The World Bank Supervision Mission during its visit to Gujarat in November 1998 agreed for the work of construction of ponds (Rain water harvesting structures). The work was entrusted to Uthan N.G.O working in that area.

The Pond comprises of following components :-

1. Pond with bed and side lining.
2. Inlet system for guiding flow from catchment to pond.
3. Outlet system for taking water from pond to filter system.
4. Filter system comprising of filter bed, storage sump, hand pumps and water meter.
5. Cattle trough for drinking water to cattle.

A general layout showing all these components is shown in drawing No 1.

The ponds are proposed to be constructed in Bhal area of Tal Dhandhuka. Most of the part of this area is situated near sea. Hence soil of this area and underground water contains high concentration of salinity.

The main purpose of lining of ponds by plastic is to prevent percolation of water to ground and entry of saline water and salinity of soil to the pond water collected during monsoon.

A project for constructing ponds in 14 villages was sanctioned. Out of these the work of ponds in 11 villages is mostly completed. Moreover such ponds in 6 villages were constructed by the Uthan in past. The project was sanctioned as a pilot project to use water for other purposes like bathing washing etc as water of previously constructed ponds was not fit for drinking purpose.

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Water samples from these ponds at certain time interval were collected and get analysed. Results were not encouraging as the water was containing high concentration of TDS and chloride. Results are shown in annexure 1 and 2.

From the results it was concluded that there are certain limitations and drawbacks of the LDPE lined ponds which are narrated as under :

1. Soil of this area is saline. Hence rain water which is collected in the ponds as runoff + carry salinity of soil with it. Thus water being collected in the ponds it self is saline.
2. In this dry area loss of water by evaporation during the year is about 2 metres. Due to evaporation the concentration of salinity in the pond increases with time. As a result in summer the quantity of water left in the pond will be too less and salinity will be more. Thus quality of water will not be fit for drinking purpose.
3. Moreover pond water always be bacteriologically unfit for drinking purpose. Filter unit installed on the side of the pond will be not so efficient to remove so high bacteriological load. There will be about 0.6., head loss in the filter beds. In summer depth of water will be 1 m or less. Hence sufficient head will not be available for proper functioning of the filter unit.
4. Water table in this area remains 2 m to 3 m below ground level- The bed of the pond should be kept sufficiently above water table. If this condition is observed depth of pond will have to be restricted to 2 m. But as evaporation losses during year are 2m no water will be left in the pond during summer. If the depth is kept 3-5 to 4.0 m there will be possibility of lifting plastic. due to uplift pressure of under ground water when pond is empty. Due to this uplift pressure of plastic is damaged the main

5. Soil of this area is black cotton soil. Behaviour of this soil is such that volume increases when wet and decreases when dry and as a result cracks are developed in the soil. This behaviour results in unequal settlement of the components resting on it. Due to this unequal settlement lining and plastic are damaged.

6. In the project it is proposed to dewater the ponds once in two years in the end of summer so that saline water is removed.

If ponds are dewatered in the end of summer and rain is delayed people will have to remain without water when it is badly required because forecasting of monsoon will never be so perfect. Due to increase in salinity of water in the ponds sweet soil spread on the plastic at bed also turns saline. This soil also requires to be replaced by sweet soil. Cost of sweet soil comes to about Rs 40,000 to Rs. 45,000. During removal of sweet soil there is all the possibility of damaging of plastic. This damaged plastic also requires to be repaired and replaced. All these will add considerably to the maintenance cost.

7. Construction cost of these ponds will be Rs 9 lacs to Rs 15 lacs according to size of pond. Capital cost per 1000 litres of water comes to about Rs 140 to Rs 200 and that also for the water which is not fit for drinking purpose.

8. Sites for ponds are selected outside villages and at higher place. Due to this higher place the ponds are not filled up fully because rain water is collected in these ponds by gravity—As ponds are not filled up fully, there will not be any water in the ponds in summer as 2 m water will be evaporated during year.

9. Net available quantity of water will be about 15 to 20 litres per capita per day. Capital cost per capita for prospective population comes to about Rs 900

**Details of Plastic lined Ponds constructed in Bhal
area, Tal. Dhandhuka, Dist. Ahmedabad**

Sr. No.	Name of village	Size of pond L x W in m.	Probable expendi- ture to complete work in Rs.lakh	On dt. 28.7.93		On dt. 20.1.94			On dt. Depth o	
				Depth of water in M	Quality of water as per Chemical report T.D.S. (ppm)	Chloride (ppm)	Depth of water in M	Quality of water T.D.S. (ppm)		Chloride (ppm)
1.	Buranpur	60 x 60	9.84	3.60	3182	1460	1	6000	3080	N11
2.	Navagam Karna	65x 70	9.15	1.20	1296	532	1	5382	2620	N11
3.	valinda	57 x 57	7.83	0.60	15366	7640	N11	-	-	N11
4.	Kamatalav	70 x 70	10.22	3.50	2284	1068	1.3	4372	2180	N11
5.	Gandhipura	64 x 64	9.13	2.50	700	332	2.0	1766	888	1.10
6.	Panchi	70 x 80	10.71	0.30	15406	7640	0.3	185042	102000	N11
7.	Hebatpur	70 x110	14.73	1.20	1186	584	2.5	1680	840	1.10
8.	Umargadh	60 x 71	11.80	0.20	29478	14800	N11	-	-	N11
9.	Ratanpur	60 x 60	10.91	0.30	44100	22000	0.30	139482	75900	N11
10.	Anandipur	64 x 64	9.84	3.5	1420	712	1.0	8298	4460	0.45
11.	Sodhi	70 x 80	14.54	-	-	-	0.15	8510	4600	N11

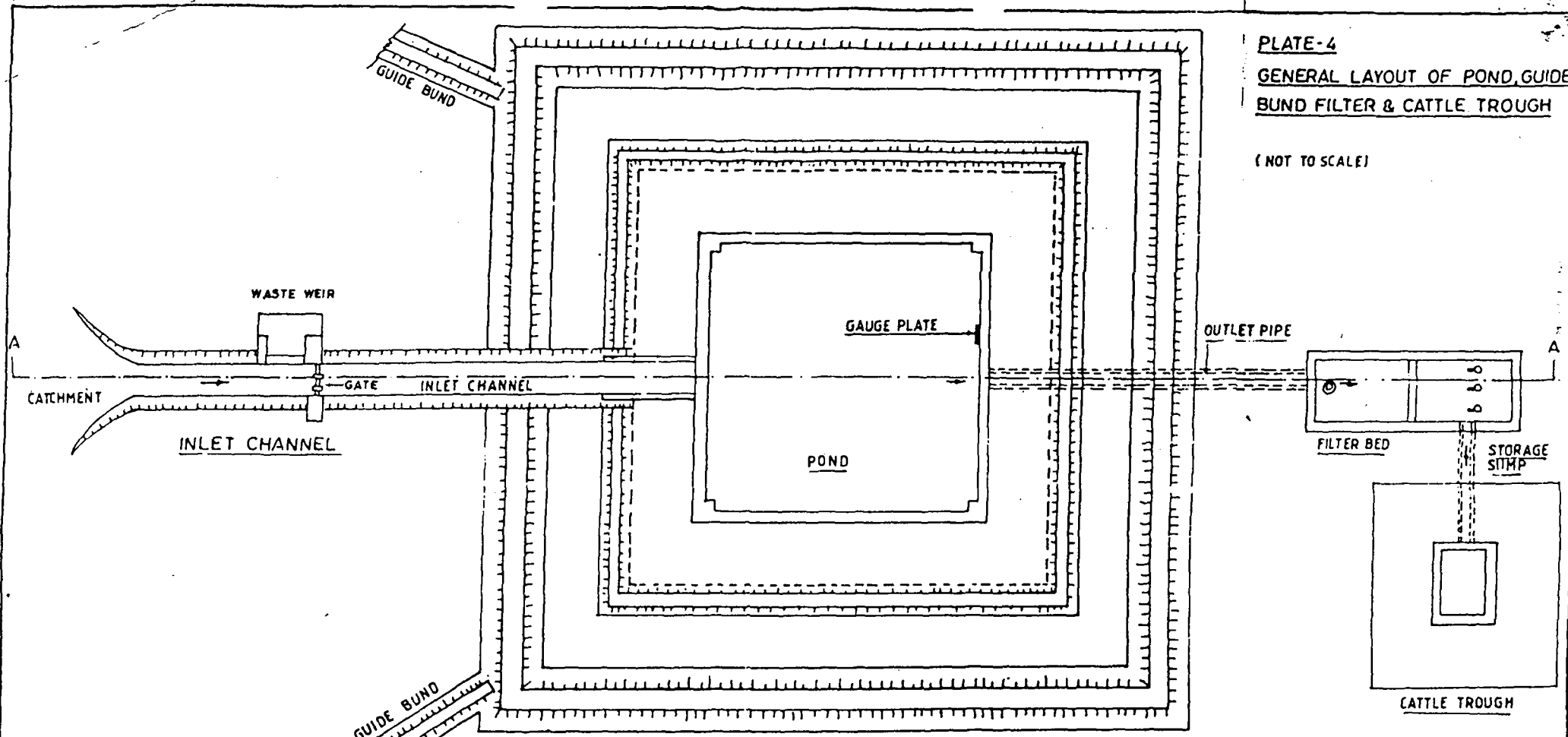
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Details of quality of water of LDPE lined ponds
constructed previously

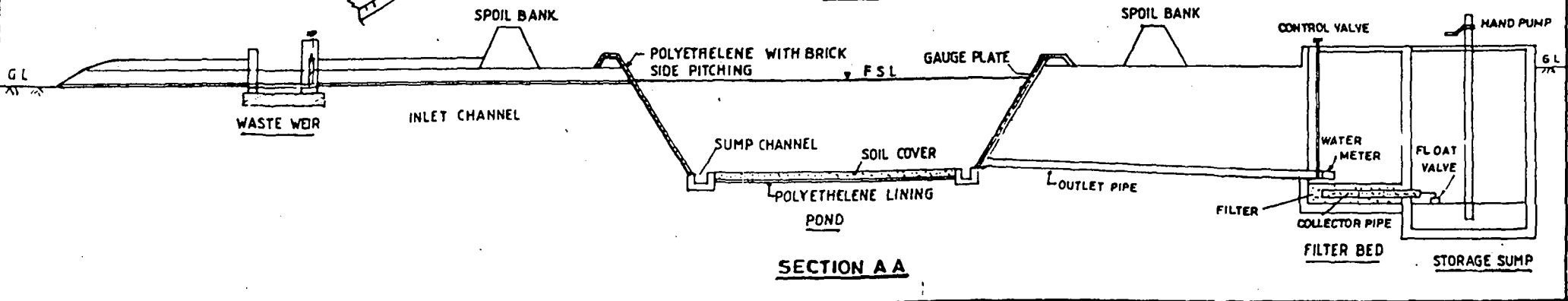
Sr. No.	Name of village	Quality of water on 9.10.91		Quality of water on 2.1.92		Remarks
		TDS	Chloride	TDS	Chloride	
1.	Bhangadh	3992	2192	6724	3650	
2.	Mingalpur	950	360	1434	590	
3.	Rahatban	3588	1700	6366	3020	
4.	Khun	1576	692	2142	950	NT
5.	Rajpur	1080	430			

PLATE-4
GENERAL LAYOUT OF POND, GUIDE
BUND FILTER & CATTLE TROUGH

(NOT TO SCALE)



PLAN



SECTION A A