



Region of Waterloo

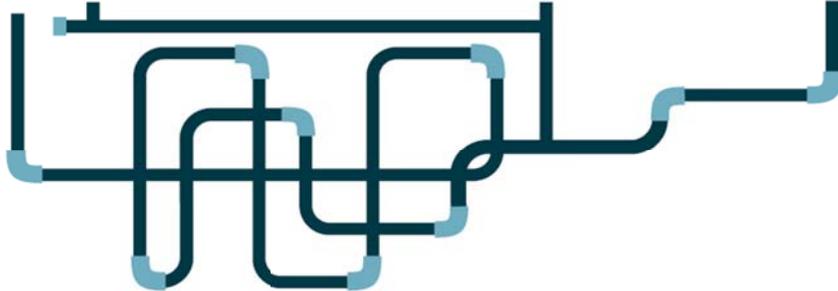
BIO SOLIDS
Strategy

Region of Waterloo Biosolids Strategy

Teacher Resource
GRADE 4 LESSON ACTIVITY:
WE ARE ALL CONNECTED

September 2016





Grade 4 Ontario Curriculum Link: Science and Technology - Habitats and Communities

BIG IDEA: Interrelationships

Goal:

To have students understand all the living things that depend on clean water, and how humans, plants, and the environment are all connected.

Materials:

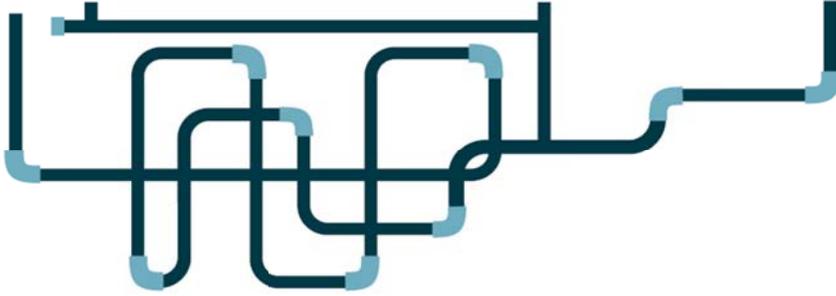
- Large piece of blank paper (one for each student)
- Drawing materials (pencils or pencil crayons)
- Large piece of chart paper (for teacher)
- Sharpie markers

Introduction:

Ask students to draw a picture of a river on a piece of paper in front of them, and a picture beside the river of an animal, a plant, and any other living things they think might depend on the river. After students have finished their drawing, bring their attention to the blackboard or chart paper where you have also drawn a river. Ask students to share what they have drawn and add it to the large class picture the teacher has drawn. The teacher asks students:

- How does this animal depend on the river?
- How does this tree depend on the river?
- How does this person depend on the river?
- Is clean water important for living things?

Next, the teacher draws a picture of a house close by the river and draws pipes leading from the house to the river. The teacher asks students:



- What places in a house might water flow from to pipes (sink, toilet, dishwasher, washing machine)?
- Is water clean when it leaves the pipes from your house or other people's houses?
- What types of things might be in the wastewater coming from houses? Should this water go directly into the river? How might it affect the animals and trees that need the water from our waterways?

The teacher then draws a building between the river and house and labels it "Wastewater Treatment Plant". The teacher explains to students that it is here that dirty water from buildings called "wastewater" is treated so that we can have access to clean drinking and bathing water, and that our rivers and lakes are healthy for animals, fish, trees and people.

The teacher then asks students to make a list of things that they think CAN go into our sinks, toilets, and drains, and a list of things that CANNOT. Then ask students to come up with one idea for how they might be able to help people in their families or own homes to be more environmentally friendly with our home water system. They can try their idea out at home that night and share with the class the following week how their families responded and if they saw a positive change. Could we help the whole school make these changes? How?

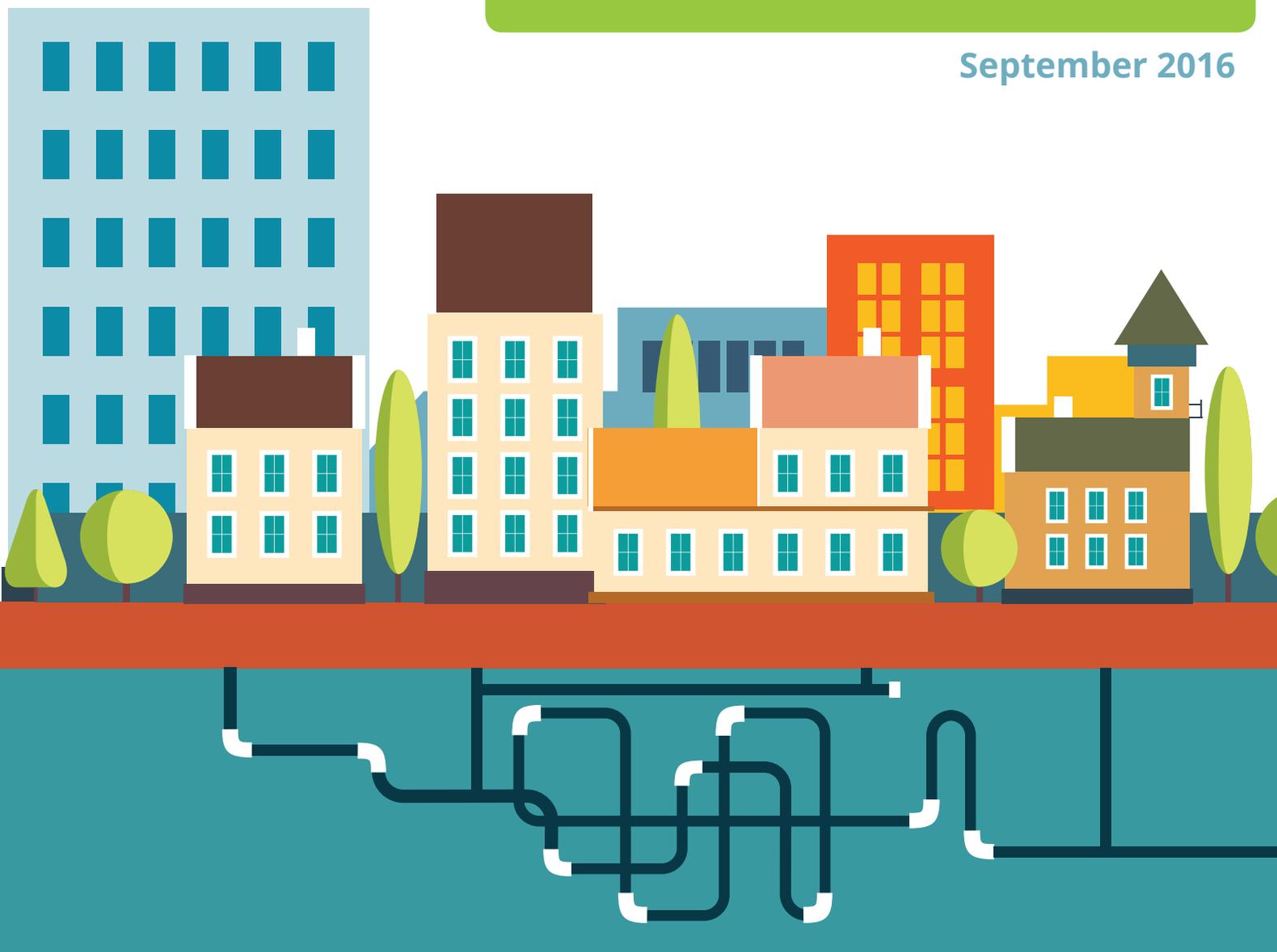


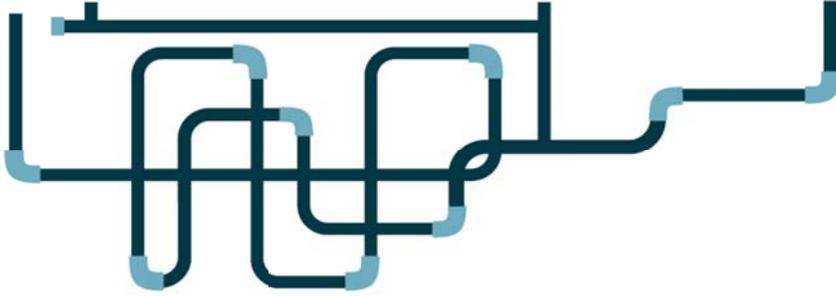
BIOSOLIDS
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Region of Waterloo Biosolids Strategy

Teacher Resource
GRADE 5 LESSON ACTIVITY:
HOW CLEAN IS YOUR WATER?

September 2016





Grade 5 Ontario Curriculum Link:
Science and Technology:
Conservation of Energy and Resources
BIG IDEA: Environmentalism

Goal:

To have students understand the complexities of wastewater management and the importance of protecting water from contamination.

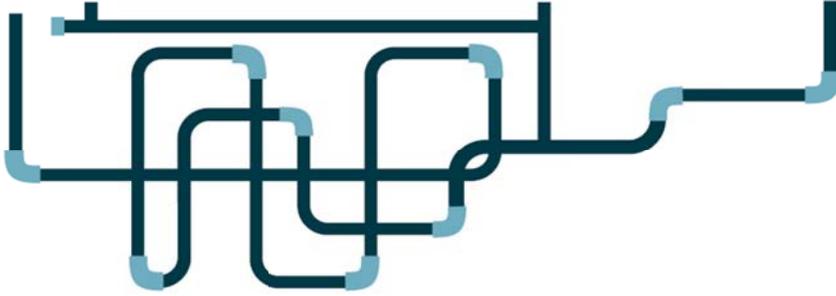
Materials:

- 2L pop bottle (one for each group of students)
- Masking tape
- Scissors
- Absorbent cotton
- Gravel
- Sand
- Metal screening
- Coffee filters
- 2 large pails of dirty water (with: dish soap, dirt, paper towel, plastic packaging, a small toy like a toy car and floss mixed in)
- Print-outs of Region of Waterloo biosolids process illustrations/descriptions

Introduction:

Take students outside and show them a large pail of dirty water. It will be dark in colour from dirt, and have soap residue, a small toy (ex. piece of lego), some paper towel, plastic packaging, and floss, etc.

Tell students that this is what wastewater looks like, and that this could be a pail of water collected from any person's pipes leaving their house.



What items do they notice in the water? Should people put these items down their drains and into their toilets? Why or why not?

Ask students if they think the water is suitable to drink. Why or why not? What would make the water suitable to drink? Explain to students that this is what water that comes out of our water source might look like if it hadn't gone through a wastewater treatment facility. We are lucky to have these facilities because otherwise water that comes out our taps would be unclean and could make us sick!

Method:

Provide each student group (divide them into 4 students per group) with a 2L pop bottle with lid cut off (edges covered in tape), and then different filtration materials (ex. absorbent cotton, gravel, sand, metal screening, coffee filters, activated charcoal, etc.) The students' job is to run different experiments with the dirty water and filtration materials and see what material or combination of materials filter out the solids and clean the water most effectively. **Which materials/tools worked the best? Which materials didn't work at all? What was left over in the water after your best filtration experiment?**

Debrief:

Write down students' ideas on the blackboard or Smartboard. Most students will have noticed that the large metal filters were able to get rid of most of the waste items like floss, plastic packaging, paper towel, and small toys. After this, the finer filter, the coffee filter, was able to catch dirt, and some soap residue, but that the water still was not drinkable or appropriate to return to the environment. These are two of the first and important steps in wastewater treatment, but there are many others.

Hand out Region of Waterloo biosolids process illustrations and descriptions for students to read. This will help learn about the full process, and understand in detail the steps to returning wastewater to the environment and, ultimately, back to our homes as fresh water and drinking water.



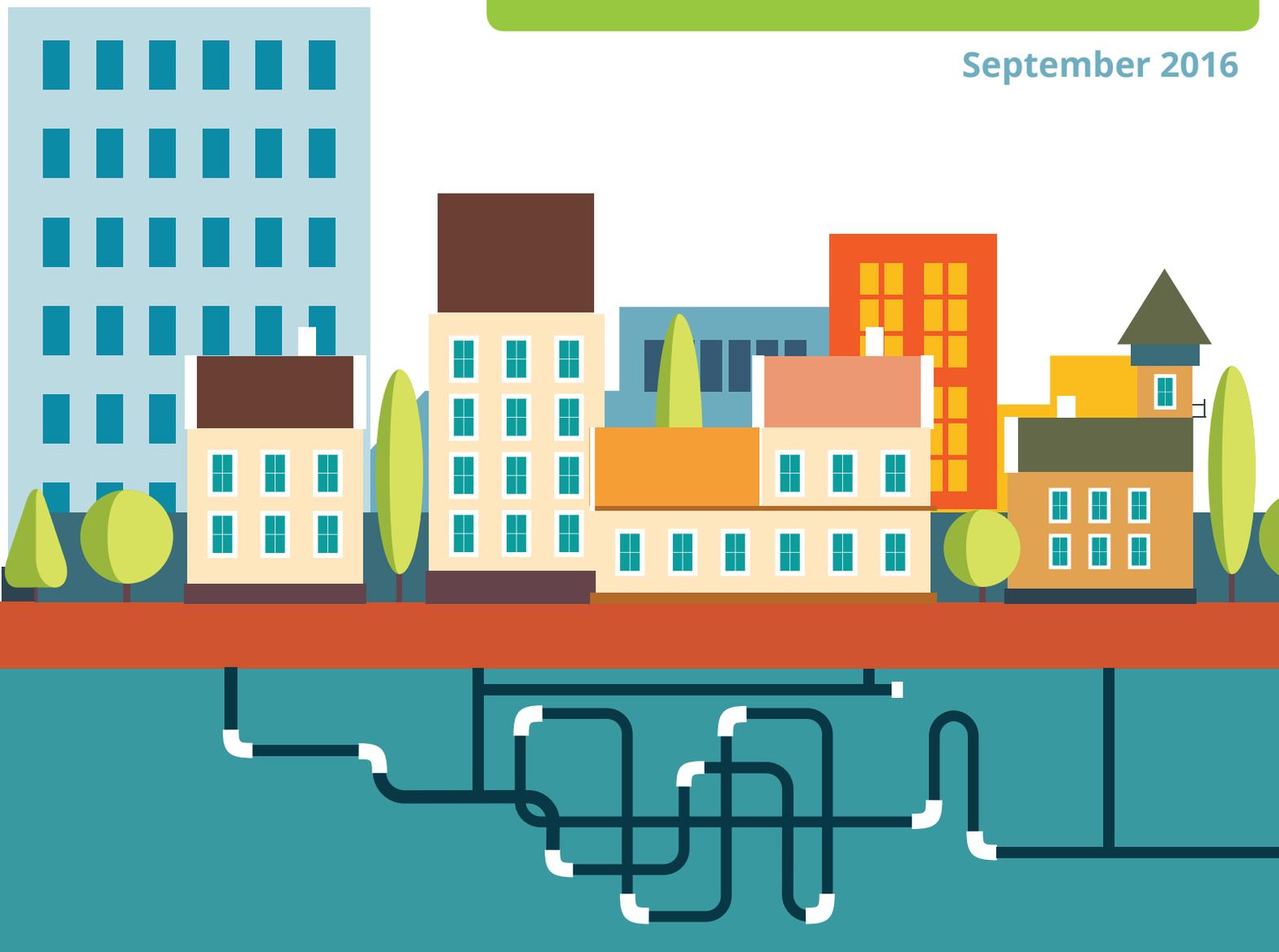
Region of Waterloo

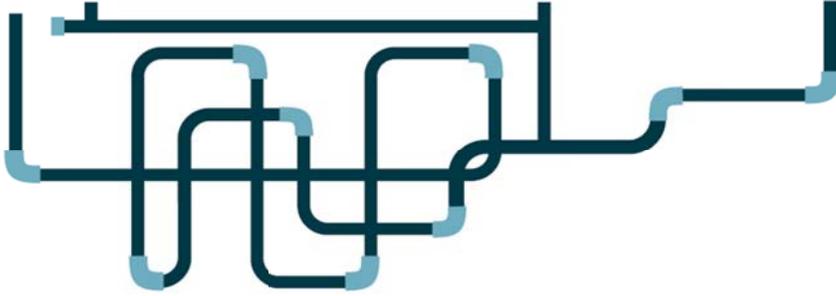
BIO SOLIDS
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Teacher Resource
GRADE 4 LESSON ACTIVITY:
THE STORY OF WASTEWATER

September 2016





Grade 4 Ontario Curriculum link: Science and Technology - Habitats and Communities

BIG IDEA: Interrelationships



Goal:

Students **w**atch both Biosolids Strategy videos created by the Region of Waterloo:

- VIDEO 1

<https://www.youtube.com/watch?v=F6eD83Zuptk>

- VIDEO 2:

<https://www.youtube.com/watch?v=EN1xngSa3mE>

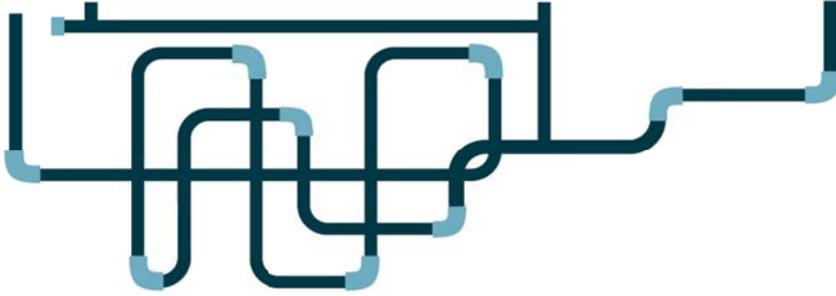
Students **w**ill write and use their artistic skills to colour and bring to life the science fair illustrations on the wastewater management process.

Materials:

- Chart paper and markers (for teacher)
- Projector, SmartBoard, or computer for showing YouTube video
- Science notebooks or paper and pencils for students to take notes
- 2 copies of each of the Region of Waterloo's biosolids process illustrations

Introduction:

Teacher begins discussion with students regarding water use in our homes. Teacher asks: "Does anyone know what happens to water once it goes down the sink or is flushed down the toilet? We have all heard and know a little about the water cycle in nature, but is there an "urban" water cycle that tells the story of what happens to water in towns, cities, and our own homes? What are some of the things that go down the drain in our homes? Is it always just water? Who can share some of the "story" of urban wastewater?"



Method:

As discussion about water in our home takes place, the teacher records students' ideas and helps students add on to each other's theories. Most likely children will say that water gets "treated" and teacher can ask for more detail and then say, "We are going to watch a short video today, two times actually, to learn about what actually happens to water in our homes once it goes down the drain. We will watch it once for understanding, and the second time so that we can take some notes".

Teacher plays the videos created by the Region of Waterloo. The videos should be played two times; once for enjoyment and twice for understanding. The students will be asked to take notes on the second viewing.

Teacher then puts students into pairs, and hands out one biosolids process illustration to each pair. The student's job is to consult their notes and put into their own words what is happening in that illustration, and to colour and decorate the illustration. For a typical class of 30-32 students, each set of illustrations will likely be handed out twice so that the class can make two books in total on the biosolids process. Once created, the class will read the books all together to solidify their understanding of the whole process, and then share with a class in a younger grade. This is to promote environmental activism in the students and to spread awareness about the importance of protecting nature through the water in our own homes.