MISSION STATEMENT

To protect water quality by providing wastewater treatment services to homes, schools, businesses, and industry in the Twin Cities, and to provide septic and holding tank waste treatment services for area communities.
LAWPCA Snapshot

- Operating since 1974 as a Wastewater Treatment Plant
- Receives flow from Lewiston and Auburn
- Wastewater treatment
  32 million gallons per day (mgd) facility peak capacity
  11-12 million gallons per day (mgd) average daily flow
  35,000+ domestic users
  23 significant Industrial users
  26 septic & holding tank waste communities

- Compost Facility in operation since 1993
- Anaerobic Digestion in operation since 2013
LAWPCA Operation

Hours of Operation
- Plant is staffed 6 AM to 4 PM
- 7 days/week
- 365 days/year
- On-call operators from 4 PM to 6 AM

Staffing Levels
- 18 Treatment plant staff
- 3 Compost facility staff

Main WWTP SCADA (Supervisory Control and Data Acquisition) Control Room
How Do We Treat Wastewater?

Step I – Screening

Wastewater enters the plant from Auburn and Lewiston.

Screening removes materials ¾-inch or larger including rags, leaves, etc. Screening material is landfilled.
How Do We Treat Wastewater?
Step II – Grit Removal

The grit facility uses air to separate heavy inorganic particles from the wastewater, leaving lighter organic particles.

Grit and debris are removed from the wastewater and landfilled.
How Do We Treat Wastewater?

Step III – Primary Sedimentation

Wastewater flows to primary sedimentation tanks where more than one-half of the solids are removed.

Grease, oils, and other floatable materials are also removed.
How Do We Treat Wastewater?
Step IV – Aeration

Wastewater flows to secondary treatment tanks where air is bubbled into it, allowing naturally occurring bacteria to use the waste as their food.

Oxygen, mixing, and nutrients provided.
How Do We Treat Wastewater?

Step V – Secondary Clarifiers

Wastewater flows to secondary clarifier tanks where the bacteria from the aeration basins are settled out of the wastewater.
How Do We Treat Wastewater?

Step VI – Disinfection

Treated wastewater is then chlorinated for disinfection with Sodium Hypochlorite.

Prior to discharge, the water is dechlorinated with Sodium Bisulfite.
How Do We Treat Wastewater?

Step VII – River Discharge

Treated water is returned to the Androscoggin River

>95% of pollutants are removed before discharge
SOLIDS TREATMENT
How Do We Treat Solids?
Step I – Sludge Thickening

Primary Sludge Thickening

Secondary Sludge Thickening

Outside Waste

Electricity

Hot Water

Anaerobic Digestion

Cogeneration Engines

Boilers

Biogas & Digested Sludge Storage

Biogas Treatment

Dewatering

Composting

Land Application
Step I – Sludge Thickening

Primary and secondary sludges are treated to remove excess moisture prior to anaerobic digestion.
How Do We Treat Solids?
Step II – Anaerobic Digestion

- Primary Sludge Thickening
- Secondary Sludge Thickening
- Outside Waste
- Anaerobic Digestion
- Biogas & Digested Sludge Storage
- Dewatering
  - Composting
  - Land Application
- Biogas Treatment
- Cogeneration Engines
- Boilers
- Electricity
- Hot Water
Step II – Anaerobic Digestion

A different class of naturally present microorganisms consume organics at 95-100°F and convert a portion of the wastes to biogas

**Digesters:** 2

**Total capacity:**
1.38 million gallons
How Do We Treat Solids?
Step III – Biogas and Digested Sludge Storage

- Primary Sludge Thickening
- Secondary Sludge Thickening
- Outside Waste

- Anaerobic Digestion
- Hot Water

- Cogeneration Engines
- Biogas Treatment

- Boilers

- Dewatering
- Composting
- Land Application
Step III – Biogas and Digested Sludge Storage

Biogas and digested sludge are stored prior to subsequent processing.

Gas storage:
33,000 cubic feet

Digested sludge storage:
168,000 gallons
How Do We Treat Solids?
Step IV – Sludge Dewatering

- Primary Sludge Thickening
- Secondary Sludge Thickening
- Outside Waste

- Anaerobic Digestion
- Hot Water

- Biogas & Digested Sludge Storage

- Dewatering
  - Composting
  - Land Application

- Cogeneration Engines

- Boilers

- Biogas Treatment

- Electricity
Step IV – Sludge Dewatering

Digested sludge (aka biosolids) are dewatered using belt filter presses

Biosolids (2012):
24,100 cubic yards

Expecting >35% reduction due to anaerobic digestion process

Biosolids (2013):
20,186 cubic yards
How Do We Treat Solids?
Step V – Biosolids Utilization

Primary Sludge Thickening

Secondary Sludge Thickening

Outside Waste

Hot Water

Anaerobic Digestion

Biogas & Digested Sludge Storage

Dewatering

Cogeneration Engines

Boilers

Biogas Treatment

Composting

Land Application

Electricity

LEWISTON AUBURN WATER POLLUTION CONTROL AUTHORITY
Step V – Biosolids Utilization

60% of the biosolids are converted to a compost product

MaineGro compost is sold to contractors, landscapers, and the general public
Step V – Biosolids Utilization

40% of the biosolids are used on area farms for fertilization.

LAWPCA biosolids have helped sustain area farms for over 30 years!
Gas Utilization/Energy Generation
Step VI – Biogas Treatment

Primary Sludge Thickening
Secondary Sludge Thickening
Outside Waste

Anaerobic Digestion

Cogeneration Engines

Boilers

Biogas & Digested Sludge Storage

Dewatering

Composting
Land Application

Hot Water

Electricity

Biogas Treatment
Gas Utilization and Energy Generation
Step VI – Biogas Treatment

The methane-rich biogas is treated to remove impurities such as moisture and hydrogen sulfide.
Step VII – Biogas Utilization

Biogas is used as a fuel in engines to produce electricity or is used in boilers to produce hot water.

The hot water produced by the boilers and from engine cooling systems is used to keep the digesters at the correct temperature.
Anaerobic digestion and energy recovery facilities
Benefits of Anaerobic Digestion and Energy Recovery

- Plant-wide purchased power: 55% reduction
- Biosolid Management Costs: 35% reduction
- CO₂ Emissions: 80% reduction
# PROJECT COST AND DEBT SERVICE

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of Funds</td>
<td></td>
</tr>
<tr>
<td>State Revolving Fund (SRF)</td>
<td>$13,800,000</td>
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<tr>
<td>Principal Forgiveness</td>
<td>880,000</td>
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<tr>
<td>Efficiency Maine Grant</td>
<td>330,000</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$15,010,000</strong></td>
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<tr>
<td>Anaerobic Digestion Debt Service</td>
<td>$920,000</td>
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<tr>
<td>Compost Facility Debt Service Retired 2013</td>
<td>(520,000)</td>
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<tr>
<td>Net Debt Service</td>
<td>$400,000</td>
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<tr>
<td>Annual Operating Cost Savings Goal</td>
<td>&gt;$400,000</td>
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## Anaerobic Digestion Performance Comparison

<table>
<thead>
<tr>
<th>Feed</th>
<th>Design Conditions</th>
<th>August, 2014</th>
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</thead>
<tbody>
<tr>
<td>Feed</td>
<td></td>
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</tr>
<tr>
<td>lb/d</td>
<td>27,400</td>
<td>19,400</td>
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<tr>
<td>% TS</td>
<td>5.7</td>
<td>5.1</td>
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<tr>
<td>Gal/d</td>
<td>58,000</td>
<td>44,700</td>
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<tr>
<td>% VS</td>
<td>75</td>
<td>75</td>
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<tr>
<td>VS, lb/d</td>
<td>20,550</td>
<td>14,550</td>
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<tr>
<td>HRT, days</td>
<td>24</td>
<td>31</td>
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<tr>
<td>VSR, %</td>
<td>55</td>
<td>56</td>
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# Energy Recovery Performance Comparison

<table>
<thead>
<tr>
<th>Item</th>
<th>Design Conditions</th>
<th>August, 2014</th>
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</thead>
<tbody>
<tr>
<td><strong>Biogas Volume</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cu ft/d</td>
<td>170,000</td>
<td>148,000</td>
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<tr>
<td><strong>Yield</strong></td>
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<tr>
<td>cu ft/lb VSR</td>
<td>15</td>
<td>18</td>
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<tr>
<td><strong>Biogas Methane Content, %</strong></td>
<td>55</td>
<td>65</td>
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<tr>
<td><strong>Biogas Utilization</strong></td>
<td></td>
<td></td>
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<tr>
<td>Engines, %</td>
<td>-----</td>
<td>94</td>
</tr>
<tr>
<td>Boilers, %</td>
<td>-----</td>
<td>2</td>
</tr>
<tr>
<td>Flare, %</td>
<td>-----</td>
<td>4</td>
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<tr>
<td><strong>Energy Production</strong></td>
<td></td>
<td></td>
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<tr>
<td>KWH/Month</td>
<td>-----</td>
<td>177,000</td>
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<tr>
<td>Approximate Value/Month</td>
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<td>$19,500</td>
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OBSERVATIONS AND LESSONS LEARNED

- Class B Cake Odor Reduction
- Cake Solids Impact on Composting
- Winter Weather Operations
- Optimization of Feeding and Mixing Cycles
- Electric Power to the Grid
- Staff Training for New Facilities
Anaerobic Digestion/Energy Recovery Facilities
Completed Summer 2013