WOODSIDE WATER RECLAMATION FACILITY PLANNING STUDY

- Chapter 1: Planning Criteria
- Chapter 2: Wastewater Flows and Loads
- Chapter 3: Current Plant Capacity and Loads
- Chapter 4: Treatment Upgrade Alternatives
- Chapter 5: Water Reuse and Sludge Disposal
- Chapter 6: Support Facilities
- Chapter 7: Summary of Upgrades and Implementation Schedule
CHAPTER 1

Planning Criteria

- Study Area Conditions
- Planning Area
  - Planning Map
- Land Use and Development
- Local Conditions
- Treatment Background
This map depicts Goal 8.1 of the 2020 Hailey Comprehensive Plan. Site-specific data and circumstances should be balanced with this plan and the overall goals of the Comprehensive Plan when considering land use decisions.
TREATMENT BACKGROUND - PAST IMPROVEMENTS

- The original WWTP was built in 1974 (package plant under the green dome) and discharged to a 4-acre percolation field
  - Capacity: 0.7 MGD
- In 2000, new secondary system including a batch tank, two SBRs, effluent EQ tank, and tertiary filtration using cloth media disk filters were added. Capacity (according to drawings)
  - Avg Flow – 1.4 MGD
  - Max. Mo. – 1.6 MGD
  - Max. Day – 2.5 MGD
TREATMENT BACKGROUND - UPGRADES LAST 10 YEARS

- Wastewater Facility Planning Study – completed in 2010
  o Selected alternative - 3rd SBR and dual stage sand filters

- In 2015 two aerobic digesters, rotary drum thickeners, and a screw press for solids dewatering
  o Original circular package plant tank used for sludge storage was removed
CHAPTER 2

Current Wastewater Flows & Loads

▪ Historical Population
▪ Historical Influent Wastewater Characteristics and Trends
▪ Regulatory and Permitting Review
▪ Future Flow and Load Projections
## CURRENT POPULATION DATA

<table>
<thead>
<tr>
<th>Year</th>
<th>US Census</th>
<th>US Census Estimate*</th>
<th>% Annual Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>6,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>7,960</td>
<td></td>
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</tr>
<tr>
<td>2011</td>
<td>7,860</td>
<td>-1.26%</td>
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</tr>
<tr>
<td>2012</td>
<td>7,901</td>
<td>0.52%</td>
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</tr>
<tr>
<td>2013</td>
<td>7,987</td>
<td>1.09%</td>
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<tr>
<td>2014</td>
<td>8,042</td>
<td>0.65%</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>8,118</td>
<td>0.95%</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>8,254</td>
<td>1.68%</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>8,378</td>
<td>1.50%</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>8,501</td>
<td>1.47%</td>
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</tr>
<tr>
<td>2019</td>
<td>8,688</td>
<td>2.21%</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>8,900**</td>
<td>2.50%</td>
<td></td>
</tr>
</tbody>
</table>

*Source: US Census Bureau Population Estimate, found at [https://www.census.gov](https://www.census.gov)

**Estimated from 2.5% Growth model
DISCHARGE PERMIT LIMITS

- Regulatory and Permitting Review:
  - Total Maximum Daily Limits (TMDL) established in 2003 with Big Wood Watershed Management Plan
  - Woodside WWTP was authorized to discharge to the Big Wood River under NPDES Permit No. ID0020303. Permit issued August 1, 2021 and expired July 31, 2017 (administratively extended to present).
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Effluent Limitations</th>
<th>Monitoring Requirements</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Units</td>
<td>Average Monthly</td>
</tr>
<tr>
<td>Flow</td>
<td>MGD</td>
<td>Report</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand (BOD5)</td>
<td>mg/L</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>lbs/day</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>% removal</td>
<td>85% min</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>mg/L</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>lbs/day</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>lbs/day</td>
<td>Annual Average Limit: 18.1 lbs/day</td>
</tr>
<tr>
<td></td>
<td>% removal</td>
<td>85% min</td>
</tr>
<tr>
<td>E. coli Bacteria²³</td>
<td>#/100 mL</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>CFU/day</td>
<td>7.53x10⁷</td>
</tr>
<tr>
<td>pH</td>
<td>s. u.</td>
<td>6.5 – 9.0 at all times</td>
</tr>
<tr>
<td>Total Ammonia as N⁵</td>
<td>mg/L</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>lbs/day</td>
<td>9</td>
</tr>
<tr>
<td>Total Phosphorus as P (Final)</td>
<td>mg/L</td>
<td>Report</td>
</tr>
<tr>
<td></td>
<td>lbs/day</td>
<td>5.2</td>
</tr>
</tbody>
</table>
PARAMETERS OF CURRENT CONCERN

- **TSS (Total Suspended Solids):**
  - Annual Mass Limit: 18.1 lbs/L

<table>
<thead>
<tr>
<th>Flow</th>
<th>TSS concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mgd</td>
<td>4.3 mg/L</td>
</tr>
<tr>
<td>0.75 mgd</td>
<td>2.9 mg/L</td>
</tr>
<tr>
<td>1.0 mgd</td>
<td>2.15 mg/L</td>
</tr>
<tr>
<td>1.25 mgd</td>
<td>1.7 mg/L</td>
</tr>
</tbody>
</table>

- **TP (Total Phosphorus):**
  - Average Monthly Mass Limit: 5.2 lbs/day

<table>
<thead>
<tr>
<th>Flow</th>
<th>TP concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mgd</td>
<td>1.25 mg/L</td>
</tr>
<tr>
<td>0.75 mgd</td>
<td>0.83 mg/L</td>
</tr>
<tr>
<td>1.0 mgd</td>
<td>0.62 mg/L</td>
</tr>
<tr>
<td>1.25 mgd</td>
<td>0.50 mg/L</td>
</tr>
</tbody>
</table>
PARAMETERS OF CURRENT CONCERN

- Ammonia:
  - Average Monthly Mass Limit: 9 lbs/day
    - 0.5 MGD → 2.1 mg/L (CAN BE DIFFICULT DURING COLD SEASON)
    - 1 MGD → 1.1 mg/L

- Future Potential Permit Concerns
  - Lower ammonia – potential toxicity concerns
  - Temperature limits
FUTURE LOADING (YEAR 2020 → 2040)

- Population 8,900 persons → 14,600 persons (growth 2.5% per year)
- Flow
  - Avg. 0.54 mgd → 0.96 mgd (80% increase)
  - Peak Hr. 1.63 mgd → 2.70 mgd
- BOD5
  - Avg. 1470 lbs/day → 2380 lbs/day
- TSS
  - Avg. 1330 lbs/day → 2370 lbs/day
- TP
  - Avg. 32 lbs/day → 69 lbs/day
CHAPTER 3

Plant Capacity and Operation
- Existing Plant Facilities
- Current Plant Operation
- Plant Performance
- Process Modeling
- Capacity Evaluation Summary
Each process within the highlighted area has two units. Only one unit shown for clarity.

SBR – Sequencing Batch Reactor
UV – Ultraviolet Reactor
EFF EQ BASIN – Effluent Equalization Basin
RDT – Rotating Disc Thickener
FLOC TANK – Flocculation Tank

Screenings and Grit to Ohio Gulch Land Disposal

At Ohio Gulch Land
PERFORMANCE - BOD

Effluent BOD Concentration (mg/L) & Effluent BOD Load (lb/day)

Average Monthly Limit: 30 mg/L
PERFORMANCE - TSS

- TSS Removal (%)
- Effluent TSS Concentration (mg/L) & Effluent TSS Load (lb/day)

EFF, TSS
EFF, TSS Load
TSS Removal

Annual Average Daily Limit: 18.1 lb/day
PERFORMANCE - TOTAL PHOSPHORUS

Average Monthly Limit: 5.2 lb/day
PERFORMANCE - AMMONIA NITROGEN

- **Maximum Daily Limit:**
  - Ammonia Concentration: 3.3 mg/L
  - Ammonia Load: 15.6 lb/day

Graph showing Ammonia Removal (%) over time from Aug-13 to Jun-20.
CURRENT FACILITIES & CONDITION

- Primary
  - Influent Pump Station - poor
  - Influent Screening - poor
  - Grit Removal - poor

- Secondary
  - Batch Tank - good
  - Sequencing Batch Reactor
    - Mixing pumps - poor
    - Blowers - poor
  - Effluent Equalization Basin - good

- Tertiary
  - Cloth-Disc Filters – poor (electrical)
  - Ultraviolet Disinfection – poor (electrical)

- Solids
  - Digester
    - Mixing – poor
    - Blowers - good
  - Solids Thickening – good
  - Solids Dewatering - good
BIOLOGICAL SYSTEM CAPACITY – FUTURE TRIGGER

- Installed capacity driven by fill fraction and cycle times of SBRs
  - 30% fill fraction is highest to reliably operate
  - 6hr aeration/react time is lowest to sufficiently remove ammonia
- These combine to get a capacity of approximately **1.5 MGD**
- Limitation of biological treatment is redundancy (removal of one SBR for service). Therefore, the actual capacity is ~ **0.75 mgd**.
  - Current maximum month flow is 0.67 mgd.
CHAPTER 4 TREATMENT ALTERNATIVES

Common Upgrades
- Headworks (screening and grit)
- Aeration / Mixing
- UV

Treatment Alternatives
- Alternative 1: MBR
- Alternative 2: SBR with TMF
- Alternative 3: SBR with Two-Stage Sand Filter
TREATMENT ALTERNATIVES

- Alternative 1: Membrane Bioreactor (MBR)
  - Alt. 1a: MBR with Chemical Phosphorus Removal
  - Alt. 1b: MBR with Enhanced Biological Phosphorus Removal (EBPR)

- Alternative 2: SBRs with Tertiary Membrane Filters (TMF)

- Alternative 3: SBRs with Two-Stage Sand Filtration
ALTERNATIVE 1A: MBR WITH CHEM
ALTERNATIVE 1A: MBR WITH CHEM
ALTERNATIVE 1B: MBR WITH EBPR

ALTERNATIVE 1A – MEMBRANE BIOREACTOR with EBPR

- Each process within the highlighted area has two units. Only one unit shown for clarity.
- AER – Aerobic Basin
- UV – Ultraviolet Reactor
- EFF EQ BSN – Effluent Equalization Basin
- RDT – Rotating Drum Thickener
- FLOC TANK – Flocculation Tank
- ANR – Anaerobic Basin
ALTERNATIVE 1B: MBR WITH EBPR
ALTERNATIVE 2: SBR WITH TMF

ALTERNATIVE 2 – SBR WITH TERTIARY MEMBRANE FILTRATION

Each process within the highlighted area has two units. Only one unit shown for clarity.

SBR – Sequencing Batch Reactor  UV – Ultraviolet Reactor
EFF EQ BASIN – Effluent Equalization Basin  RDT Rotating Drum Thickener
FLOC TANK – Flocculation Tank  TMF – Tertiary Membrane Filter

RAW INFANT
SCREEN
VORTEX ORIF
BATCH TANK
SBR #1
SBR #2
SBR #3
EFF EQ BASIN
UV
CFS
BAS WOOD PONER
POLYMER
RED THICKENED SLUDGE TANK
POLYMER
THICKENED SLUDGE TANK
Screw Press
Screw Press
EFFOSOIL AT ONE GUILCH TRANSFER STATION
ALTERNATIVE 3: TWO-STAGE SAND FILTER

ALTERNATIVE 3 – SBR WITH TWO-STAGE TERTIARY SAND FILTRATION

Each process within the highlighted area has two units. Only one unit shown for clarity.

SBR – Sequencing Batch Reactor
UV – Ultraviolet Reactor
EFF EQ BASIN – Effluent Equalization Basin
RDT – Rotating Drum Thickener
FLOC TANK – Flocculation Tank
PAIRWISE COMPARISON

- Treatment Confidence
- Capital Cost
- Operating and Maintenance Cost
- Ease of Operation
- Energy Efficiency
- Opportunity for Reuse
# PAIRWISE COMPARISON

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Treatment Confidence</th>
<th>Ease of Operation</th>
<th>Capital Cost</th>
<th>O&amp;M Costs</th>
<th>Energy Efficiency</th>
<th>Re-use Potential</th>
<th>Percent</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td>Treatment Confidence</td>
<td></td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>25.56%</td>
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<td>Ease of Operation</td>
<td>2</td>
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<td>4</td>
<td>4</td>
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<td>5</td>
<td>21.11%</td>
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<tr>
<td>Capital Cost</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td></td>
<td>15.56%</td>
<td>4</td>
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<tr>
<td>O&amp;M Costs</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td></td>
<td>5</td>
<td>4</td>
<td>17.78%</td>
<td>3</td>
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<tr>
<td>Energy Efficiency</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td>4</td>
<td>11.11%</td>
<td>5</td>
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<tr>
<td>Re-use Potential</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td>6.89%</td>
<td>6</td>
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**Scoring scale:**
Rate the importance of the activity in the row relative to activity in the column where they intersect.

- If the row is much less important than the column, enter 1
- If the row is less important than the column, enter 2
- If the row has the same importance as the column, enter 3
- If the row is more important than the column, enter 4
- If the row is much more important than the column, enter 5
# Pairwise Comparison

<table>
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<tr>
<th>No.</th>
<th>Alternative Name</th>
<th>Treatment Confidence</th>
<th>Ease of Operation</th>
<th>Capital Cost</th>
<th>O&amp;M Costs</th>
<th>Energy Efficiency</th>
<th>Re-use Potential</th>
<th>Weighted Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Action</td>
<td>Low</td>
<td>Medium</td>
<td>&lt;$12.5MM</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>2.03</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>MBR with Chem</td>
<td>High</td>
<td>Medium-High</td>
<td>$12.5-15 MM</td>
<td>Medium-High</td>
<td>High</td>
<td>High</td>
<td>4.03</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>MBR with EBPR</td>
<td>High</td>
<td>Medium-High</td>
<td>$15-17.5 MM</td>
<td>Medium-Low</td>
<td>High</td>
<td>High</td>
<td>4.23</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>SBR and TMF</td>
<td>High</td>
<td>Medium-High</td>
<td>$17.5-20 MM</td>
<td>Medium-High</td>
<td>Medium</td>
<td>High</td>
<td>3.50</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>SBR and Sand Filtration</td>
<td>Medium</td>
<td>High</td>
<td>$12.5-15 MM</td>
<td>Medium</td>
<td>Medium-Low</td>
<td>3.45</td>
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<td></td>
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</tbody>
</table>

**Scoring basis:**

- 1 = Low
- 1 = $20-22.5MM
- 1 = High O&M
- 1 = Low
- 3 = Medium
- 3 = Medium
- 3 = Medium O&M
- 3 = Medium
- 5 = High
- 5 = $<12.5MM
- 5 = Low O&M
- 5 = High

**Scoring scales:**

- 1 = Low
- 1 = $20-22.5MM
- 1 = High O&M
- 1 = Low
- 3 = Medium
- 3 = Medium
- 3 = Medium O&M
- 3 = Medium
- 5 = High
- 5 = High
## ALTERNATIVE RANKING

<table>
<thead>
<tr>
<th>Rank</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alternative 1b: MBR with EBPR</td>
</tr>
<tr>
<td>2</td>
<td>Alternative 1a: MBR with Chemical Phosphorus Removal</td>
</tr>
<tr>
<td>3</td>
<td>Alternative 2: SBR with TMF</td>
</tr>
<tr>
<td>4</td>
<td>Alternative 3: SBR with Tertiary Sand Filtration</td>
</tr>
<tr>
<td>5</td>
<td>No Action</td>
</tr>
</tbody>
</table>
Water Reuse

- Why reuse treated water?
  - Avoids putting any nutrients in the river
  - Lowers the annual mass of TSS going to river (i.e. less treatment required)

- Reuse Dose 100 mJ/cm²
  - Two banks to treat 2020 up to 2040 max day (1.5 mgd)
  - Redundant two banks installed in second channel
  - No need to treat to peak hour flow, if flows exceed maximum day rate (1,040 gpm), discontinue reuse. Return to river discharge.
POTENTIAL REUSE AREAS

- **Wood River High School** (Dist. ~16,500 ft)
- **Founder’s Field** (Dist. ~14,200 ft)
- **Wood River Trails** (Dist. Varies)
- **Keefer Park** (Dist. ~10,700 ft)
- **Alturas Elementary School** (Dist. ~3,400 ft)
- **Woodside WWTP**
- **Hailey Cemetery** (Dist. ~15,000 ft)
- **Friedman Memorial Airport** (Dist. ~7,800 ft)
Areas identified total ~ 74 acres

### Mean Monthly Deficit

<table>
<thead>
<tr>
<th></th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm/day</td>
<td>0.15</td>
<td>1.81</td>
<td>4.13</td>
<td>5.34</td>
<td>4.29</td>
<td>2.42</td>
<td>0.39</td>
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<tr>
<td>in/day</td>
<td>0.01</td>
<td>0.07</td>
<td>0.16</td>
<td>0.21</td>
<td>0.17</td>
<td>0.10</td>
<td>0.02</td>
</tr>
</tbody>
</table>

### Reuse Volume* (mgd)

<table>
<thead>
<tr>
<th></th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>0.19</td>
<td>0.43</td>
<td>0.56</td>
<td>0.45</td>
<td>0.25</td>
<td>0.04</td>
<td></td>
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</tbody>
</table>

*Based on 73.5 acres of reuse area and 75 percent irrigation efficiency

Annual Average Flow = 0.54 mgd
2040 Annual Average Flow = 0.96 mgd
DEQ requires discontinuing final disposal of drying bed on old landfill site

Options include:

- Hauling dried solids (90% solids) with transfer station refuse to Milner Butte.
  - Cost $65/ton. Hailey cost ~ $16,000/year.
- Composting
  - Advertised for interested parties – Received one proposal from Winn Composting
  - Hailey, Ketchum and Bellevue – pooled resources for preparation of Standard Operating Plan
  - First year pilot program – fine tune sampling and operations
  - Cost – avoidance cost? To be negotiated with Winn
CHAPTER 5 - COMPOST

▪ Standard Operating Plan – Submitted to Hailey, Ketchum and Bellevue for review.

▪ Pathogen Reduction Criteria for Class A – Exceptional Quality (EQ)
  o Fecal coliforms <1,000 MPN per gram solids OR
  o Salmonella sp. <3 MPN per 4 grams solids
  o Windrow Composting – 55 degC for 15 days, minimum of five turnings

▪ Vector Attraction Reduction
  o Aerobic processes at greater than 40degC for 14 days

▪ Low Pollutant (Metals) Levels
CHAPTER 6 SUPPORT FACILITIES

- New Standby Generator – installation in 2021
- Administration Building Expansion – by 2030
- Maintenance Shop Expansion – by 2030
CHAPTER 7 – SUMMARY OF UPGRADES AND IMPLEMENTATION SCHEDULE

Capital Improvements Plan (CIP)

- Upgrade projects over the 20-year period based upon need
- Population growth rate increase 2.5%
- Majority of cost in first 10 years due to biological system (MBR) upgrade
  - Why? Because the existing plant is 20 years old and lacks redundancy
- 85% threshold to the 0.75 avg. mgd occurs in year 2027
UPGRADE CAPITAL DEMAND

MBR Upgrades
SEWER RATE SCENARIOS

- Many ways to finance and raise revenue for upgrades
- Detailed rate study required to find the best approach to meet City needs

Existing Rates

- Current base rate $51.50/month
  - Bond component $15.15/month
  - Base rate for O&M and some excess for R&R $36.35
USER RATE INCREASE OF 2.5% OVER 20 YEARS
USER RATE 5% INCREASE FIRST 8 YEARS THEN NO INCREASES
Questions and Discussion

WOODSIDE WATER RECLAMATION FACILITY PLANNING STUDY

Hailey, Idaho