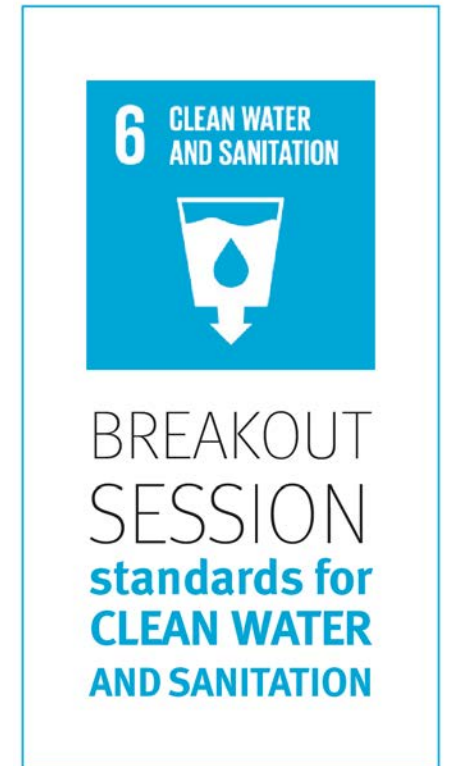




# WASTEWATER TREATMENT & REUSE USING A CONSTRUCTED WETLAND SYSTEM AT INSTITUTIONAL LEVEL



# Background

- Botswana is faced with water shortages due to limited water resources.
- The situation is worsened by low rainfalls, high evaporation rates, poor water quality due to high salinity in groundwater and water wastages in institutions especially schools.
- The country has reached its full potential in terms of surface water development (construction of dams).
- All Botswana's perennial rivers are shared with neighboring countries.



# Botswana's Surface Water Drainage Patterns

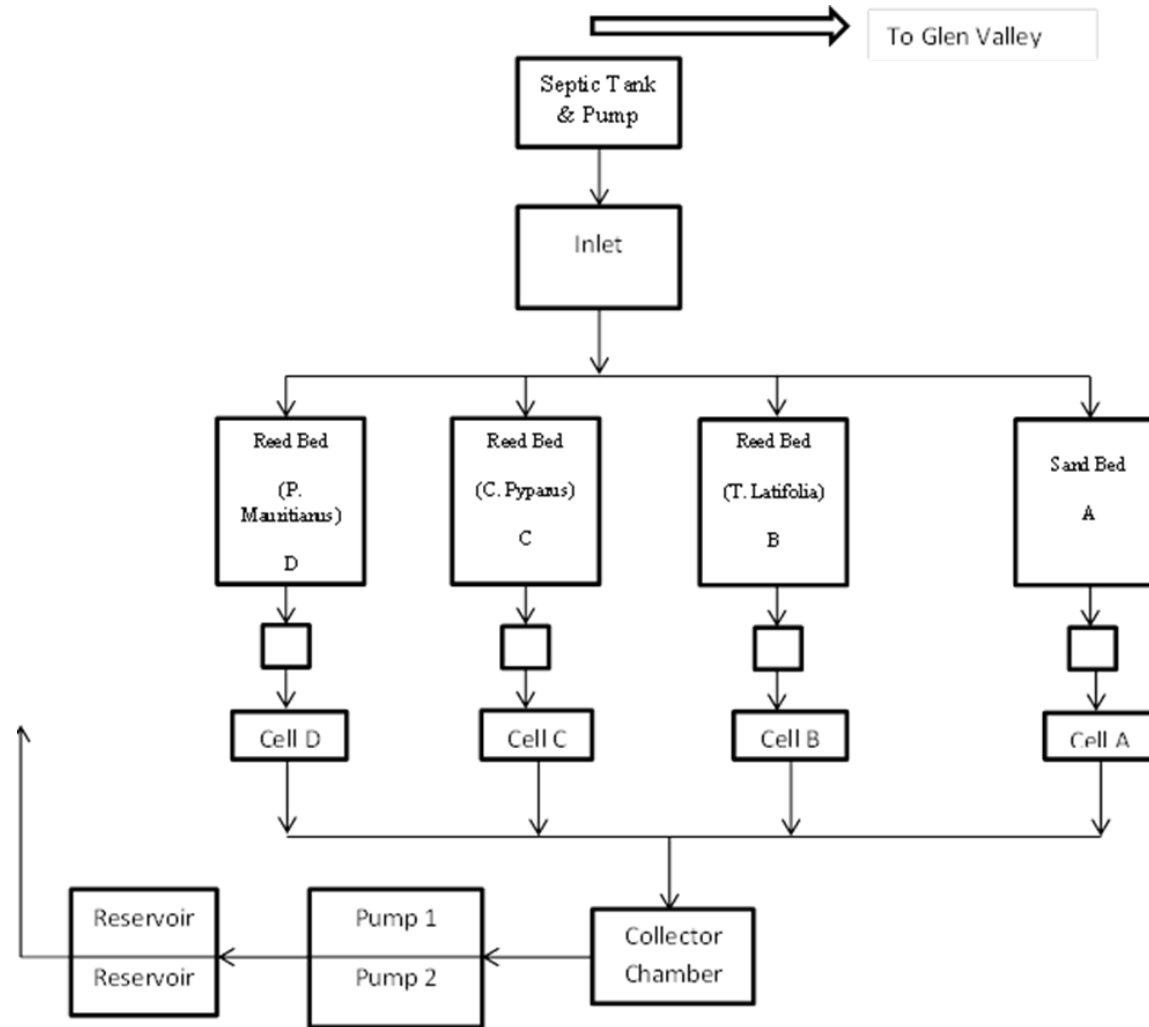


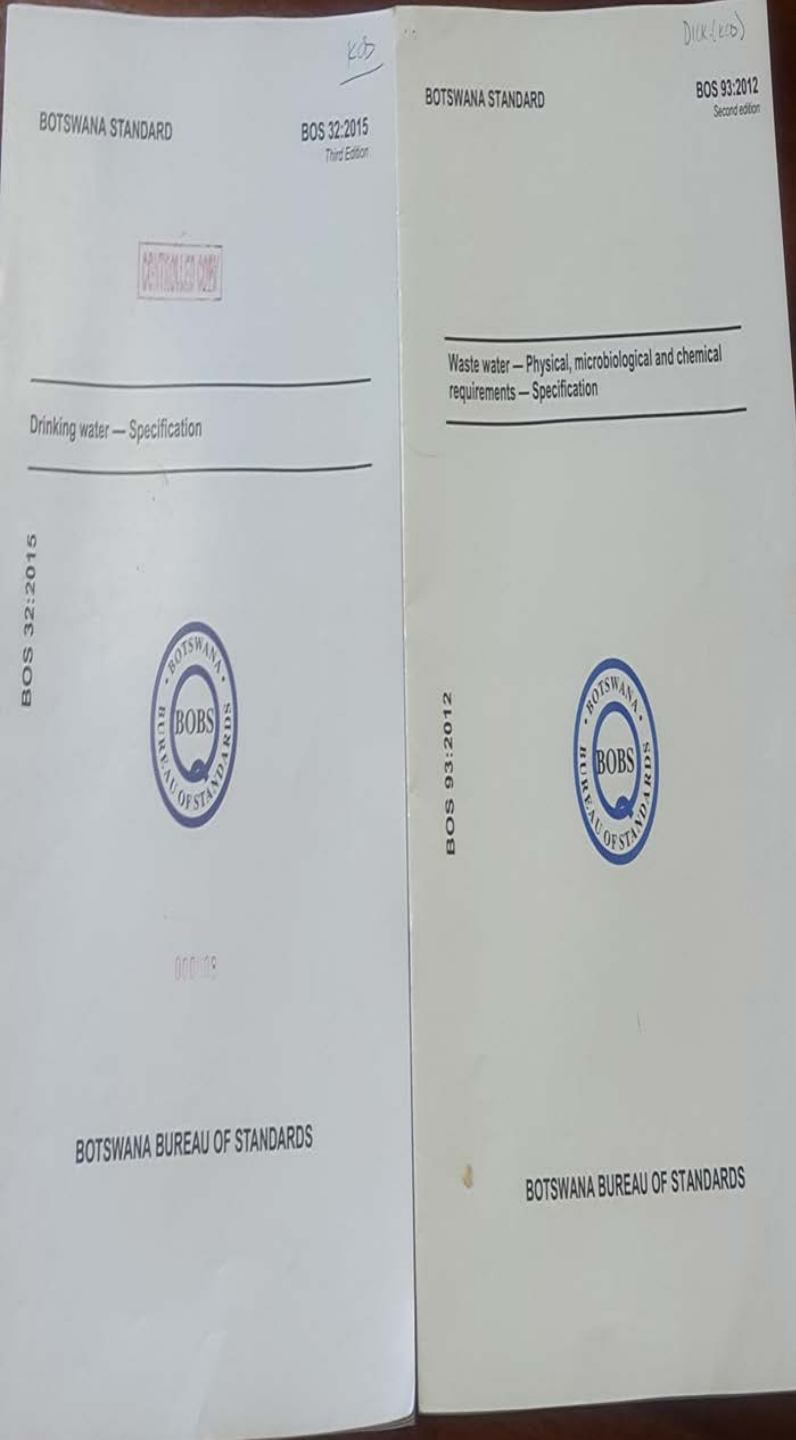
# Wastewater Reuse

- The country's economy is in transition and water is required for economic growth in domestic, energy, agriculture, tourism, manufacturing and mining.
- Wastewater reuse was identified as an alternative water source by the Botswana National Water Masterplan Review of 2006 and the Botswana IWRM/WE plan of 2013.
- Department of Water Affairs(DWA) constructed a wetland system to treat wastewater on-site for re-use in non potable uses.
- This is a demonstration project to promote wastewater treatment and reuse on-site.



# Flow Diagram of the DWA Constructed Wetland System



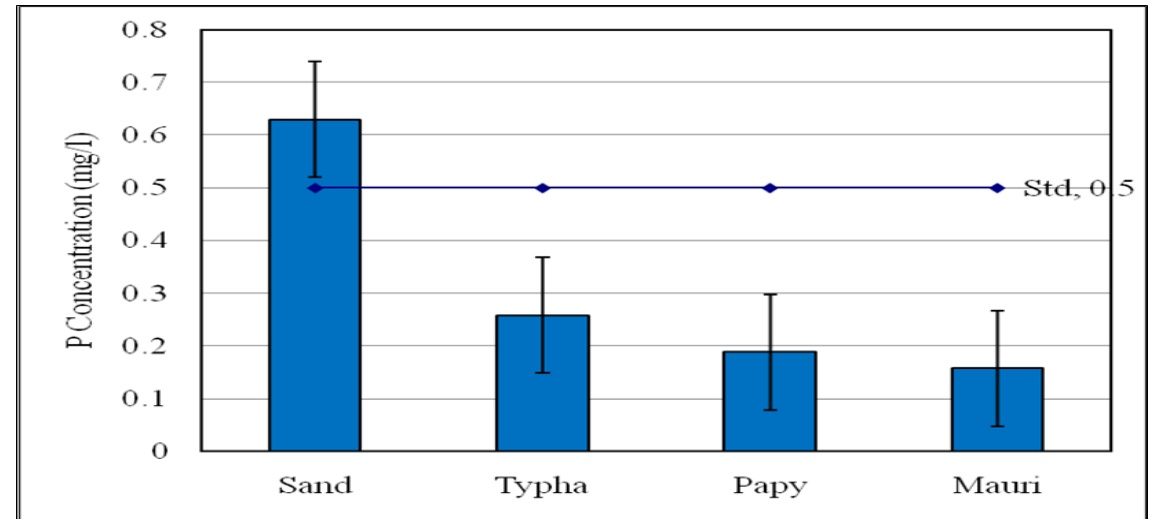
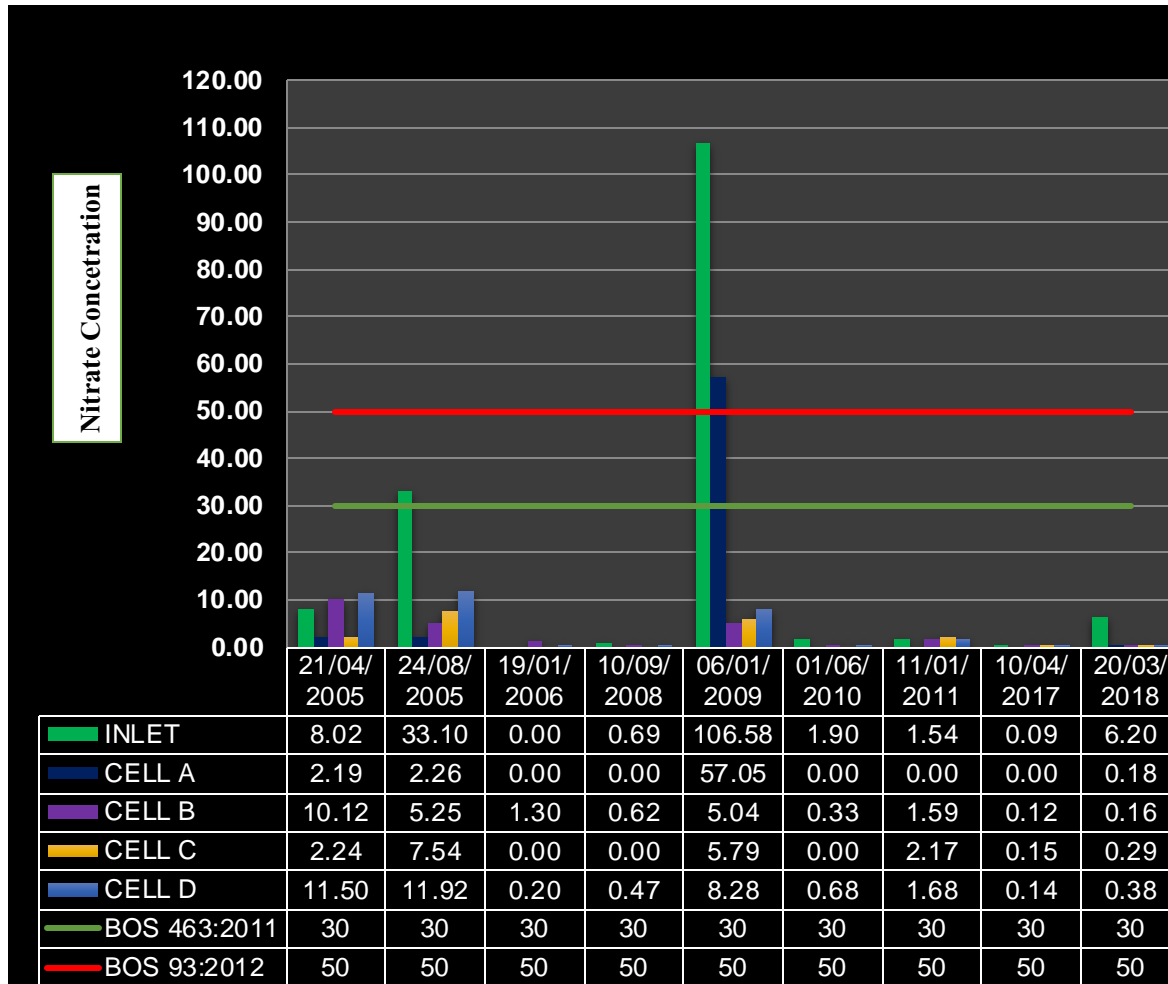


# Treated Effluent Quality Assessment

- Effluent quality after treatment is assessed using the Botswana water quality standards to ensure fitness for purpose.
- These are the Drinking Water Quality Specifications (BOS 32:2015), Wastewater Discharge Requirements (BOS 93:2012) and the Water Quality for Irrigation (BOS 463:2011).
- Sample collection and transportation is done in accordance with BOS ISO 5667 and BOS ISO/IEC 17025.



# Results



# Challenges & Lessons Learnt

- Constructed wetland system was found to be effective in treating wastewater for non-potable uses such as irrigation, construction and dust suppression.
- Treatment of wastewater for drinking purposes requires coupling the wetland system with an advanced water treatment technology like the reverse osmosis.
- There is low uptake on wastewater reuse by the various stakeholders due to social, cultural and religious beliefs.
- Extensive research is required on wastewater treatment for reuse to determine water treatment technologies that are effective on improving wastewater quality and establish the consequences of cumulative pollution over extended time of use.





# Thank You!

