Purpose and Goal of this Workshop

- Present Collection System Alternatives
- Review Advantages and Drawbacks
- Take Questions and Comments
- Discuss Preferences
Port Hadlock UGA – Sewer Facility Plan

Agenda

- Introduction
- Background
- Collection System Technologies
- Collection System Alternatives
- Discussion/Questions
Port Hadlock UGA – Sewer Facility Plan

Approach to New Sewer Facilities Plan

Public Involvement

- Public Workshop
- Public Workshop
- Public Workshop
- Public Workshop

Technical

- Review Past Work
- Collection System Alternatives
- Disposal Alternatives
- Treatment Alternatives
- System Selection
- Public Open House
- Public Open House
- Public Open House
- Public Open House

Financial

- Financial Analysis
- Rates and Implementation Plan
Sewer Planning – Why?

- Plan for expected growth in the Tri-Area
- Support economic vitality of the Tri-Area
Sewer Facility Plan - Why?

- Required by WAC 173-240 for Constructing or Modifying Wastewater Facilities
- Prescribed, Methodical Approach for Planning Sewer Facilities
- 20-year Planning Period
- Meets Federal Funding Requirements
- Involves Ecology early in the process
Port Hadlock UGA – Sewer Facility Plan

Sewer Facility Plan Elements

- Purpose and background
- Service area boundaries
- Population, flows, and loads
- Collection system
- Treatment
- Discharge
- Solids handling
- Implementation
  - Phased implementation
  - Funding strategy
  - Rate impacts
- Permitting and environmental documentation
- Public outreach / involvement
Port Hadlock UGA – Sewer Facility Plan

Service Area Boundaries

Port Hadlock Sewer Service Areas

- 6 Year Service Boundary
- 20 Year Service Boundary
- Streams
- Parcels

Port Townsend Bay
Port Hadlock UGA – Sewer Facility Plan

Wastewater Collection Technologies - Overview

- Conventional gravity sewers
- Pressure sewers
  - Septic tank effluent pumping (STEP)
  - Grinder pumps
- Small-diameter gravity sewers
- Vacuum sewers
Conventional Gravity Sewers

8\" Diameter Gravity Sewer
Conventional Gravity Sewers

**Advantages**
- Proven reliability/Length of service
- Lowest O&M cost
- No need for septic tanks or pumps for individual connections

**Drawbacks**
- Require constant downward slope
  - Deep sewers for flat terrain
  - Intermediate pump stations for hilly areas
- Highest initial cost (deeper sewers)
2" Diameter Force Main  Effluent Pump  Septic Tank
Pressure Sewers - STEP

- **Advantages**
  - Low initial cost
  - Smaller sewers that can follow terrain

- **Drawbacks**
  - Septic tank O&M (ownership agreements, septage pumping, easements required)
  - Pump requirements (electrical connection, O&M)
Pressure Sewers - Grinder

- 2" Diameter Force Main
- Grinder Pump
Pressure Sewers - Grinder

- **Advantages**
  - Used when terrain doesn’t allow gravity sewers and septic tanks aren’t desired

- **Drawbacks**
  - Pump requirements (electrical connection, O&M)
  - Pump must pass solids
    - More difficult than passing liquid only
    - Additional maintenance required
Small-Diameter Gravity Sewers

4" Diameter Gravity Sewer

Septic Tank
Small-diameter Gravity Sewers

- **Advantages**
  - Low initial cost
  - Smaller sewers that can follow terrain

- **Drawbacks**
  - Septic tank O&M (ownership agreements, septage pumping, easements required)
  - Sewers are deeper than STEP or grinder, but not as deep for conventional gravity
Port Hadlock UGA – Sewer Facility Plan

Vacuum Sewers

- Vacuum Station
- Valve Pit
Vacuum Sewers

- **Advantages**
  - Low initial cost
  - Smaller sewers that can follow terrain

- **Drawbacks**
  - Best suited for flat terrain
    - Limited lift capacity
  - Valve pit and vacuum station O&M
  - Odor control required at the vacuum station
Port Hadlock UGA – Sewer Facility Plan

Estimates of Cost Breakdown

<table>
<thead>
<tr>
<th>% of Total Present Worth</th>
<th>O&amp;M</th>
<th>O&amp;M</th>
<th>O&amp;M</th>
<th>O&amp;M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pipelines &amp; Pump Stations</td>
<td>Septic Tanks</td>
<td>Pipelines &amp; Pump Stations</td>
<td>Septic Tanks &amp; Pumps</td>
</tr>
<tr>
<td>Conventional Gravity System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small-Diameter Gravity System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEP System /Grinder</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TETRA TECH INC.
Port Hadlock UGA – Sewer Facility Plan

Technology Evaluation

- **Shortlisted Technologies**
  - Gravity system
  - Grinder pumps where lift required
  - STEP/Grinder system

- **Rejected Technologies**
  - SDG - relatively deep pipe depths, requires septic tanks at each house
  - Vacuum system – not as adaptable to variable terrain
Alternatives

1. Conventional Gravity
   • Grinder pumps where lift required

2. STEP/Grinder – Pressurized System

3. Combined Gravity/Pressurized System
   • Gravity in central portion of system
   • STEP/Grinder in outer reaches of system
Port Hadlock UGA – Sewer Facility Plan

Alternative 1 - Gravity
Port Hadlock UGA – Sewer Facility Plan

Alternative 2 – STEP/Grinder
Port Hadlock UGA – Sewer Facility Plan

Alternative 3 - Combined

[Map Image]
Port Hadlock UGA – Sewer Facility Plan

Gravity vs. STEP

- STEP system well suited for low density housing
  - shown below: 2 houses/acre

1 ACRE

Deep Gravity Sewers

1 ACRE

Shallow STEP Sewers

House

STEP Tank/Pump

Sewer (gravity or pressure)
Gravity vs. STEP

- Gravity system better suited for high housing density, new development
  - shown below: 10 houses/acre

![Diagram showing Deep Gravity Sewers vs. Shallow STEP Sewers. 1 ACRE is divided into sections with houses, STEP Tank/Pump, and Sewer (gravity or pressure).]
Cost Analysis

- Gravity system: higher initial cost
- STEP/Grinder system: “pay-as-you-go”
- Combined system is somewhere in-between

Plan for Phased Implementation

- Costs shown here are only for comparative purposes
- Actual costs may be lower due to phasing of implementation and efficiencies found during detailed design
Port Hadlock UGA – Sewer Facility Plan

Phasing Considerations

- Sewer to be constructed in phases: 6-year and 20-year planning periods
- 20-year area subdivided into six sub-areas
- New developments will connect to sewer
- Boundary adjustments
Port Hadlock UGA – Sewer Facility Plan

Estimated Implementation Costs

- Present Worth O&M; Replace Equipment at 20 Years and Sewers at 50 Years
- Capital Cost of Homeowner Connections
- Capital Cost of Mainline Sewers Only

ALT 1 - GRAVITY
ALT 2 - STEP
ALT 3 - COMBINED

Core Area
- 2023 Population (344 ERUs)

Area 1
- 2023 Population (200 ERUs)

Area 2
- 2023 Population (150 ERUs)

Area 3
- 2023 Population (350 ERUs)

Area 4
- 2023 Population (798 ERUs)

Rhody Area
- 2023 Population (360 ERUs)

Alcohol Plant
- 2023 Population (105 ERUs)
Port Hadlock UGA – Sewer Facility Plan

Estimated Cost Per ERU

- **Core Area**: 2023 Population (344 ERUs)
- **Area 1**: 2023 Population (200 ERUs)
- **Area 2**: 2023 Population (150 ERUs)
- **Area 3**: 2023 Population (350 ERUs)
- **Area 4**: 2023 Population (798 ERUs)
- **Rhody Area**: 2023 Population (360 ERUs)
- **Alcohol Plant**: 2023 Population (105 ERUs)

Detailed cost breakdown for:
- Alcohol Plant
- Core Area
- Area 1
- Area 2
- Area 3
- Area 4
- Rhody Area

Cost per ERU ranges from 0 to 35,000.

- Present Worth O&M; Replace Equipment at 20 Years and Sewers at 50 Years
- Capital Cost of Homeowner Connections
- Capital Cost of Mainline Sewers Only
Port Hadlock UGA – Sewer Facility Plan

Next Steps

- Analysis of treatment and discharge options
- Selection of a preferred alternative for collection, treatment, and discharge
Port Hadlock UGA – Sewer Facility Plan

Today

- Questions & Comments
- Discuss Preferences to Finalize Collection System Approach
Jefferson County
Port Hadlock UGA
Sewer Facility Plan

Public Workshop – Collection System
March 16, 2006