Construction of a Domestic Greywater Treatment System

MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT

Green Water

GERMAN DEVELOPMENT COOPERATION

Why treat greywater?

Greywater contains

- nutrients,
- organic matter,
- pathogens &
- greases

  = smell, health hazard (disease & mosquitoes), environmental degradation

But greywater is also a valuable source of irrigation water

Materials

Greywater Treatment Box		
40mm PVC pipe	6m	low pressure pipe (waste)
40mm PVC 90°bend	5 pieces	
40mm PVC caps	4 pieces	
40mm PVC T sections	3 pieces	
Inner tube strips	3m	used tube from bicycle tyres
rubber washers	6 pieces	can be cut from ¼" rubber sheet/tyres
20mm PVC pipe	6	medium pressure pipe drains box to planter beds
20mm PVC T sections	3 pieces	
20mm PVC 90°bend	3 pieces	
Container	1	dimensions approx 50cm deep, 50cm wide and 100cm long - PVC or brickwork (+other alternatives?)
Blocks/bricks	60	various sizes to support container and grease trap
Sand - clean and coarse (eg. beach sand)	3 wheelbarrows	Use best sand possible (no fine material, single size)
Gravel - clean ½"	3 wheelbarrows	Clean with water to remove fine material/dust
Mesh netting	2m	to prevent sand and gravel mixing
Plants		various water loving species (may include Vetiver grass, sedges, papyrus etc)

Materials

Grease trap	
1 x 20l plastic jerrycan	
1 x plastic collander	mesh should catch rice size particles
1 x 10l mineral water bottle	need the upper (neck) section only or use plastic funnel

Tools	
1 x shovel	
1 x machete	
1 x small knife	
1 x hacksaw	
1 x drill with bit size 10	to make holes in inlet pipes (or use hot nail)
2 pairs Gloves	

NB. Materials listed are for a single household producing up to 100litres of waste water per day, greater load will require a larger or multiple containers
Exact numbers of "T"s and bends required dependent on inlet/outlet arrangements (site specific)

A greywater treatment system constructed in Lilongwe

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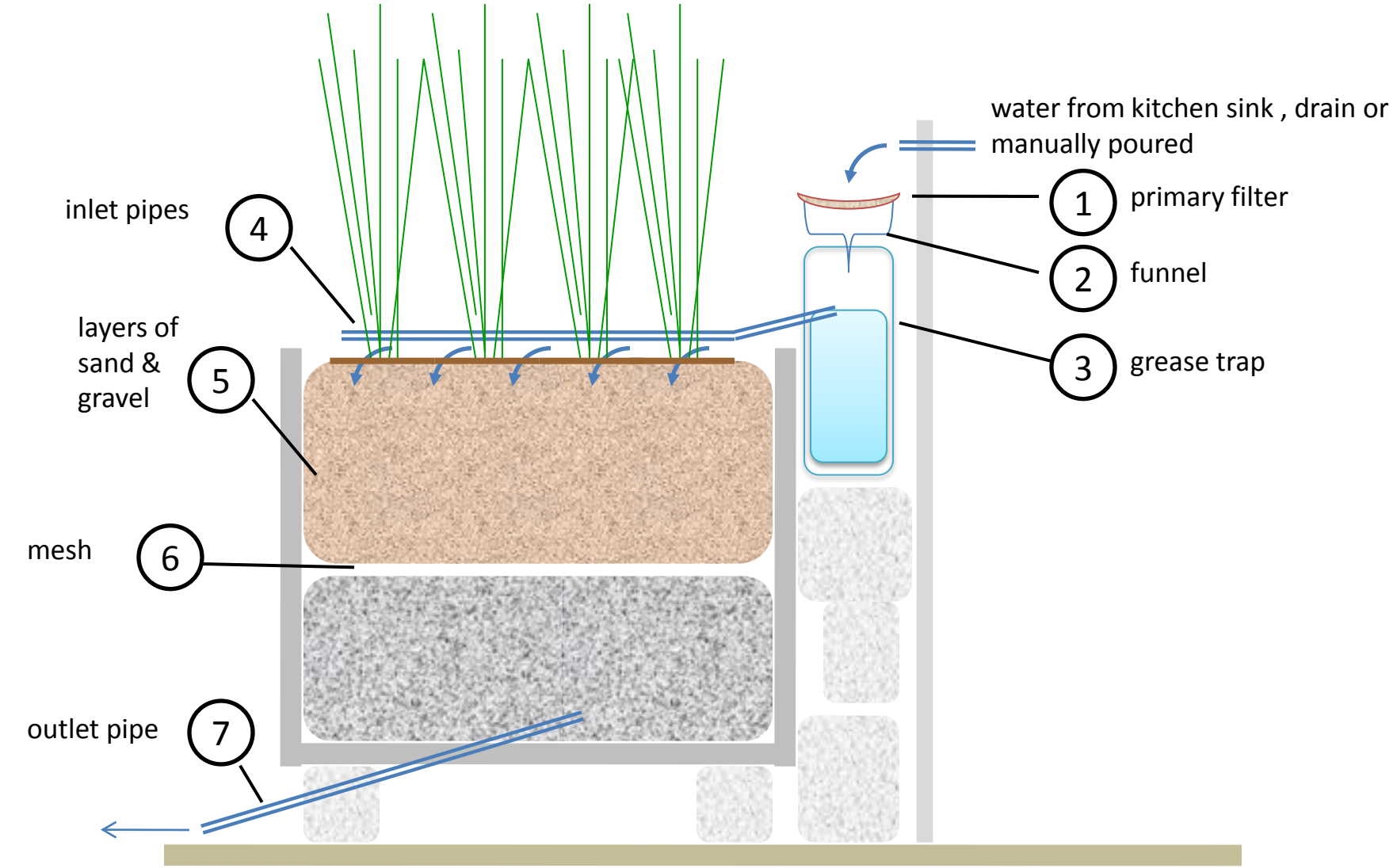

water from kitchen sink , drain or manually poured
1
primary filter
2
funnel
3
grease trap
inlet pipes
4
layers of sand & gravel
5
mesh
6
outlet pipe
7
Cleaned water for irrigation

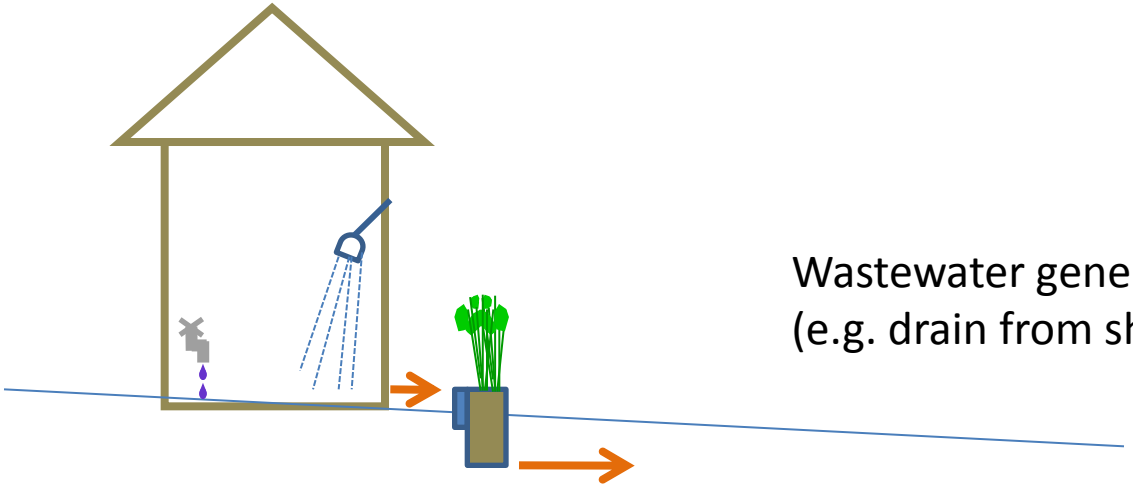
Design Considerations

Location of wastewater generation….

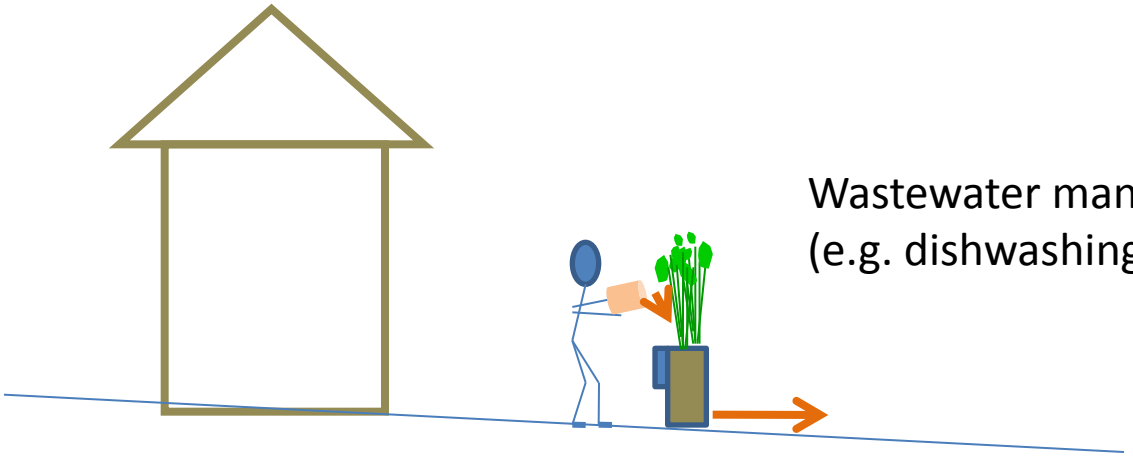
….and re-use

Slope may restrict/determine options

Ground level vs. elevated drain



Wastewater generated at ground level
(e.g. drain from shower)



Wastewater manually lifted to system
(e.g. dishwashing and laundry water)

Container should be watertight, locally available and cheap. Depth 50cm ideal, length and width to give surface area of approximately 0.5m^2 (i.e. length 1m, width 0.5m). 20mm diameter hole should be made for outlet pipe on appropriate side for discharge.

Tin container made locally in Lilongwe (cost 2,000Kwacha)

Plastic container from Kenya (cost 3,500Kwacha)

Measuring and cutting pipes – 40mm pipe for surface, 20mm pipe for base

making holes using a hot nail or a drill. Holes every 10cm for inlet pipes (2 lines 90deg apart) and random for drainage pipe

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Perforated drainage pipes at base to collect filtered water. Outlet sealed with rubber washer and inner tube.

Perforated distribution pipes on surface.

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Coarse gravel laid over pipes (10cm), followed by ½” gravel (20cm), a layer of netting and finally coarse sand (20cm).

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Water loving plants (sedges, papyrus, reeds, Vetiver grass etc) planted into sand between inlet pipes. Gravel placed immediately below perforations to reduce scour.

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Grease trap construction

Use a 20l plastic container and cut a 40mm diameter hole for outlet pipe and slice open 75% of the upper section (so that the container may be opened for cleaning.

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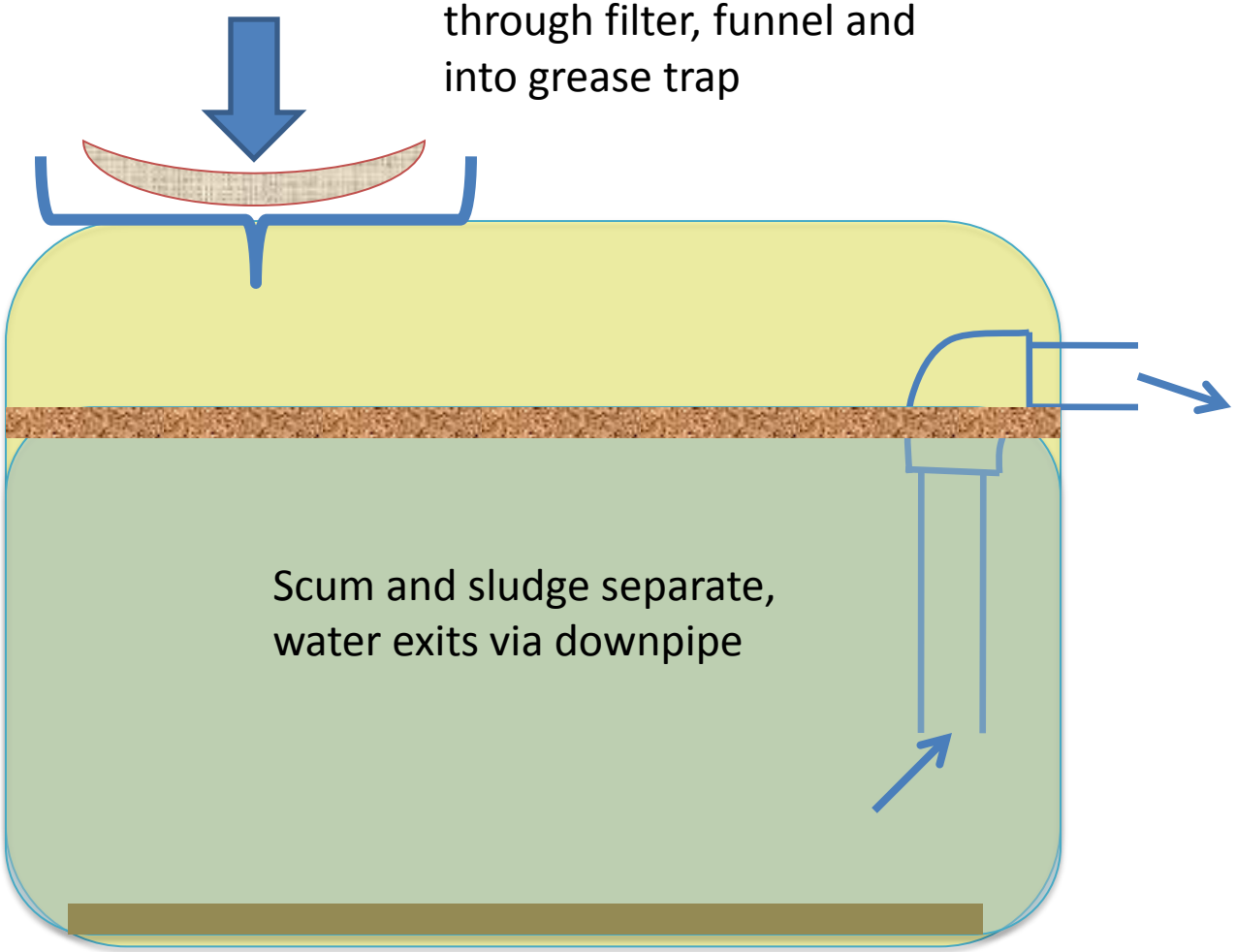
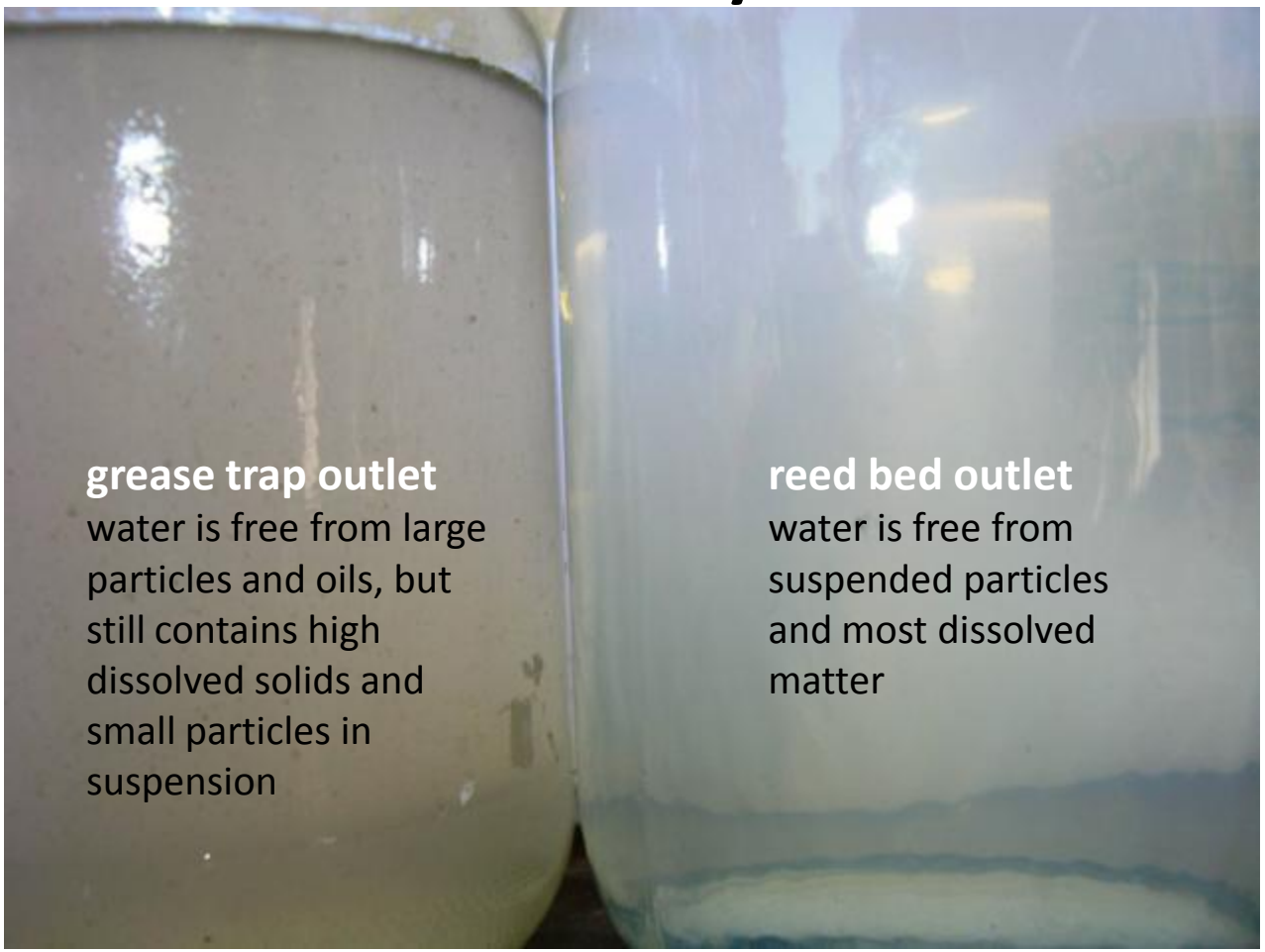
Use a funnel and sieve for inlet (to channel water into container and remove large particles). Outlet pipe passes through 40mm hole via a down pipe so that fats and greases are retained and not passed through to bed (see following schematic).

Water from sink passes through filter, funnel and into grease trap



Water Quality Achieved



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