Palam Drain Remediation Plan

Palam Greenway Project, Dwarka, Delhi

Project Brief

Dwarka is a sub-city and diplomatic enclave located in South West Delhi. Most of the wastewater generated upstream of Dwarka district is directly discharged into 4 major storm drains – Palam drain being one. It originates at Central Ridge - Delhi Cantonment area; and flows into the Najafgarh Drain (which goes on to flow into the Yamuna River). Over time, the drain has become a carrier of untreated sewage (discharged from houses located in the upstream) and unsegregated solid waste. It has thus become a major threat to public health and the environment, contributing significantly to the dire condition of both the Najafgarh Drain and the Yamuna River downstream.

Recognizing the public and environmental health risks associated with this drain, the Delhi Development Authority (DDA) has included plans to rejuvenate the Palam Drain as part of **a larger urban rejuvenation program aimed at rejuvenating and transforming stormwater drains** in a manner that they serve as vibrant urban spaces too.

The **Palam Greenway Project** envisages a rejuvenated Palam Drain with an attractive green stretch along the drain, that includes bicycle and pedestrian access. The aim is to **set an example of transformation for all natural drains and waterbodies.**

With the Ahmedabad-based Center for Green Mobility (CGM) leading these efforts, CDD Society has served as technical partner to design wastewater treatment solutions for these drains.

Salient Features

Source: Stormwater from the catchment and wastewater from houses surrounding the drain
Number of inlets: Around 45 outfalls at 4 drains
Length of drain: 10 km
Average flow in drain: 75 MLD
Upstream population: 4 lakh
Influent quality: BOD: 117 mg/L
COD: 418 mg/L

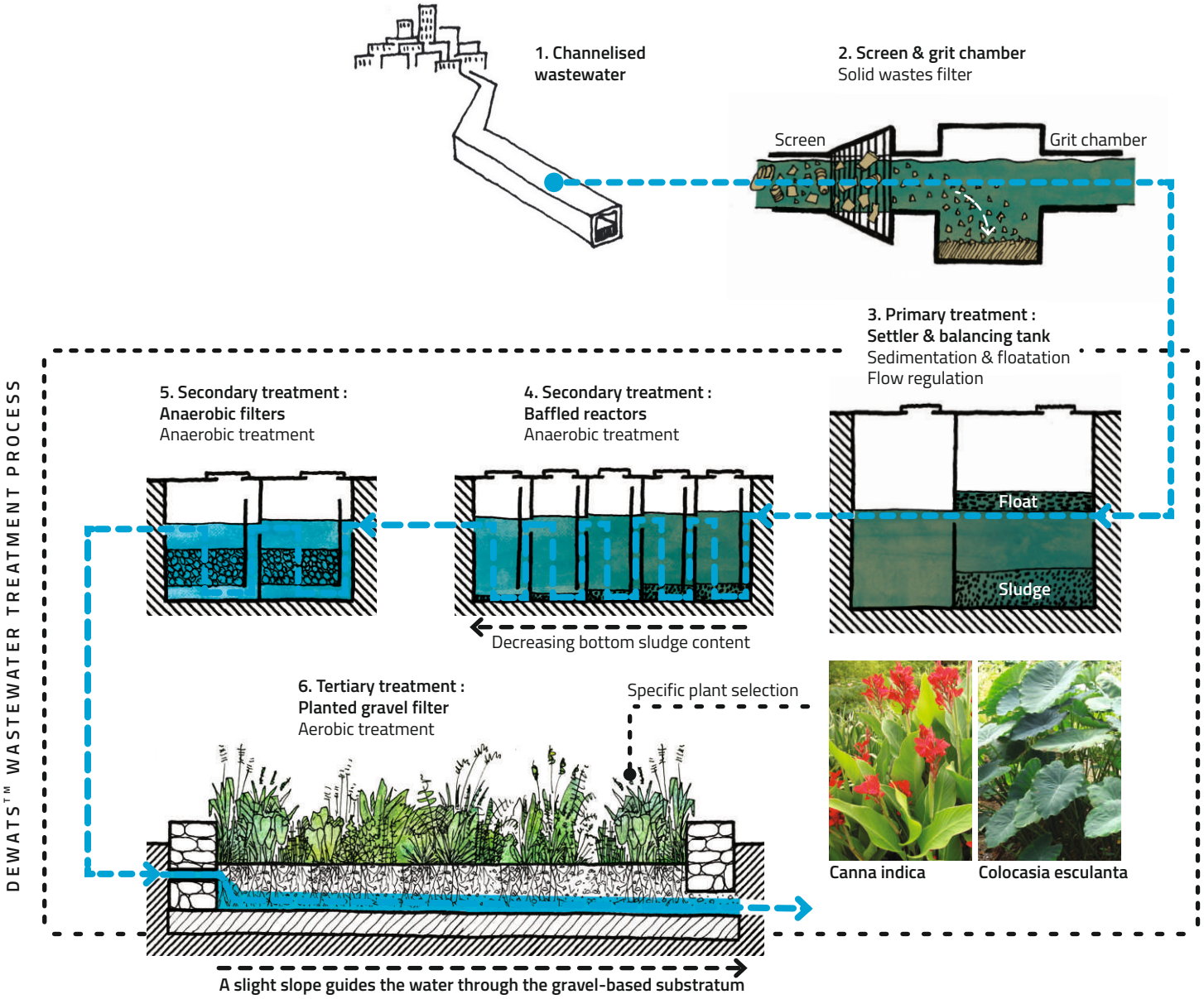
Project Specifications

Study funded by: The Bill and Melinda Gates Foundation (BMGF)
Implementing Agency: Delhi Development Authority
Partner Agency: Centre for Green Mobility
Project Duration: 18 months (August 2016 to December 2017)
Output: Master Plan

Modules Adopted

- **DEWATS™** – For the treatment of wastewater (of 16 MLD from 9 inlets) thereby adding treated wastewater to the drain
- **Bioremediation** - Integrating tertiary treatment as a part of the landscape along the shore of the drains as well as within the drains according to availability of space
- **Disposal** - Treated water discharged into the drain

Process Flow Diagram: DEWATS™ – Wastewater Treatment Process



System In Brief : DEWATS™

The wastewater streams entering the drain, mixed with stormwater, are conveyed in pipelines to the treatment system, which consists of 6 modules:

1. Wastewater diversion channel: used to divert the wastewater to the treatment system; will have an arrangement to allow free-flow of rainwater, from heavy monsoons, directly into the drain, without any treatment.

2. Screen and Grit chamber: primary treatment module, that comprises of screens and grit removal chambers; used to prevent solid waste and grit from entering the channel

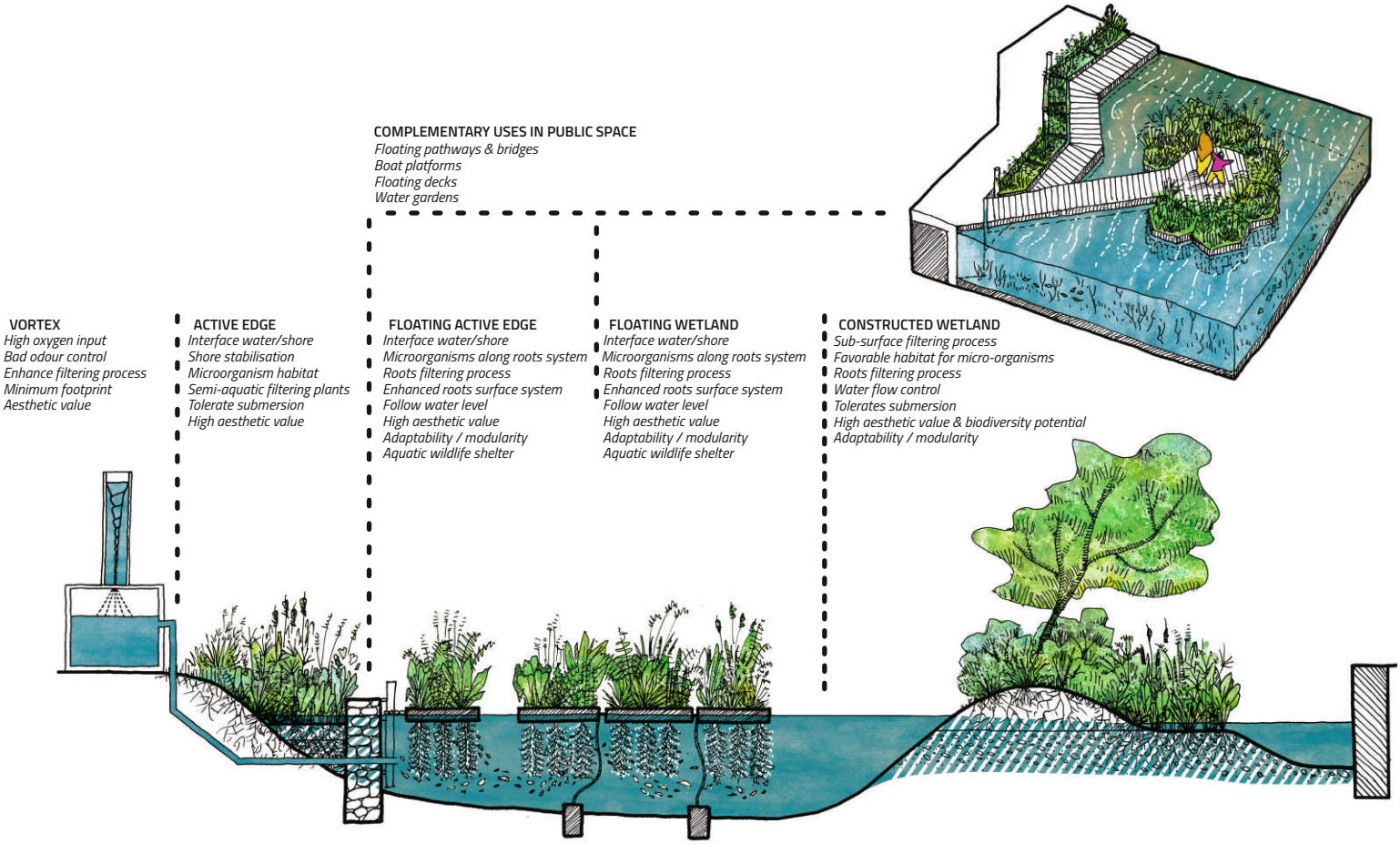
3. Settler and Balancing Tank: a sedimentation tank for retaining particles by settling over a specific time frame; also used for balancing the flow in order to avoid shock loads on the treatment modules during heavy floods

4. Anaerobic Baffled Reactor: ensures anaerobic degradation of suspended solids by mixing fresh waste water with an active sludge blanket

5. Anaerobic Filter: acts as a fixed bed filter where wastewater is brought into close contact with active bacteria for removal of dissolved organic matter

6. Planted Gravel Filter: used as a tertiary treatment unit to oxygenate the partially treated wastewater. Dissolved organic matter occurs post which the treated wastewater enters the drain.

Schematic Flow Diagram of the Bioremediation System:



System In Brief : Bioremediation Systems

The wastewater streams, after treatment in the DEWATS™, enter the bioremediation loop, which consists of 5 modules:

1. Vortex: The Vortex system is based on the slow spinning of the wastewater flow in contact with the atmosphere. It creates a whirlpool, which ensures a high level of oxygen input in the wastewater flow. This helps control odours. In addition, BOD, COD and other wastewater components are further reduced as a result of the continuous oxygen input and vortex motion.

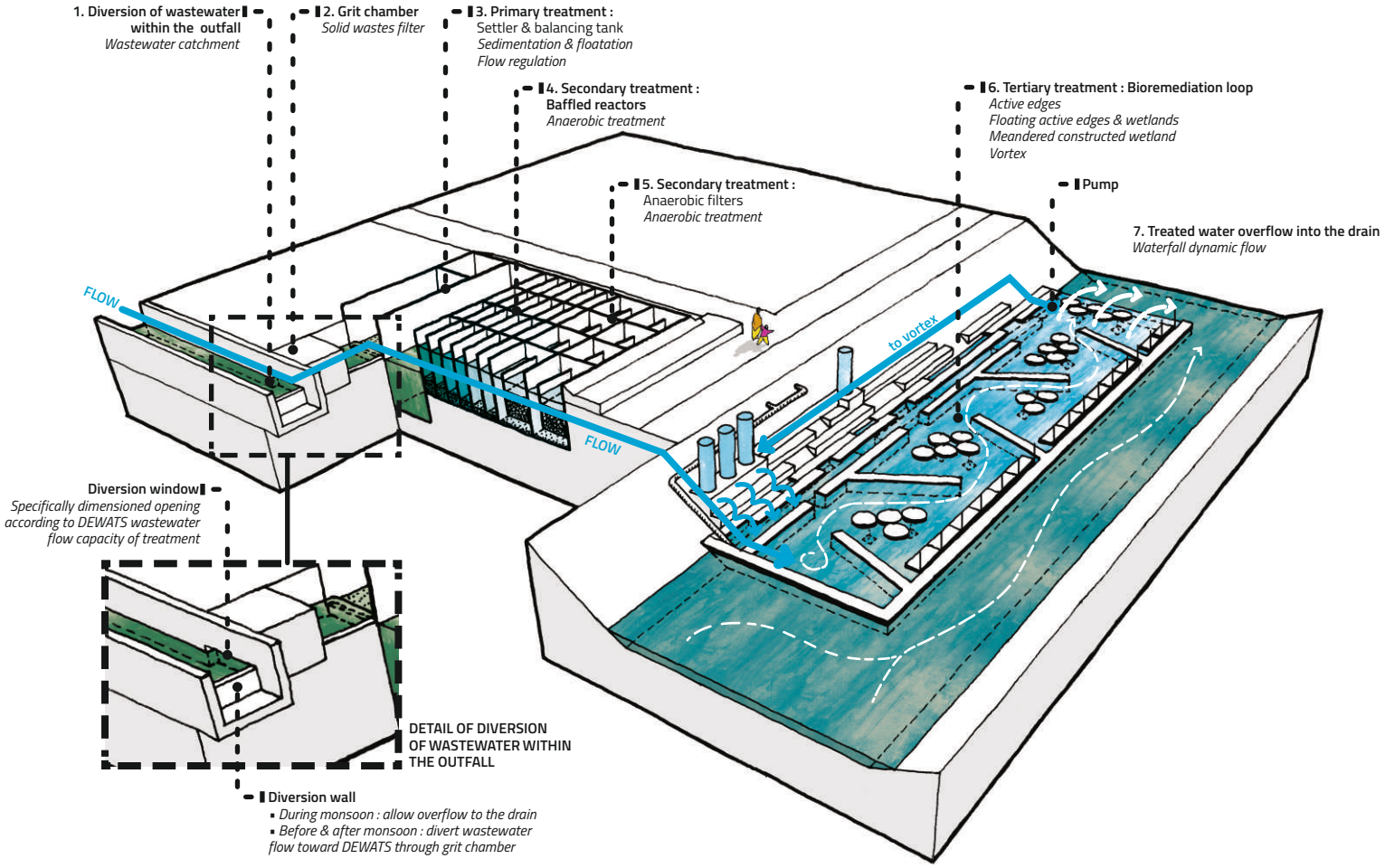
2. Active Edge: It creates an ideal interface between the water and the shore. Made of porous material, semi-aquatic plants can develop harmoniously on it while micro-organisms can populate the filter media.

3. Floating Active Edge: An artificial floating bed, anchored to the shore, it is filled with supporting material and planted with semi-aquatic plants. The micro-organisms, which develop around the root system, help in treatment of the water, till the very bottom.

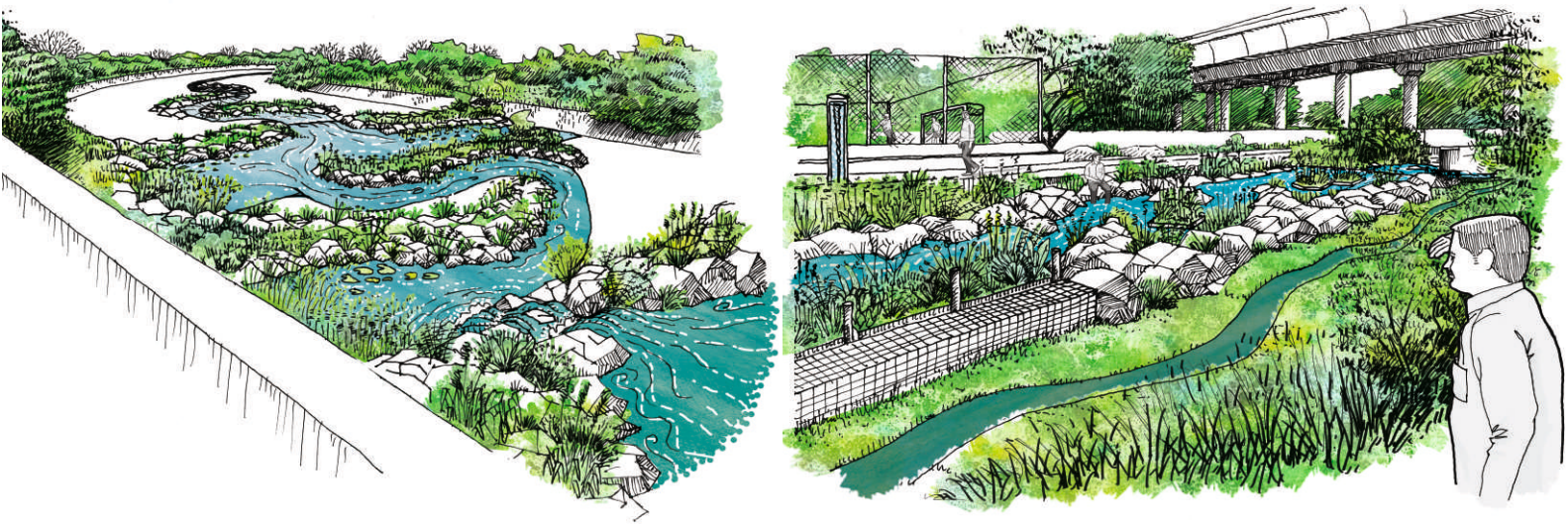
4. Floating Wetlands: The wetlands provide a floating mat of vegetation that floats up and down with the changing level of water surface. The plant stems remain above the water level, while their roots grow below - through the buoyant structure and into the water column. It also serves as a wildlife habitat and improves the aesthetics of the waterbody.

5. Constructed Wetlands: It provides a relatively passive, natural, low operation & maintenance system that enhances habitat and aesthetic values and provides an ecological alternative to the traditional treatment processes of today.

Conceptual View of the Wastewater Treatment Process:



- The location of the system has to be fixed based on land availability
- One method would be to setup the treatment system at the outfall of the tributaries to the main drain
- Another method would be to setup DEWATS™ and bioremediation directly for the main drain
- Additionally, solid waste needs to be removed - in order to clean the drains



Conceptual view of the drain and wastewater treatment system (integrated into the landscape)

Consortium for DEWATS Dissemination **Society**

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