Introduction

Background
- A small scale sustainable housing development comprising 15 earth sheltered eco-homes, situated to the north of Bedford.
- 53 P.E. and ‘off grid’ with regards to water supply and wastewater services.
- Residents will live in an eco-friendly and sustainable manner to minimise water consumption.

Objectives
- Design of water and wastewater treatment processes that would enable 100% greywater reuse and achieve > 60% water self-sufficiency
- Literature review, feasibility study and estimation of CAPEX and OPEX.
- To outline a low water usage strategy for residents.

Potable Water Treatment

- Background
- Uses passive treatments such as constructed wetlands and trickling filters.
- Low chemical consumption.
- Low energy consumption.
- Aesthetically pleasing.
- 100% self-sufficiency in terms of water supply.

Benefits of proposed process designs:
- Uses passive treatments such as constructed wetlands and trickling filters.
- Low chemical consumption.
- Low energy consumption.
- Aesthetically pleasing.
- 100% self-sufficiency in terms of water supply.

Greywater Treatment

- Findings
  - Passive biological processes like wetlands have the potential to meet the project wastewater requirements.
  - Denitrification in VF wetlands could achieve up to 85% nitrate conversion.
  - Greywater and blackwater separation can offer greater flexibility regarding water reuse applications.
  - Utilisation of greywater reuse provides sustainable alternatives to conventional water supply sources.

Blackwater Treatment

- Findings
  - Passive biological processes like wetlands have the potential to meet the project wastewater requirements.
  - Denitrification in VF wetlands could achieve up to 85% nitrate conversion.
  - Greywater and blackwater separation can offer greater flexibility regarding water reuse applications.
  - Utilisation of greywater reuse provides sustainable alternatives to conventional water supply sources.

Sludge Management

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humus from TF (kg/year)</td>
<td>120</td>
</tr>
<tr>
<td>SS in raw water (kg/year)</td>
<td>117</td>
</tr>
<tr>
<td>Total SS (kg/year)</td>
<td>237</td>
</tr>
<tr>
<td>Removed SS (kg/year)</td>
<td>178</td>
</tr>
</tbody>
</table>

- Findings
  - Passive biological processes like wetlands have the potential to meet the project wastewater requirements.
  - Denitrification in VF wetlands could achieve up to 85% nitrate conversion.
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  - Utilisation of greywater reuse provides sustainable alternatives to conventional water supply sources.

“We do not inherit the Earth from our ancestors; we borrow it from our children.”

– Native American Proverb