



# DEWATS FOR SUSHMA KOIRALA HOSPITAL

Sankhu, Kathmandu, NEPAL

## Project Background

The Sushma Koirala Memorial Plastic and Reconstructive Surgery Hospital is a non-government hospital located in Sankhu, within the Kathmandu Valley. The hospital constructed a wastewater treatment plant in 2002 to improve the environmental and hygienic quality of the wastewater discharge. Due to hospital expansion the treatment plant was also expanded in 2007.

The treatment plant is well maintained and operated, setting an example of DEWATS in institutional setting and protecting the downstream communities from potentially dangerous hospital waste.

Kind of Project	DEWATS-SME (Hospital)
Funding Agency	Sushma Koirala Hospital
Implementing Agency	Sushma Koirala Hospital
Supporting Organisation	ENPHO
Construction Period	2002
Upgraded Period	2007
Construction Cost	NRs. 1,100,000 (US\$ 14,103)

## Purpose

- To minimise impact of downstream community and environment from untreated wastewater.
- To demonstrate the application of DEWATS and sustainable environmental management in a hospital setting.

## System in Brief

Treating wastewater from the hospital, cafeteria and staff quarters through an on-site DEWATS system prior to discharge onto the land for overland flow to the nearby river.

- Inlet tank with grit cage
- Settling tank with intermittent discharge
- Horizontal flow wetland
- Two vertical flow wetlands (in series)

### Also at site

- Rainwater capture
- Incinerator for managing medical waste

## Salient Features

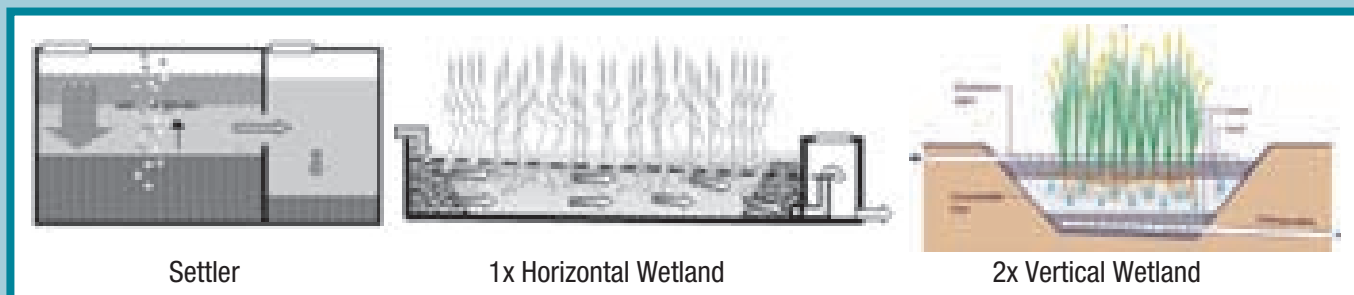
Source	Hospital Wastewater
Design Capacity	15-20m <sup>3</sup> /d
No. Users	Designed for 250 patients,
Peak flow	20m <sup>3</sup> /d
Influent Quality: Dec 2010	BOD 450mg/L
COD	832 mg/L
Effluent Quality: Dec 2010	BOD 70mg/L
COD	159mg/L
Efficiency	84% BOD, 81% COD



## Modules Adopted

<b>Settling Tank – 1 unit</b>	
Chambers	3 baffle walls
Area Construction	9m <sup>3</sup>
Depth	1.5m approx
<b>Planted Gravel Filter: 1 Horizontal Bed</b>	
Surface Area	65m <sup>2</sup>
Depth	0.6m average
Filter Material	Gravel
Plants Used	<i>Phragmites karka</i>
<b>Planted Gravel Filter: 2 Vertical Beds</b>	
Surface Area	70m <sup>2</sup> each
Depth	0.6m average
Filter Material	Gravel
Plants Used	<i>Phragmites karka</i>
<b>Total Area</b>	200m <sup>2</sup>

## Typical Drawing of Components



## Operation and Maintenance

The operation and maintenance of the plant is managed by the hospital engineering staff and routine maintenance is included within the overall hospital maintenance plan. The maintenance staff are highly knowledgeable about the system and were heavily involved in instigating and developing the wetland expansion in 2008. The staff remove rubbish from the screen every 1-2 days which includes high volumes of medical waste, additionally they remove litter, manage vegetation and check flows. In August 2010, the tipping bucket had broken therefore water was flowing continuously from the settler causing high level of ponding across all wetlands and low level of water in the settler. Once fixed the system was visited in December for monitoring, at which time the performance was low due to the built up sludge caused by the ABR emptying and cleaning the media was recommended, the media was previously cleaned in 2007. Desludging is done once a year via a pump truck and taken off site.

The maintenance costs are minimum and staff costs are included within the hospital annual maintenance budget. Any large purchases are approved by the funder however this has not caused an issue to date.

## Reuse Options

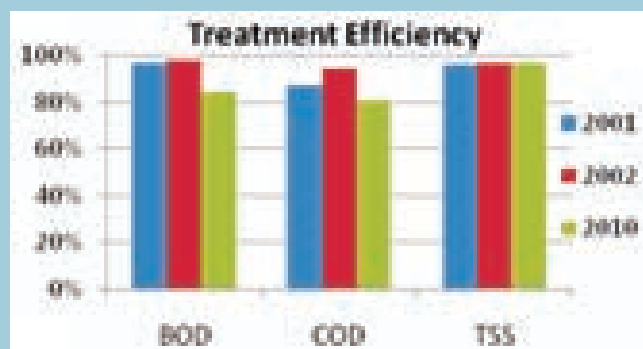
Treated grey water is being used for toilet flushing (Eco-home has two flush toilets besides the dry toilet), cleaning vehicles and gardening. Organic waste compost and urine are applied in the garden as fertilizer.

## Monitoring Results

The treated wastewater is discharged overland into the river. The treated water could be used for irrigation however due to the wetland location there is not much opportunity to be reused within the site.

Parameter	In	Out	%
pH	7.1	6.7	NA
PO4 (mg/l)	2.6	6.6	NA
NO3 (mg/L)	46.5	65	-40%
TSS (mg/L)	1095	34	97%
BOD5 (mg/L)	450	70	84%
COD (mg/L)	832	159	81%

*Data from 2010*



## Site Photos

