

Parry Sound Water Treatment

Then and now...



Description of Lesson

Through this lesson, students will explore the history of water treatment in Parry Sound and explore the processes used in treating the water.

Connect with the Georgian Bay Biosphere

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Georgian Bay Biosphere: Lesson in a Backpack Program



GEORGIAN BAY
BIOSPHERE
MNIDOO GAMII
Spirit of the Water

At a Glance

Grade Level: 8

Learning Environment:

Indoor Classroom
Old Pumphouse
Water Treatment Plant

Prep Time: 20 minutes

Be sure to organize a visit to the
Tony Agnello Water Treatment Plant
by calling (705) 746-5641.

Length of Lesson: 2 hours

Key Vocabulary: Water Treatment,
Waste Water, Filter

Staffing: 1 educator/ 5 students

Materials:

1. From the Bay and Back Again cards.
2. Tony Agnello Water Treatment Plant questionnaire, 1 per group
3. How a Treatment Plant Works worksheet, 1 per group.
4. Teacher's Info Sheet about the old pumphouse
5. Pictures of old pumphouse

Kit available from the NNDSB
Resource Centre

Groupings: Whole class, and Small
groups of 2 or 3

Teaching/Learning Strategies:
Discussion, Field Trip, Inquiry

Lesson Outline

Time	Activity	Location	Materials
10 minutes	Introduction	Indoor Classroom	
20 minutes	From the Bay and Back Again	Indoor Classroom	From the Bay and Back Cards
15 minutes	Labelling the Water Treatment Process	Indoor Classroom	Worksheet Pencils
30 minutes	Field Trip– To the Pumphouse	Pumphouse	Teacher's Info Sheet about the old pumphouse Pictures of old pumphouse
45 minutes	Fieldtrip– To the New Water Treatment Plant	Treatment Plant	Tony Agnello Water Treatment Plant questionnaire, 1 per group How a Treatment Plant Works worksheet, 1 per group.

Curriculum Expectations Grade 8 Science and Technology

Understanding Earth and Space Systems: Water Systems

Overall Expectations

- Investigate factors that affect local water quality
- Demonstrate an understanding of the characteristics of the earth's water systems and the influence of water systems on a specific region.

Specific Expectations

2.2 Investigate how municipalities process water (obtain, test, treat) and manage water (distribute, measure consumption, dispose of water)

2.4 Use scientific inquiry/research skills to investigate local water issues.

Teaching and Learning

This lesson refers to knowledge and understanding developed in the Old Parry Sound Pumphouse Lesson in a Backpack.

Part A: Introduction to Water Treatment

Using the information gathered in the previous lesson about the old Parry Sound Pumphouse, discuss how a water system works. Get the class to try to remember all of the different components of a waterworks system, from the intake pipe to the wastewater plant (treatment plant, pipes, water tower, fire hydrants, wastewater treatment plant, etc.)

Part B: From the Bay and Back Again

Play the game From the Bay and Back Again.

How to Play:

Each group is given a set of 12 cards identifying parts of a waterworks system (bay, pipe, pump, water treatment plant, home, water heater, shower, drain, sewer, sewage treatment plant, settling pond, evaporation/rain). Each student takes a card with one of the above words on it. Working together, each group has to put the water cycle together in the right order (it should be a circle in the end). After everyone is in the right spot, they must come up with a sound or action that represents their word. This can be done as a race between groups to add some competitive fun. When both groups have figured out their order/actions, have them present their cycle to the other group.

Discuss with Students:

Why do we treat water from the Bay before drinking it? Need to ensure bacteria, etc. is removed.

How many students are on municipal water?

How many rely on water from their own wells? Kids in town, and most of Nobel have water from the Tony Agnello Water Treatment Plant in Parry Sound. (The tower near the Kinsmen Park stores water and creates pressure for the pipes that lead to Nobel, and the small building across from the high school store pumps for those pipes.) Others may have treated surface water or drilled groundwater wells. If students don't know, have them ask when they get home.

What steps do you think are taken at the water treatment plant? Basic steps include filtration and chlorination. Water is then pumped up a tower so it can be gravity fed to our homes.

Part C. Labelling the Water Treatment Process

Have students assemble into groups of 2 or 4. Hand out the How a Typical Canadian Water Treatment Plant Works sheet. Have the groups read the sheet, and draw a labeled diagram of a conventional water treatment plant.

Part D. Field Trip-To the Old Pumphouse

At the old pumphouse, use the Teacher Info Sheet and the pictures provided to give students details about the old pumphouse. Note: A couple now lives in the old pumphouse. They are proud of the heritage of the pumphouse, and do not mind people admiring it from the outside. That being said, please be respectful of their privacy.

Part F. Field Trip-To the New Water Treatment Plant

Before Leaving: Have each group think of one question that can be answered at the Water Treatment Plant. Have them write it on their Tony Agnello Water Treatment Plant Questionnaire sheet.

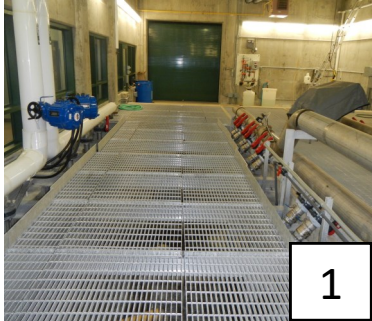
At the new treatment plant, have each group fill out a Tony Agnello Water Treatment Plant Questionnaire, provided.

Give the students time to ask the questions that they recorded before hand.

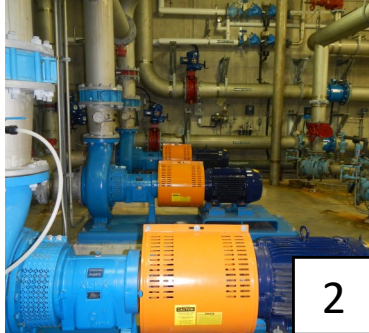


Water Treatment Plant Questionnaire

The pictures below are all components of the Tony Agnello Water Treatment Plant. In the space below, give each component a name and describe its purpose. For the last picture, try to guess what might be kept in the containers.



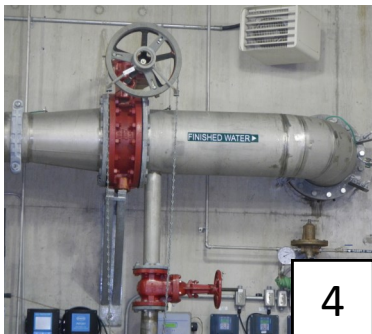
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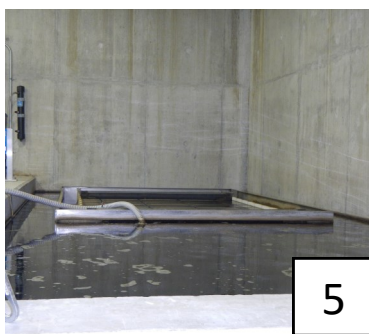
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3



4



5



6

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____

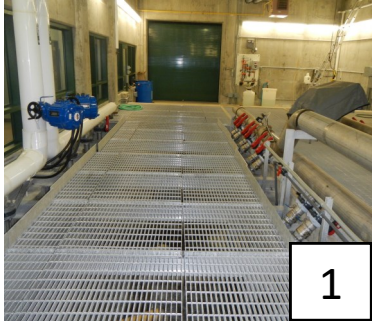
Name two ways that our treatment plant differs from a conventional treatment plant:

- 1) _____
- 2) _____

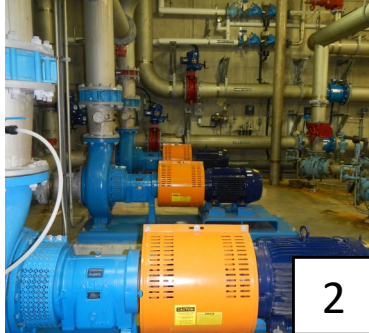
Think of a question to bring with you to the tour of the water treatment plant. This question **MUST** have an answer by the end of your tour! Write your question on the back of this page.

Water Treatment Plant Questionnaire: TEACHER COPY

The pictures below are all components of the Tony Agnello Water Treatment Plant. In the space below, give each component a name and describe its purpose. For the last picture, try to guess what might be kept in the containers.



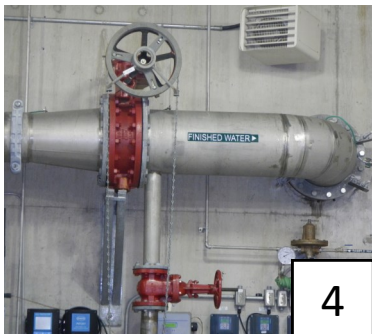
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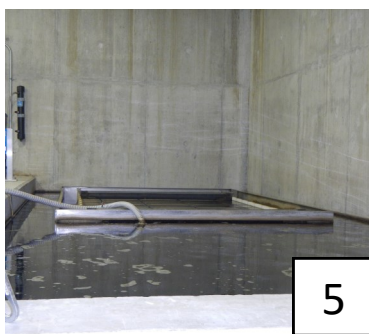
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3



4



5



6

- 1) Membrane Filter Room: Under the grates in the photo are the membrane filters. The water from the bay is pumped into this room, and then pumped through the membrane filters. This rids the water of bacteria, microorganisms, particulates, and organic material.
- 2) Permeate pumps: These pumps are responsible for sucking the water through the membrane filters and into the next basin where the water will be chlorinated.
- 3) Main (Pilot) pumps: These pumps are responsible for pumping the clean water out into various areas of town, & to the water tower.
- 4) Finished water pipe: This is the pipe through which water exits the building and heads to areas around town.
- 5) Waste water basin: Stuff that didn't make it past the membrane filter goes into this basin. The water here is sent to the wastewater treatment plant.
- 6) Coagulant bins: These bins hold a chemical, alum, which is added to the water to be used as a coagulant (it sticks to the particles in the water and make them heavy, so they will sink to the bottom).

Name two ways that our treatment plant differs from a conventional treatment plant:

- 1) Our water treatment plant does not have the pre-sedimentation basins or the sedimentation basin that is meant to allow sand and silt to settle out.
- 2) Our treatment plant does not use the conventional filter (sand, gravel and charcoal) to help remove smaller particles. Instead, it uses a membrane filter, which look like tiny straws.

How a Typical Canadian Water Treatment Plant Works

Below are the steps in a typical water treatment plant. Use the steps below to draw a diagram of a water treatment plant. Be sure to label every important component.

1. Untreated (raw) water is withdrawn from either a surface water supply (lake or river) by a submerged intake structure, or from an underground aquifer (well).
2. The water flows or is pumped to a central treatment facility.
3. Surface water is screened through steel bars to prevent fish or logs from entering the treatment plant. Finer screens might be in place to remove leaves.
4. If the water is highly turbid (cloudy or muddy), it may be pretreated in a large basin known as a pre-sedimentation basin to allow time for sand and larger silt particles to settle out.

It is now necessary to remove the suspended solids which make the water muddy or cloudy, since water cannot be disinfected when it is turbid.

5. Chemicals (like alum) are added to the water in a mechanical mixing tank called a flocculation basin. The chemicals react with small particles in the water to form particles large enough to settle out. The flocculation basin gently agitates the water so that smaller particles coagulate with bigger particles and become heavy (coagulated particles are called floc).
6. The flocculated water is sent to the sedimentation basin, where the floc particles are given enough time to settle out (2-4 hours). The clear water moves to filtration.
7. The water passes through filters, some made of layers of sand, gravel, and charcoal that help remove even smaller particles.
8. Chlorine is added for disinfection. A chlorinator meter measures chlorine gas and then delivers a dosage based on water quality parameters.
9. Finished water contact basins ensure that enough time is allotted for the chlorine to provide adequate disinfection.
10. Pumps send clean, safe water to underground distribution pipes throughout the community, or to finished water storage tanks. The storage tanks provide water pressure for system operations and a water supply for firefighting.

Teacher Information Sheet for Viewing the Old Pumphouse

STORIES FROM THE PAST:

The **Murray family** operated the pump from 1892-1932 (40 years!)

- ♦ Originally was steam operated, meaning that a boiler produced steam which powered the pump.
 - ♦ Parry Sound got electricity in 1895, even before New York City!! So, it was only a few years before an electric pump had to replace the steam engine.
 - ♦ In 1904, the massive electric pump went into service. It's grinding noise was so loud that when it started, Mrs. Murray had to go visit friends!
 - ♦ It was common in early, simpler, unpolluted times to pump the water directly from the clean lake and to use sand filters to remove particulates. (*How does that compare to today?*)
 - ♦ Disinfection of the water didn't come until 1916, when Parry Sound started to use chlorination.
 - ♦ The pump was provided with an automatic cut off, to prevent overflowing of the tank. When the pressure in the pump rose due to the elevation of the tank, a sliding rod was moved that shut off the steam and stopped the pump.
 - ♦ The pump was provided with revolution counter, time clock, water gauges, steam gauges, etc.
- STATE OF THE ART!

The **Thomas family** operated the pump from 1933-1984 (51 years!)

- ♦ In 1933, Ben Thomas was paid \$77 per month, as Waterworks Superintendent.
- ♦ Dave Thomas, Ben's son, served 44 years at the old pumphouse, and more than half that time he was Waterworks Superintendent.
- ♦ In the late 1950's, on hot summer nights, the old pump struggled to provide supper and bath water to the furthest houses. Water would dry up in some houses unless Dave could help the pump along. The pump had to be kept cool, so Dave would pour cold water over the pump to help it through the evenings.
- ♦ Notice that most of the old pictures you've seen are from the Dave Thomas Collection. He has compiled *thousands* of photos of Parry Sound history through the years.

The **Agnello family** operated the pump from 1984 onwards.

- ♦ Tony Agnello was waterworks superintendent and lived here with his family.
- ♦ Tony was a Fifth Dan Black Belt in Karate. One evening, three young men came visiting the pumphouse, carrying a baseball bat, having consumed something that affected their judgement. When Tony suggested that they leave quietly, they didn't know who they were talking to. The baseball bat lost.
- ♦ His son, Warren, works next door at the new treatment plant.

MORE HISTORIC INFO:

- ♦ From the pump the water flowed into a ten inch pipe leading down to the more thickly populated parts of the town. From there, smaller pipes led to 60 hydrants and 650 units within 10 km of the pumphouse. (1912)
- ♦ An eight inch pipe led to the elevated storage tank, placed on the top of Belvedere Hill.
- ♦ **Pass pictures around to students, to compare old images to present day.**
- ♦ Built of brick and stone, had a boiler room, pump room, and a dwelling.
- ♦ Total cost of water for families in 1912: \$3.50 per year.
- ♦ Pumped 80 lbs. of pressure (or 120 lbs. for fires). *You may want to ask at the new treatment plant about their pressure!*

WHAT NOW?

- ♦ Owners are proud to be living in a historical monument.
- ♦ Owners are planning to restore the garden (one of the original pumphouse operators was a wonderful gardener). They have had thoughts to restore it to show the original brick colour.

Copyright David Thomas Collection

Original
configuration



1935



c. David Thomas Collection

1960

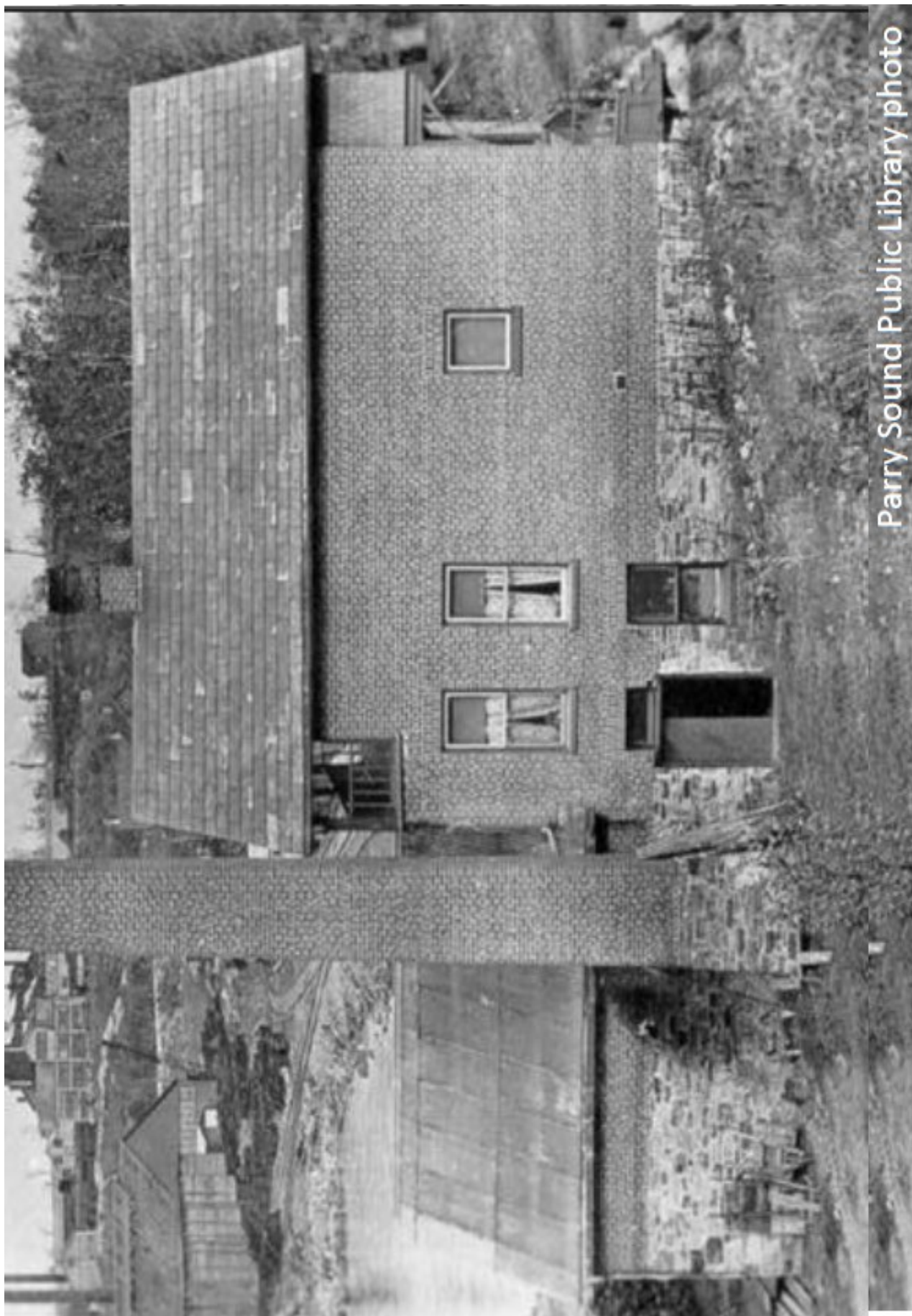


c. David Thomas Collection

Present Day



Georgian Bay Biosphere: Lesson in a Backpack Program



From the south (town beach side) of the pumphouse facing north. Notice the woodwork on the porch/balcony. This photo was taken in 1919 (27 years after construction).



Laying pipes during the construction of the waterworks system, 1892.

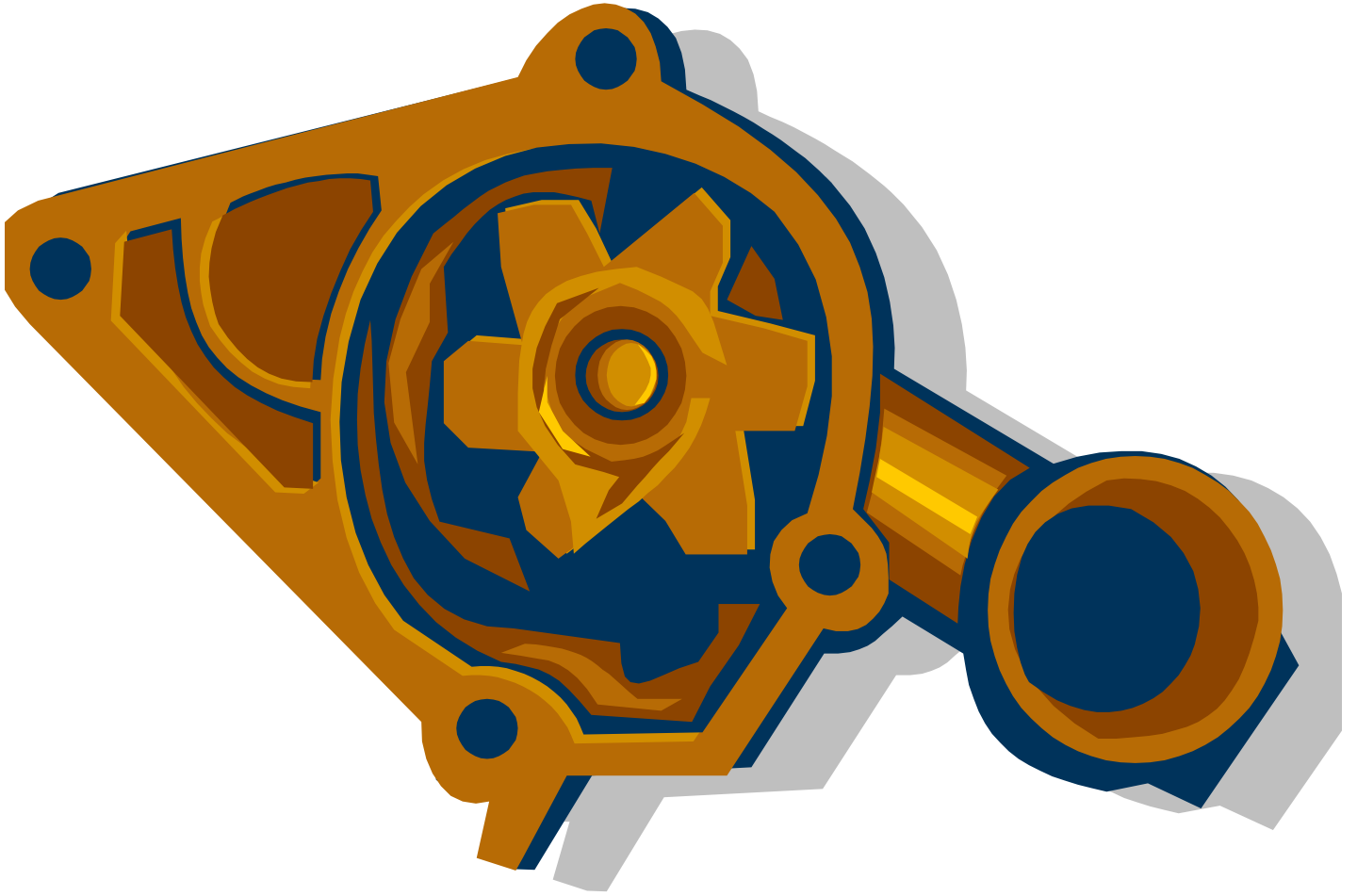
The Bay



Water Treatment Plant



Water Pump



Water Pipe



Home



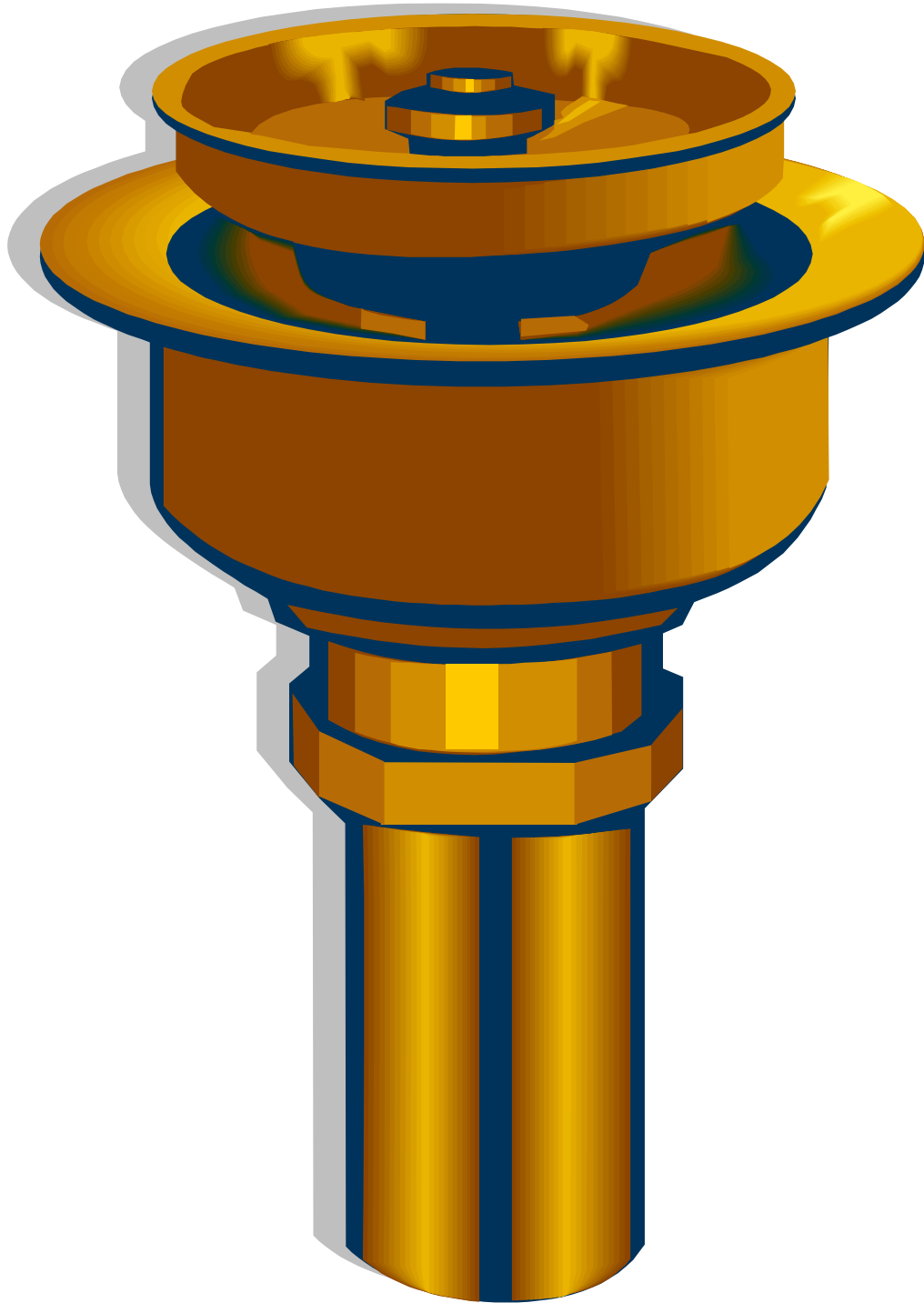
Water Heater



Shower



Drain



Sewer



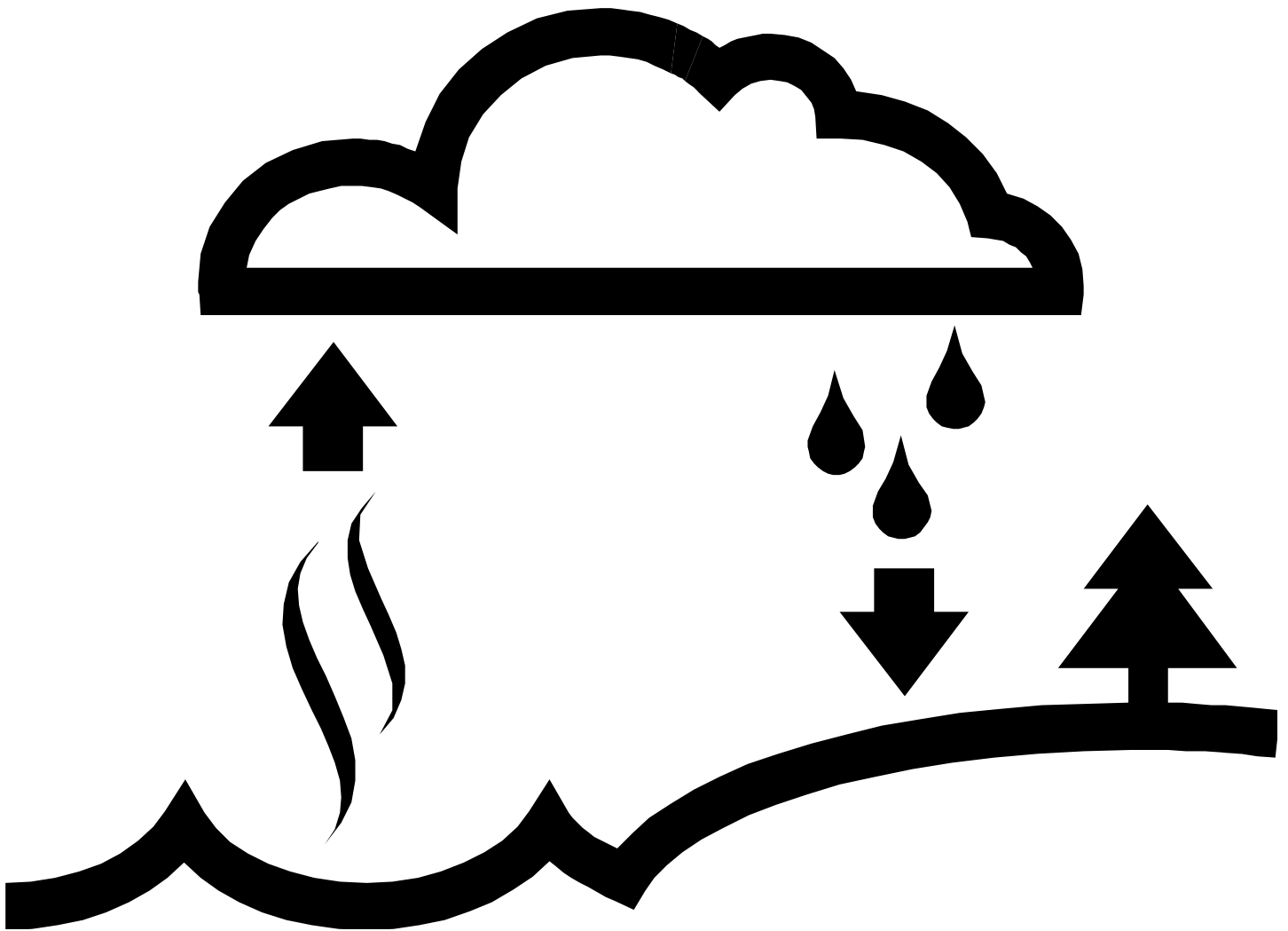
Sewage Treatment Plant



Settling Pond



Evaporation/Rain



The Bay

