Sustainability Assessment for a First Time Wastewater Scheme

Presented by Thomas Haarhoff
Harrison Grierson Consultants
Introduction

- Trend to provide centralised wastewater collection systems to un-serviced communities

- Drivers – public health and pollution from effluent

- Sustainability assessment of collection options
Point Wells - Setting
Point Wells - Issues

- Excessive infiltration
- Poor maintenance
- Odour (effluent not fully treated)
- High water table
- Only 5m above sea level
Point Wells - Issues

- Point Wells Sustainable Development Plan (June 2006)
  - Intensification of existing village
  - Expansion of existing village
  - Population to grow from 360 to 1,300
Point Wells - Issues

- Minimise roads and loss of productive land

- Smaller lot sizes incompatible with on-site treatment and disposal

- Climate change

- Existing on-site treatment and disposal was not sustainable
Sustainability Assessment - Introduction

- Measures social, environmental, and economic spheres (triple bottom line approach)
- Interactions and integration of spheres
- Consideration of bottom lines
- Scale – meso, macro, micro
- Geographic span of the life cycle of the inputs and outputs
Sustainability Assessment - Methods

- EIA Driven Impact Assessment
- Objective Lead Integrated Assessment
- Assessment for Sustainability
Sustainability Assessment - Methods

• EIA Driven Impact Assessment
  – Compares proposals/options against social, environmental, and economic impacts
  – Can only be applied once the proposal is conceptualised
  – Identifies if triple bottom line impacts are acceptable
Sustainability Assessment - Methods

• Objective Lead Integrated Assessment
  – Evaluates if proposals achieve social, environmental and economic objectives
  – Questions whether a proposal contributes positively to triple bottom line goals

• Both methods are “direction to target” approaches

• Avoid defining a sustainable state
Sustainability Assessment - Methods

• Assessment for Sustainability
  – Determines if a proposal is sustainable
  – Complex, subjective, ambiguous
  – Understanding of institutional arrangements
  – Global cycles
  – Suited to meso scale proposals
Sustainability Assessment - Methods

- Point Wells Sustainability Assessment
  - EIA Driven Impact Assessment Selected
  - Appropriate for scale of scope of assessment
Our Objectives

1. Minimise impacts to the environment
2. Minimise impacts on public health
3. Minimise total cost
4. Align with the district’s wastewater servicing strategy and the objectives of the Point Wells Sustainable Development Plan

Rodney District Council (2006), Our Vision Pt. Wells/Omaha Flats Sustainable Development Plan
Sustainability Assessment – Boundary Conditions

• Only considered wastewater servicing issues

• Treatment at the Omaha Wastewater Treatment Plant

• Rodney District Council budget $3.6 million

• Consideration of existing technologies
Sustainability Assessment – Boundary Conditions

- Environmental impacts limited to Whangateau Harbour
- Material suppliers excluded (not cradle to grave)
- Water supply from rainwater harvesting
Sustainability Assessment – Options

1. Pressure sewer system
2. Vacuum sewer system
3. “Low infiltration” gravity system
4. Conventional gravity system
Sustainability Assessment – Methodology

- Quantitative and qualitative indicators
- Relative effects measured and scored

**Impact scoring for indicators**

<table>
<thead>
<tr>
<th>Impact</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Positive</td>
<td>5</td>
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<tr>
<td>Minor Positive</td>
<td>2</td>
</tr>
<tr>
<td>Nil / Neutral</td>
<td>0</td>
</tr>
<tr>
<td>Minor Negative</td>
<td>-2</td>
</tr>
<tr>
<td>Major Negative</td>
<td>-5</td>
</tr>
</tbody>
</table>
Sustainability Assessment – Methodology

- **Weighting**
  - Long term effect = 3
  - Short term effect = 1

- **Quantitative indicators**
  - Material use
  - Energy use
  - Risk
  - Construction issues
  - Earthworks etc.
Sustainability Assessment – Methodology

- Qualitative Indicators were determined collaboratively with Harrison Grierson, Rodney District Council, and community representatives
  - Impacts on private and public land
  - Amenity effects
  - Visual
  - Public health risk etc.
## Sustainability Assessment – Results

### Summary of Triple Bottom Line Assessment For Point Wells Wastewater Servicing Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Low Pressure Sewer</th>
<th>Vacuum</th>
<th>Low infiltration</th>
<th>Conventional</th>
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</thead>
<tbody>
<tr>
<td>Long-term Social Considerations</td>
<td>1.3</td>
<td>1.3</td>
<td>0.5</td>
<td>0.5</td>
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<tr>
<td>Short-term Social Considerations</td>
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<tr>
<td>Long-term Economic Considerations</td>
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<td>Short-term Economic Considerations</td>
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<td>-2</td>
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<tr>
<td>Long-term Environmental Considerations</td>
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<td>2.3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Short-term Environmental Considerations</td>
<td>0</td>
<td>-1</td>
<td>-3</td>
<td>-3</td>
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<tr>
<td>Capital Cost</td>
<td>$2.8M</td>
<td>$3.3M</td>
<td>$3.6M</td>
<td>$3.9M</td>
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<tr>
<td>NPV Cost</td>
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<td>$3.6M</td>
<td>$4.7M</td>
<td>$5.0M</td>
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<tr>
<td><strong>Total Non Weighted</strong></td>
<td><strong>7.6</strong></td>
<td><strong>4.3</strong></td>
<td><strong>-5.3</strong></td>
<td><strong>-9.3</strong></td>
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<tr>
<td><strong>Total Weighted</strong></td>
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<td><strong>13.0</strong></td>
<td><strong>-4.8</strong></td>
<td><strong>-12.8</strong></td>
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</table>
Sustainability Assessment – Results

• Low infiltration and conventional gravity sewer systems
  – Exceeded the council’s budget
  – Greatest impacts (energy use, overflow risk, amenity, construction effects)

• Vacuum and Pressure Sewer selected for further evaluation
Sustainability Assessment – Results

• The vacuum option has the lowest lifetime cost but does not receive the highest score

• Pressure sewer recommended over Vacuum
  – Minimal disruption of community during construction
  – The pressure system grows with the community (low initial capital cost) which minimised financial risk
  – Pressure sewer identified as a favourable servicing technology in other Rodney communities
Sustainability Assessment – Discussion

• Low pressure sewer system aligned closest to the objectives and boundary conditions of the assessment

• EIA Impact Driven Assessment criticised for not identifying the most sustainable solution however this is possible with the correct boundary conditions and objectives

• Assessment appropriate for the scale of the project
Sustainability Assessment – Discussion

• The Objective Lead Integrated Assessment method could have been used for Point Wells

• Interprets sustainability as triple bottom line goals

• “win, win, win” outcome

• Assumes that objectives improve the probability of a more sustainable outcome

• Assessment for Sustainability
Project Implementation

- Pressure sewer system commissioned on 28 June 2008
- 7.3km of pipeline in 4 months ($1.2 million)
- High level of community support
Questions?

www.rodney.govt.nz  www.harrisongrierson.com