

Small-scale Domestic Wastewater Management Project

(Sample: Gantlavalli Gram Panchayat, RR District, Telengana)

The Problem

Gantlavalli Gram Panchayat¹ is in Farooqnagar Block of Renga Reddy District in Telengana state. Gantlavalli village has 100% toilet coverage, and almost all the houses has piped water supply as well. In addition there is an RO Plant running, where people buy water swiping a rechargeable card. There is a closed drainage system for wastewater disposal. But, there are some houses not connected to the sewerage system. Such houses - geographically dispersed and away from the course of the sewers - let the water flow on the streets. Moreover, there is no proper rain water runway (storm water sewers) planned by the side of the grey water sewers. Even the streets where closed grey water sewerage exists, the final disposal from the grey water sewerage is haphazard causing mosquito breed. There is frequent overflow of wastewater on the road at the disposal point. The Mission Antyodaya-2019 reports critical deficiency in water management. Direct Observation confirms that wastewater disposal is very deficient too.

There is no scientific disposal of wastewater from households, which is a matter of serious concern from the stand point of environmental sanitation, and health. Wastewater stagnation causes mosquito breeding. Puddling of wastewater in the streets and on the village roads renders it uncomfortable to walk, destroying the aesthetics of the village. Although every house has toilet, the high incidence of anaemia among children in the ICDS centres, and lactating mothers could be partly explained due to unhygienic practices. It has a tell upon the quality of life. Absence of scientific grey water disposal system is viewed as a serious problem here.

The Context

This Project on domestic wastewater management is designed keeping in view that this villages has 200 households, and the projected increase in the number of households for the next 20 years might make it 280 households with a population of 1250. The current situation in this village is that it already has underground drainage system connecting 180 households in three rows of houses, and the remaining 20 households are cut off and away from the course of the underground drainage system. But the final disposal of domestic wastewater is haphazard – flowing in the common land, oftentimes, stagnating at one end of the village –

¹ *The Mission Antyodaya ID of Gantlavalli Gram Panchayat is 205130. This project is developed taking cues from the Mission Antyodaya Gap Report, coupled with a field survey and discussion with Panchayat functionaries.*

away from sight. The construction of the existing drainage has been carried out without taking into account the follow of rainwater. The chances are that rain water, in all probability joins the grey water at the final disposal point.

It is advisable to assess and determine the course of the rain water, and construct a percolation pond or recharge well, which can help groundwater recharge. However, construction of storm water drainage is outside the scope of this proposal. This proposal specifically looks into addressing the problem of haphazard disposal of wastewater from bathrooms and households (grey water) from 280 households. It takes into account providing household level wastewater disposal solution to 20 households that are not connected to the existing sewerage system in order to cater to the scattered households that are away from the course of the sewerage line. The technology proposed is small-scale constructed wet land.

Objectives of this Project

1. Construct a wastewater disposal system for houses that are connected to a centralized drainage system so that final disposal of grey water is scientific and environmentally sound.
2. Enable scattered households that are disconnected from centralised sewerage system to have household level technical solution can ensure scientific disposal of wastewater from the bathrooms and kitchens
3. Make way for grey water reuse for purposes such as improving groundwater recharge and / or expanding green cover in the village

Components of this Proposal

| Sl. | Technical structure | Technology to be used |
|-----|--|---|
| 1. | Connect the centralised sewer lines from all the streets into a common point, and construct a final grey water disposal system that is scientific and environmentally sound. | Constructed wetland |
| 2. | Provide level leach pits to those households that are cut off – and away from the centralised sewerage system. | Single Leach pit (honey comb structure brick work 1.5 metre x 1 metre x 1 metre rectangle) constructed for every house that is not connected to the centralised sewer line. |

Technology Description

1. **Constructed Wetland System:** This is for the houses that are in rows connected by underground drainage. Constructed wetlands are free water surface systems with shallow water depths (or subsurface flow systems) with water flowing laterally through the sand or gravel. The removal efficiency of typical pollutants is very high in constructed wetlands. The major costs and energy requirements for constructed

wetlands are associated with pre-application treatment, pumping and transmission to the site (if not run on gravity), minor earthwork, and land costs. The land requirement may be at least four times higher compared to high-tech wastewater systems that are cost-intensive. In addition, a constructed system may require the installation of a barrier layer to limit percolation to groundwater and additional containment structures in case of flooding. See Diagram at Annexure – I.

Compared to conventional wastewater treatment technologies, constructed wetlands are cost-effective and easily operated and maintained, and they have a strong potential for application in a small community like Gantlavalli, that has available land but technology and budget constraints.

- 2. Household Level Leach Pits for scattered Households:** Leach pits are proposed for households that are away, / not connected to the existing centralised sewerage system. This looks like single pit of a leach pit toilet. This is to be constructed like honey comb structures in brick work. See diagram – 1 & 2, at Annexure – II.

Technical Specifications based on Population Parameters

| Population Parameters | System Requirement | Costs |
|--|---|--|
| Number of Households – 280 (260 HH connected to sewer and 20 HH not connected) Total Population – 1270 (i.e. 1170 in 260 HHs) | Wastewater per capita =50 Lr in Gantlavalli Total wastewater 1170x50 Lrs = 58,500 (60 KLD) Area required for preparing constructed wetland is 1600 sqmtr. | Tentative cost of 60 KLD system works out to Rs.5 – 7 lakhs. Annual Maintenance Rs.20,000 |
| Leach Pit for 20 households | This is constructed using bricks as honey comb structure. | Rs.5000 per pit x 20 pits |

Budget

| | |
|-------------------------------------|--------------|
| Constructed Wetland System (60 KLD) | Rs. 7,00,000 |
| Leach Pits (20 numbers x Rs.5000) | Rs.1,00,000 |

Source of Fund

- The capital investment will be provided from SBM-G, and most manual work can be done through MGNREGS by incorporating in the labour budget for MGNREGS.

- There is little maintenance cost – annually, which can be borne by the Gram Panchayat through its own source revenue. This can be generated even by going for fish culture through reuse of outlet water (after testing the quality of water is reusable for fish culture).

Expected Benefits of the Project

- It will help improve environmental sanitation, and quality of life in the village.
- Maintenance cost is very negligible, and it involves no power or fuel in operation.
- Reduction in water-borne diseases
- System such as Constructed Wetland System can render treated grey water to be reused for developing greenery, gardens etc. in the Gram Panchayat area. It can help improve the green cover in the village.
- If water treated through Constructed Wetland can be made to flow through oxidation pond, and polishing pond, it can be diverted to recharge groundwater, which can reduce the chances of village going water scarce.

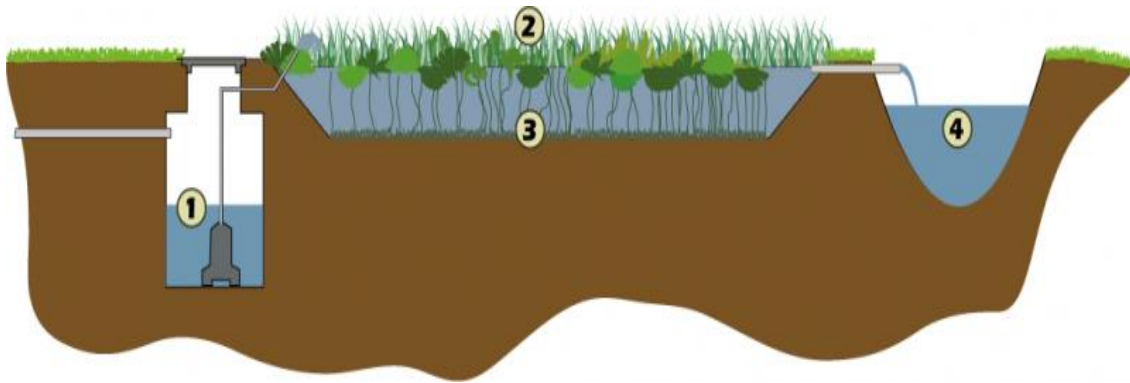


Diagram – 1

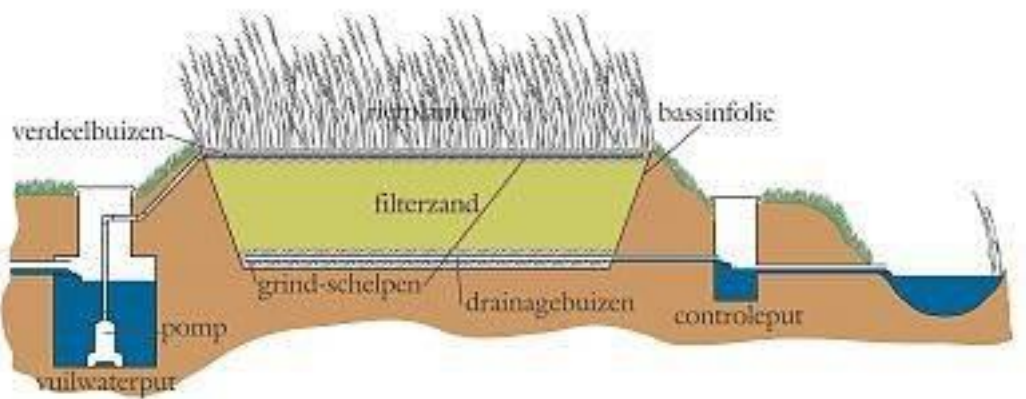


Diagram – 2

- Subsurface horizontal flow constructed wetland

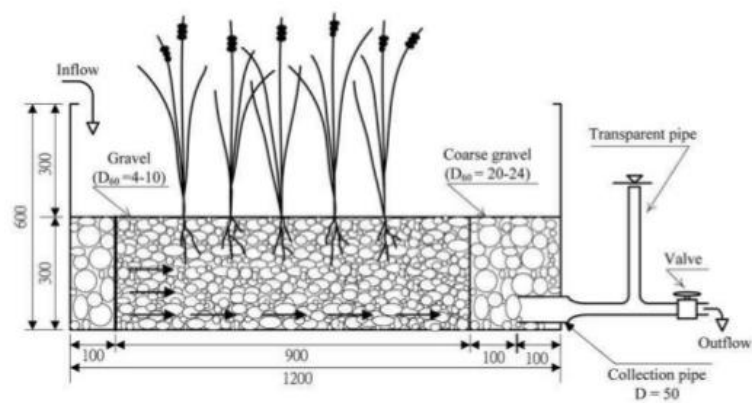


Diagram – 3

1. Household Level Wastewater Leach Pit (Honey Comb Structure)



2. Household Level Wastewater Leach Pit (with cover slab)

