



Decentralized Wastewater
Treatment Solutions

HoSan | Sanitation for Hospitals and Hotels



**An adequate, integrable and
cost-effective wastewater
treatment solution for
Hotels & hospitals**



BORDA

HoSan |
DEWATS Service Package

Developed and disseminated by
BORDA & BORDA BNS Network

Specific requirements for wastewater treatment of hotels and hospitals as highly frequented institutions

Wastewater treatment of Hotels & Hospitals

Hotels and hospitals as highly frequented institutions may play very different roles in society, but they have to deal with similar specific requirements concerning the adequate treatment of wastewater such as:

- o a high fluctuation of people and therefore a mostly high but unsteady load of wastewater
- o aesthetic and space-saving requirements
- o compliance to environmental standards
- o complaints of the neighbourhood

In addition, hospitals face the problem of how to deal with contaminated or toxic wastewater that is produced during normal everyday working procedures.

Generally, there are two main problems with common wastewater treatment technology:

- 1) high capital costs of investment and operation
- 2) natural resource-intensity (uses water to flush, to convey, to dispose before and after treatment)

Due to high installation and implementation costs, many hotels and hospitals, above all those, which are situated in peripheric areas, are not connected to the centralized city sewerage system, if available.

Instead of being treated adequately, the wastewater is often discharged directly into a nearby river or open drain.

As a result, neither the general nor the specific requirements on wastewater treatment are complied.



Open drainage as a consequence of missing connection to the central sewer system

To satisfy the requirements of hospital patients, hotel guests and surrounding neighbourhoods, and to be able to comply with environmental standards, there is a demand for an effective and aesthetically pleasing wastewater treatment solution. However, such a solution must have low installation and maintenance costs.

In order to meet such demands, BORDA has worked out a wastewater treatment solution following its guiding principle "Facilitating Basic Needs Services – Thinking long-term, acting now".

BORDA BNS Networks Mission

With a mission to improve the livelihoods of disadvantaged groups within societies and to sustain the functioning of eco-systems through dissemination of demand oriented Basic Needs Services (BNS), BORDA (Bremen Overseas Research and Development Association) and its BNS Partner Network develop and disseminate innovative solutions for facilitating the access to BNS.

DEWATS Service Packages

One Basic Needs Service is DEWATS, an effective, efficient, affordable and proven wastewater treatment solution for (sub-) tropical regions and low-income countries. DEWATS stands for "Decentralized Wastewater Treatment Solutions", but it is much more than just a technical approach. DEWATS Service Packages include not simply the design and construction of hardware but a whole set of integrated measures on social and technical interventions which are combined according to demand. DEWATS HoSan is one of these Service Packages which aims to advance wastewater treatment in hotels and hospitals.

Hotels & Hospitals have to meet environmental and aesthetical demands – a pleasing pond for wastewater post-treatment is part of the DEWATS



DEWATS HoSan as an affordable, aesthetically pleasing and adaptable wastewater treatment solution

DEWATS for Hotels & Hospitals

The DEWATS HoSan Service Package aims to provide an affordable and efficient solution to the wastewater treatment requirements of Hotels & Hospitals, particularly if the hotel or hospital is not connected to a city sewerage system or commonly discharged into surface drains and water bodies.

To reach this aim, DEWATS on-site wastewater treatment plant designs are governed by the following general principles:

- o efficient performance
- o non-dependence on energy (most of the time a natural ground slope is sufficient)
- o reliability and longevity
- o tolerance to inflow fluctuation and peak loads
- o minimal maintenance
- o odourless operation
- o flexible area requirements (underground construction)
- o possibility of combination with special treatment systems for treating liquid waste from departments generating highly infectious, radioactive and chemical pollutants
- o easy implementation also for existing premises (not only for new constructions)

First steps of the planning process in cooperation with local stakeholders at the Phnom Penh hospital in Cambodia



Implementation steps of HoSan

HoSan implementation is carried out through several steps that allow complete and locally adapted planning, installation and operation of the wastewater treatment plant. The steps include:

- o identification of wastewater characteristics, source and quantity
- o evaluation of existing sanitary and wastewater infrastructure
- o feasibility analysis of wastewater segregation at source
- o elaboration of feasible concepts
- o selection of suitable location
- o preliminary estimates
- o detailed design
- o construction
- o operation and maintenance training
- o monitoring and warranty



DEWATS polishing pond at a Hotel in Cochin, India (above) – DEWATS under construction (below)



HoSan Benefits

DEWATS HoSan provides the following benefits:

- o **aesthetical design** of the treatment plant, **well integrated** in the surrounding (garden, water forms)
- o **cost efficiency** because low maintenance costs and the piping to the central sewer system is avoided
- o **no or little energy supply** is needed
- o **on-site treatment** of wastewater that meets **legal regulations** and standard disposal criteria set by pollution control authorities
- o **reducing environmental pollution** by superseding open drainage
- o **meeting patients', guests' and neighbours' demands**
- o **easy operation and maintenance** by local, trained staff (gardener)
- o **efficient management** of natural resources
- o **reduction of pathogens** with integrated disinfection unit if required



Planted gravel filter and polishing pond in the garden of the Aravind Eye Hospital, India

- o **planning, financing, implementation and management** of the project with participation of all stakeholders
- o **demand-oriented approach and reconciliation** of all participants' interests throughout the whole implementation process
- o use of **local materials** and employment of **local craftsmen** in combination with optional pre-fab modules



Multiple successful implementations of HoSan provides proof that it is a proven solution

Additional benefits

Another highlight of the DEWATS system is the possibility for re-using by-products that occur during the treatment process. These include:

- o biogas, which can be used for cooking or lighting purposes
- o sludge which can be used as fertilizer for agriculture
- o treated water, can be used for irrigation and for creating aesthetically pleasing water features (e.g. ponds), which support additional treatment processes

Therefore, electricity, water and fertilizer **cost savings** are possible.



Best practice – example:

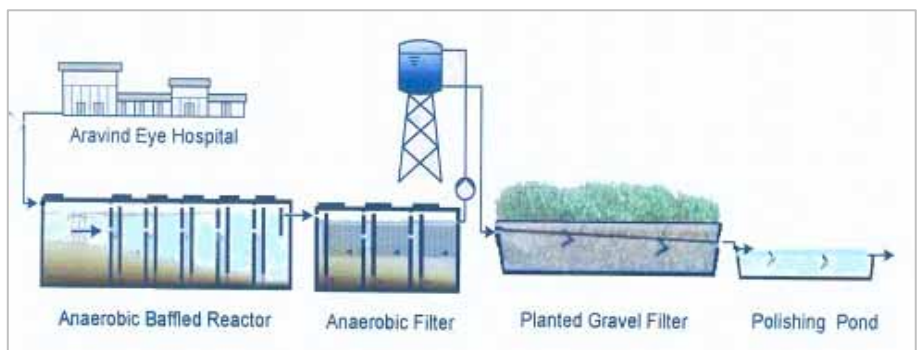
The Aravind Eye Hospital

According to demand of the Aravind Eye Hospital in Thavalakuppam, Pondicherry, India, BORDA and its local BNS Partner designed and installed a DEWATS system that is able to treat 307 m³ of domestic wastewater per day. During the planning process, efficient land use and the possibility of reusing treated wastewater was given the highest priority. The successful implementation of this DEWATS now allows the hospital to irrigate a huge garden (300 trees, 250 coconut trees, 50 mango trees, etc.) with treated wastewater. The hospital was honoured with the Pondicherry Government's award for the best garden in 2004.

Left: Planted Gravel Filter –
Below: construction & design draft of the DEWATS system for the Aravind Eye Hospital -
Right: Kim Bang District Hospital, Vietnam

HoSan – a proven solution

BORDA and its BNS Partner Network have provided Basic Need Services for about 30 years. During this time, the development of more and more adapted solutions has become a strong ambition. The implementation of more than 900 sustainable operating DEWATS plants offers proof of its efficiency. These include multiple HoSan projects that have been successfully completed in India, Indonesia, Vietnam, Cambodia and other project regions.



DEWATS Service Packages

- o Treatment Systems
- o Community Based Sanitation
- o School Based Sanitation
- o Sanitation for Hospitals & Hotels
- o Wastewater Treatment for Agro-Industry
- o Emergency Sanitation
- o Sanitation for Prisons
- o Sanitation for Real Estates
- o Sanitation Mapping
- o Municipal Sludge Treatment Plant
- o Health Impact Assessment & Hygiene Education
- o Capacity Development
- o Standardisation
- o Research & Development

DEWATS – Decentralized Wastewater Treatment Solutions

Developed & disseminated by BORDA and over 20 BORDA BNS Network Partners in South and South East Asia & Southern Africa

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