

GUJARAT MINERAL DEVELOPMENT CORPORATION LIMITED



(A Government of Gujarat Enterprise)

Lignite project, MATA NO MADH. Post – RAVAPAR KACHCHH.

Tal: Nakhatrana. Dist : Kutch, pin- 370625

Ph : (02839) 291403 & (02835) 275699 Gram : MINECORP Fax : 02839 –291467

RAIN WATER HARVESTING AND ITS COST EFFECTIVE USE.

Kutch being in arid to semi arid zone, Plantation work at Lignite Project, Mata na Madh is a challenging job. From the very beginning of the project, we are doing plantation work departmentally as well as through Gujarat Forest Department. Fig. (1) Scanty rain fall, scarcity of water, high wind velocity, dry and extremity of atmosphere create great problem for survival of sapling and plants. Due to these problems cost of afforestation is going high and high while on the other hand we have to struggle very much to maintain the survival rate of plants. To harness this problem, we at Lignite Project, Mata na Madh planned and implemented the following strategy successfully.

CHECK DAM: We selected a strategic location of Dam site outside lignite bearing area; checked the flowing stream of seasonal nallah and prepared a dam of 3 Lac CMT water storage capacity. Top RL of the check dam is 87 its over flow RL is 84 and average depth of water is 5.5 Meter, its storage area 5.4 Hacts. Details shown in Fig.(2) Due to good monsoon this year check dam filled up to the overflow mark and thereby we have harvested 3 Lac. CMT of fresh rain water this monsoon. Check dam filled at its complete designed capacity in a single spell of monsoon thereby provides us a good hope of extending its capacity in coming year by raising its overflow level up to 2 meters further thus further adding approx. 1 lac CMT storage capacity.

ECONOMIC WATER MANAGEMNT SYSTEM. The RL of in pit plantation site is 72, while top of check dam is 87. We selected an elevated site near check dam with RL 90 and prepared cemented tank of size 3Mx1.5Mx2M. Now level difference between in pit plantation and that of tank is 18M. There was good cause for gravitational conveyance of water. The only problem was distance which was about 2 KM. We managed over 100 **old scraped PVC pipes** of 4” and some spare HDPE pipe of 8” and laid the line for 2KM. The difference of diameter of line maintained the pressure drop. Water from check dam is lifted by 7.5 HP diesel pump up to the cement tank situated about 15M away from the pump. Form the cemented tank, it is conveyed by gravity to in pit dump plantation site. In side in pit dump plantation (area 15 Hector) a network of micro tube irrigation is laid as shown in Fig.(3). Indifferent blocks with control valves to regulate the supply of water. Thus by opening and closing different valves in rotation whole area of 15 Hectors is irrigated within 5 to 8 Hours.

Initially we were using 5000 Lts. X 2 tanks for each Hector which were filled up by purchased water from Ravapar (about 15 KM /trip by tankers) . Now we have spared all 12 No.s of tanks which cost 59% of drip irrigation system and stopped use of tanker and purchase of water to irrigate in pit plantation area.

The location and capacity of dam is such that it will serve throughout life of mine and quarry area .Fig(4).

FUTURE SCOPE: Good rainfall this year provides us a good scope of raising its overflow level upto 2 metres further thus we shall add approx. 1 lac CMT storage capacity in the coming year.

COST PER HACTARE AND SAVINGS.

No	Item description	Unit	Required	Rate	Cost.
01	Main pipe 4”	RMT	50 Mtr	75/-	3750.00
02	Branch pipe 3”	“	100 “	60/-	6000.00
03	Laterals 16 mm	“	2500 “	06/-	15000.00
04	Micro 2mm	“	2500 “	1.10	2750.00
05	Ball valves 4”	No	1	325.00	325.00
06	Ball valves 3”	No	1	245.00	245.00
07	Grommet	“	50	1:25	62.50
08	Takeout	“	50	1:25	62.50
09	Joiner	“	25	1:25	31.25
10	End cap	“	50	1.25	62.50
11	PVC Shocket 4”	“
12	PVC Shocket 3”	“
13	PVC T 4”	“	1	65/-	65.00
					28353.75

Say 28500.00

As laying of pipes and laterals is simple. We are deploying our departmental Labor for erection & commissioning work. No masonry civil work involved.

- Cost of 2500 plants/ Hector @ Rs. 5/- =Rs.12500.00
- Manure etc./ Hector for 3 year = Rs. 1000.00
- **TOTAL COST = Rs.42000.00**

Diesel cost / Hectare for 3 years . = Rs. 8000.00
 Total Cost/ Hector for 3 years. = Rs. 50000.00
 Cost / Hector charged by Forest deptt. = Rs.290000.00
 Savings / Hector = 290000- 50000 = Rs.240000.00
 Total saving for remaining life of mine for 650 Hectors,

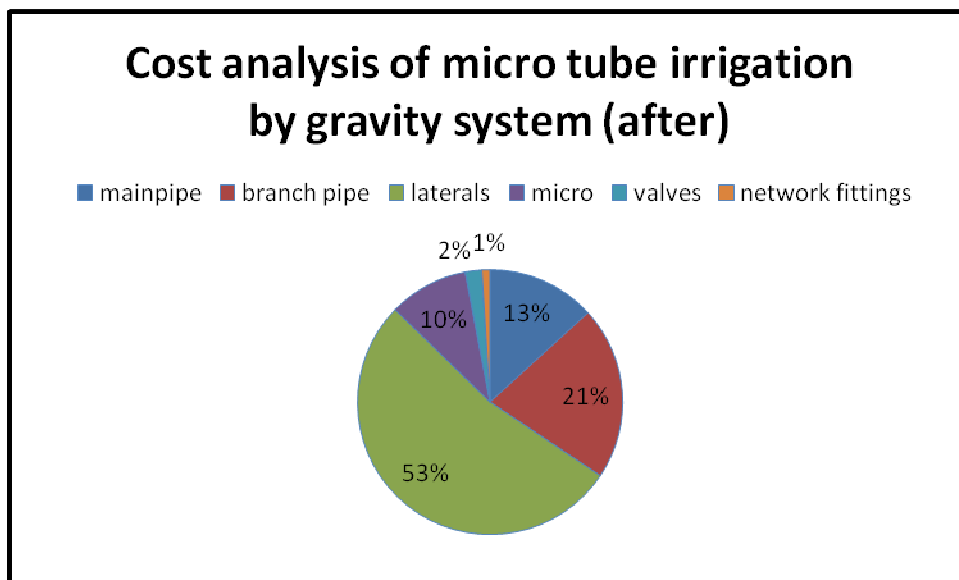
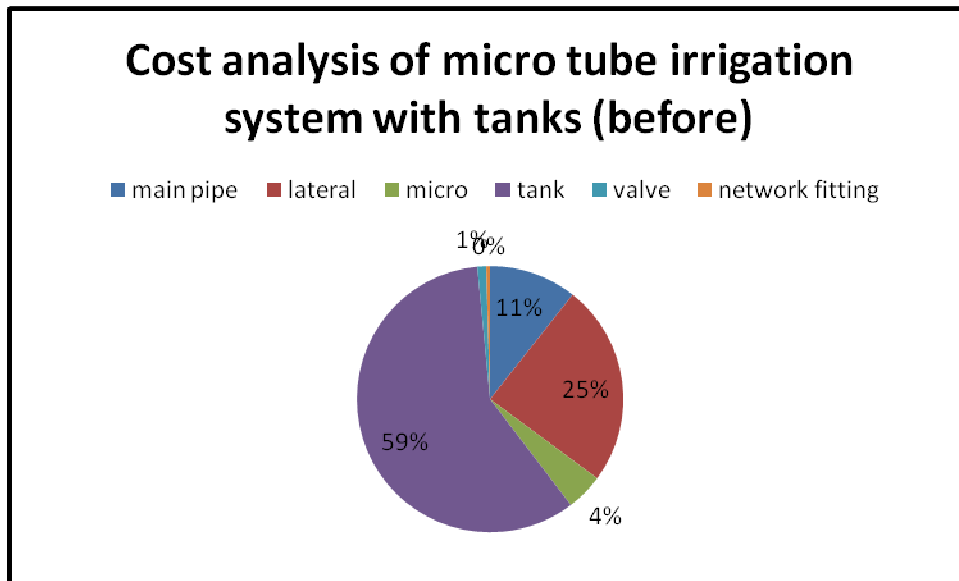
650 X 240000 = Rs.15, 6000,000.00

[Rs. Fifteen Crores Sixty Lakhs Only.]

SALIENT FEATURES OF RAIN WATER HARVESTED AND USED

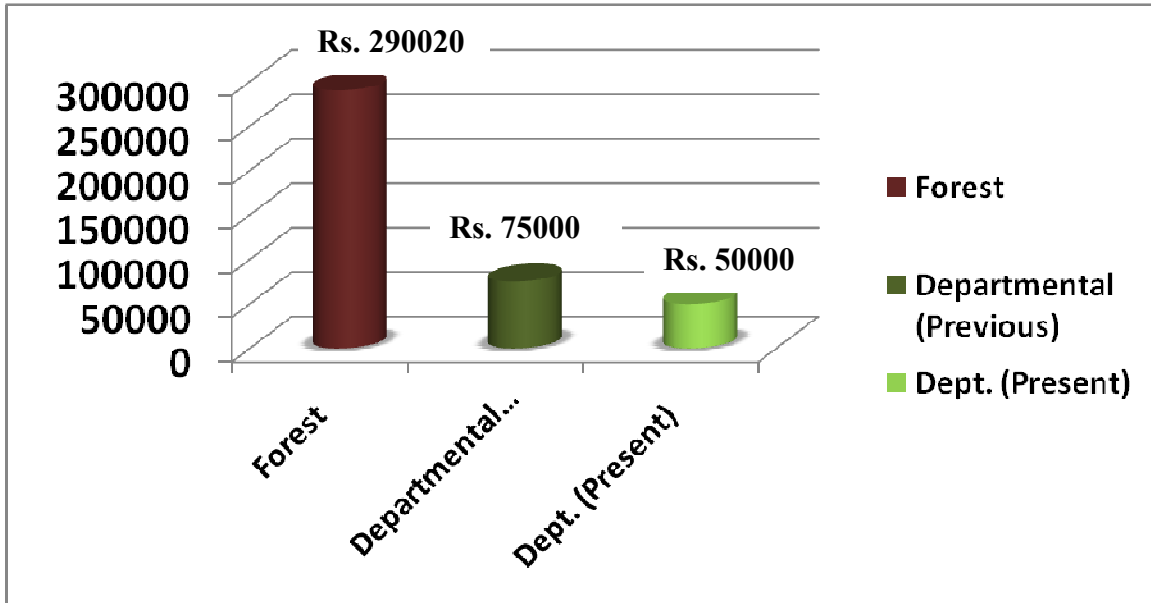
1. Capacity of dam ...3lacs CMT
2. Total length of pipe line for water conveyance ...1.8Km.
3. Level difference of tank and plantation area18Mt.
4. Mode of conveyance of water ...By gravitational force.
5. Savings in running Km./months of tanker1900Km.
6. Savings of [diesel/months@Rs.42/Ltr.](#)Rs.15750/=
7. Cost of water saved/monthRs.8000/=
8. Mandays saved/month150
9. One tanker spared which may be used for sporadic, external dump and service road side plantation thus additional plantation that could be served20Ha.
10. Additional savings of purchased water/month125trips
11. Departmental Cost of plantation/Ha.after implementation
Of gravity irrigation system & reorientation of drip layout ...Rs.50000/=
12. Cost of plantation/Ha. Charged by forest department ...Rs.290000/=
13. Savings/Ha.Rs.240000/=
14. Quarriable area of mine700Ha.
- 15.Total savings for remaining 650Ha.back filled area.....**Rs.15600000/=**

Cost savings in departmental effort by rain water harvesting and subsequent micro tube drip irrigation by gravity methods



As per our continuous improvement we have saved 59% of cost of tanks, from our previous practice of micro tube drip irrigation system with water tanker and tanks. Cost saved per hectare is Rs.36000.00

Cost Comparison of Plantation expenditure per hectare through previous practices and recent innovative practices:



TOTAL NO.OF PLANTATION DONE TILL DATE.

FIGURE NO.1

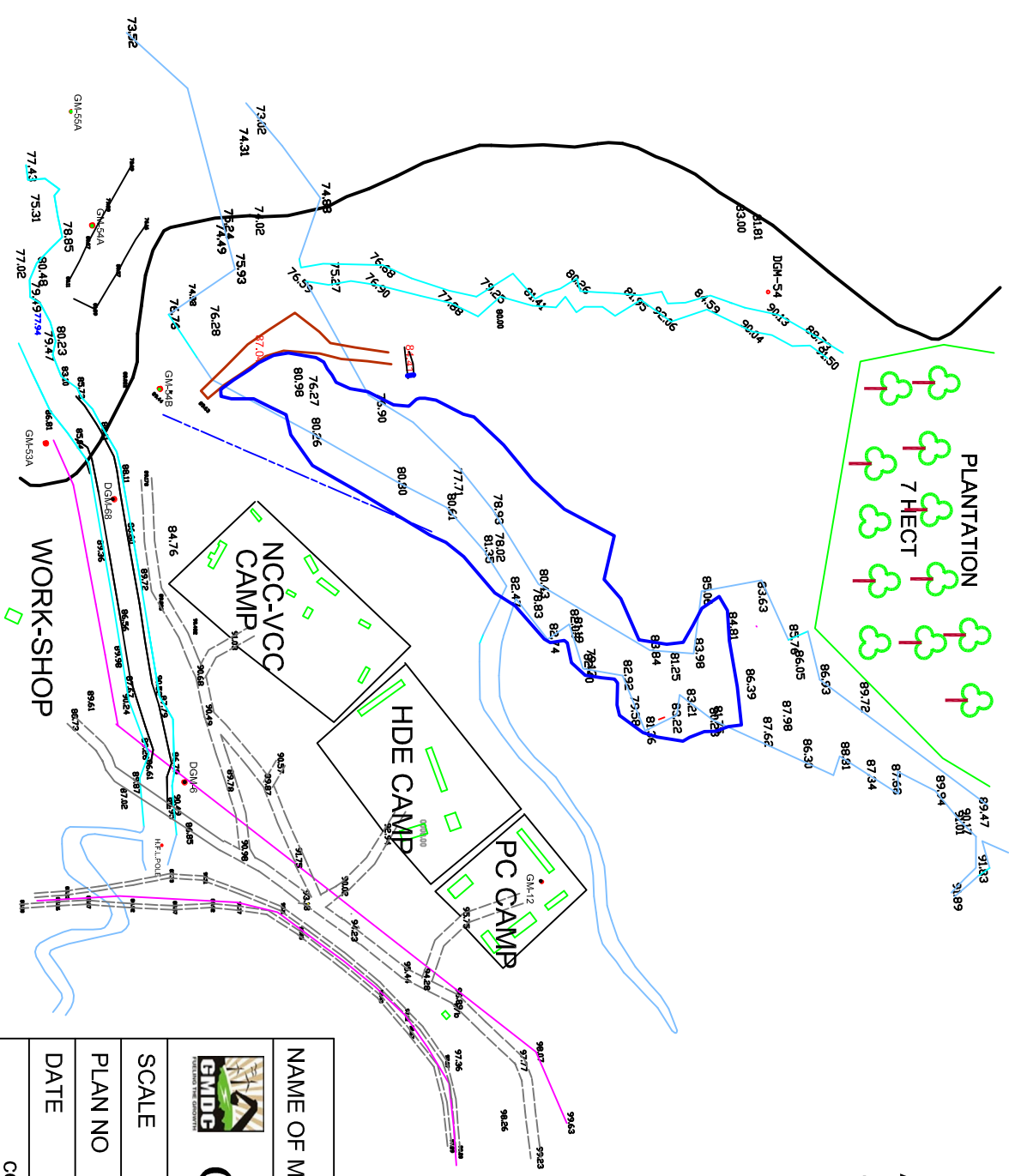
Year	Forest		dept		total (dept +forest)	
	Area (ha)	Plantation (No.s)	Area (ha)	Plantation (No.s)	Area (ha)	Plantation (No.s)
2003-04	--	--	15	16,000	15	16000
2004-05	--	--	12	12,000	12	12000
2005-06	5	10,000	0.5	2000	5.5	12000
2006-07	15	30000	1	4000	16	34000
2007-08	10	20000	1.5	6000	11.5	26000
2008-09	50	64000	2	8000	52	72000
2009-10	--	--	3	10000	3	10000
2010-11	10	12000	25	79425	35	91425
2011-12	15	20250	19.8	34943	34.8	55193
Total	105	156250	79.8	172,368	184.8	328,618

Grand total*	Area	184.8
	Plantation	328,618






FIGURE No. 2

DETAILS:

AREA OF RESERVOIR: 54000 sqm
 CAPACITY: 3.0 LAKH cum
 CHECK DAM TOP RL: 87.04 M
 OVER FLOW RL: 84.41 M



LEGEND:

-  NALA
-  LIGNITE BOUNDARY
-  WATER RESERVOIR
-  CHECK DAM
-  OVER FLOW

NAME OF MINES : LIGNITE MINES, MATA NA MADH

G.M.D.C. Limited.



SCALE	1:5000	KEY PLAN
PLAN NO		
DATE	31-03-11	

certified that the plan is correct.

Mines Surveyor Mines Manager

FIGURE NO 3

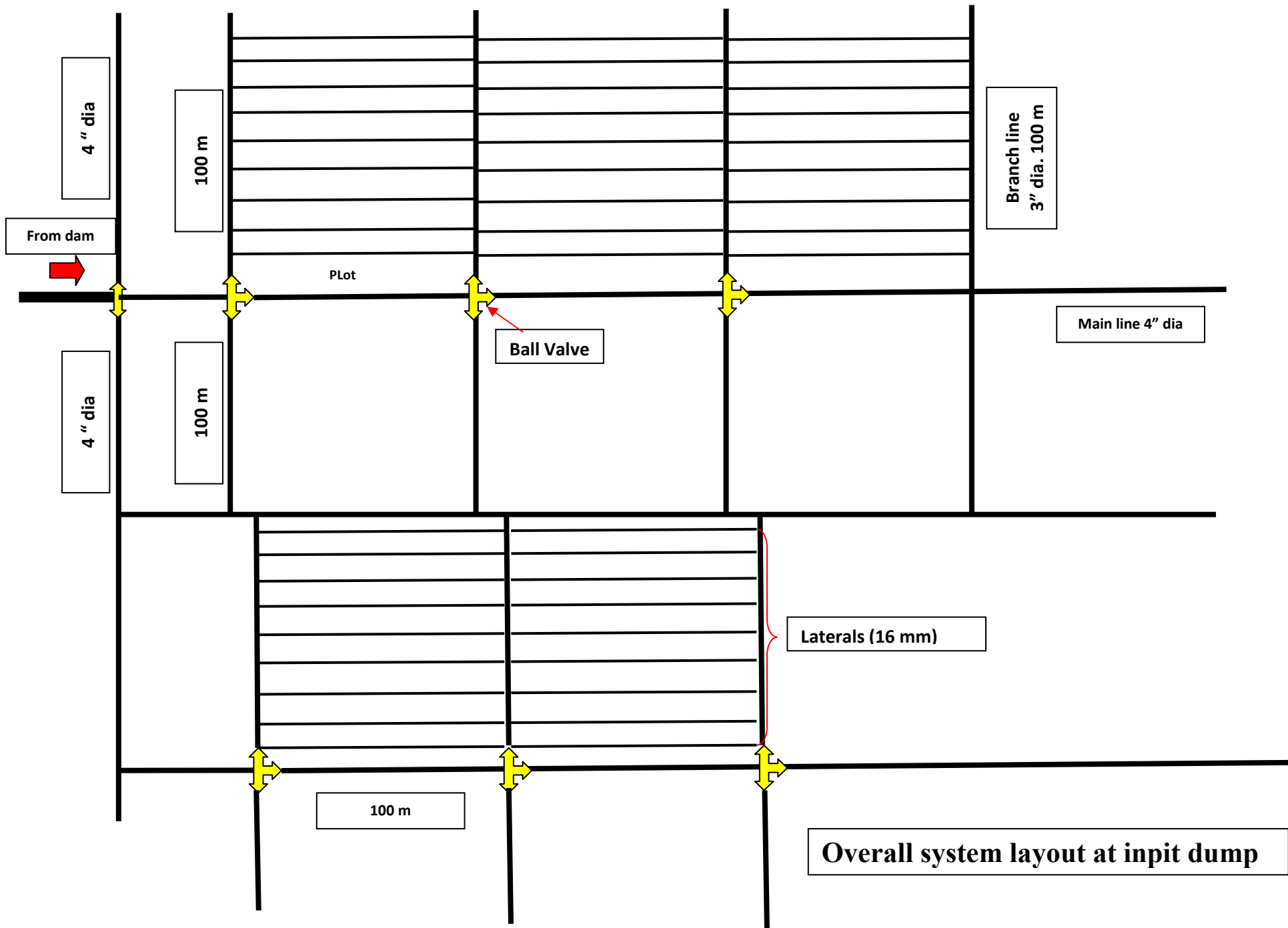


Fig. 4 : PICTURES DEPICTING THE ENTIRE COST EFFECTIVE NETWORKING SYSTEM AND CHECKDAM LOCATION



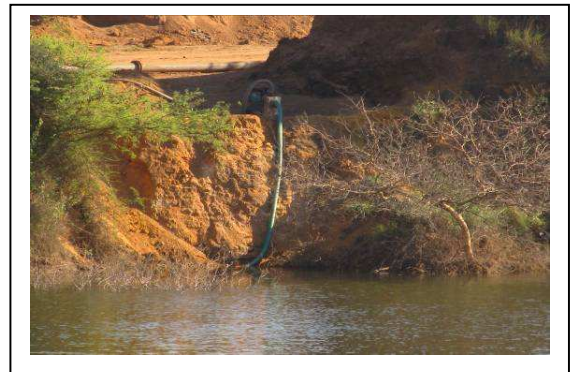
Site preparation for check dam



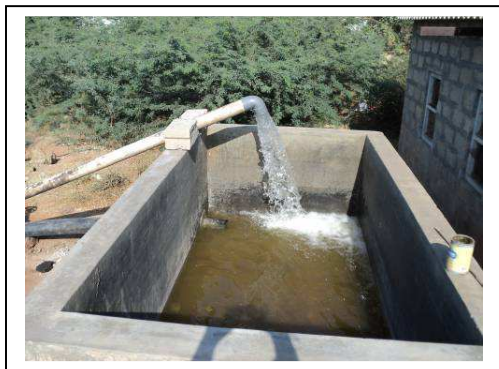
Key Formation for checkdam



Setting up of pumping station



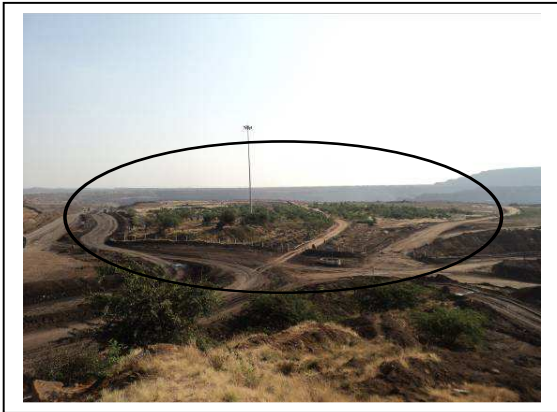
Pump withdrawing water from checkdam



Elevated water reservoir



Gravity conduits heading towards inlet.



15 ha backfilled dump plantation at inpit being supplied water from gravity conduits network from checkdam



Alternatively tanker filling by gravity pipes to cater water requirements for plants



Biodiversity inhabiting at check dam, a way towards greener future.