Lesson Plan: Historic Landfills and Perpetual Care, Grade 12 The Environmental and Resource Management (CGR4M)

Introduction

In this lesson, students will identify the importance of managing historic landfills and address challenges that can be encountered when managing these sites. Students will begin to explore stakeholder (a person or group with an interest or concern related the landfill) interests and use their knowledge to prepare an information report to senior Waste Management staff.

Learning Objectives

1. Analyze the potential environmental impacts of historic landfills and assess the implications of managing the sites sustainably
2. Evaluate impacts from landfill gas on the natural environment and on human health
3. Analyze challenges involved in reducing potential environmental impacts from historic landfills
4. Investigate potential remedial actions in relation to landfill gas
5. Develop a strategy to communicate with local area residents / stakeholders

Resources Provided (located in the resource folder)

- Durham Owned Landfills map
- Student Report Template

Questions

1. What is municipal solid waste and what is it composed of?
2. What are the potential environmental and human health concerns related to historic landfill?
3. Identify challenges to managing a closed historic landfill. (Examples include public access to the site (vandalism, trespassing, safety…), encroachment, lack of documentation from historic activities, access to areas (steep slopes, lack of roadways), public opposition, etc.).
4. What is landfill leachate, how is it created, what does it consist of, and why can it pose a concern?
5. What is landfill gas, how is it created, what does it consist of, and why can it pose a concern?
6. What environmental systems can be put in place on site to manage landfill gas and leachate? (Examples include leachate collection system, passive gas venting system, active gas venting system, methane collection system, landfill mining, etc.).
7. How has our outlook on waste management changed over the years and what has influenced these changes?
8. How does public perception and values play a role in waste management?
9. How can we better manage our waste to divert material from disposal in a landfill?

The Regional Municipality of Durham - Waste Management Services
If this document is required in an accessible format, please contact schoolprograms@durham.ca

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Activity

1. Provide your students with the following scenario:

   You are a staff member with a Regional Waste Management Division. Annual gas monitoring at your designated closed landfill site is conducted monthly during the spring and summer months, and biweekly during winter months. Higher than normal concentrations of landfill gas have been recorded at the boundary of the landfill site, adjacent to residential housing. While these readings are high, they remain below the explosive limit. Additional monitoring will be initiated while an investigation commences. You have been asked to prepare an information report to Senior Management to inform them of the issue and to notify them on how stakeholders will be informed.

2. Students will use the template provided in the lesson plan to draft their reports.

3. Once complete, students will submit their reports to their teacher for review and comment.

Summary

Garbage within a landfill site needs to be managed, even long after the site has been closed. These sites need to be managed responsibly to protect the environment and human health. How we choose to manage waste today, impacts the future.

Expanded Curriculum Connections

The Ontario Curriculum, Grade 11 and 12: Canadian and World Studies, 2015 (revised)

The Environment and Resource Management, Grade 12 (CGR4M)

A. Geographic Inquiry and Skill Development

- A1. Geographic Inquiry: use the geographic inquiry process and the concepts of geographic thinking when investigating issues related to the environment and the management of natural resources
- A2. Developing Transferable Skills: apply in everyday contexts skills, including spatial skills, developed through geographical investigation, and identify careers in which a background in geography might be an asset

C. Sustainability and Stewardship of Natural Resources

- C1. Policies and Strategies: analyse the roles and contributions of individuals, governments, and organizations with respect to the sustainable management of the world's natural resources
- C2. Development of Natural Resources: analyse impacts of resource development on the natural and human environment, and assess ways of managing resource development sustainably

D. Ecological Systems: Interconnections and Interdependence

- D1. Reducing Pollution: analyse challenges involved in reducing pollution from human activities, and assess the effectiveness of various methods of pollution reduction
- D2. Impacts of Pollution: evaluate impacts of various types of pollution on the natural environment and on human health

- D3. Ecological Processes: describe key ecological and biological processes, and explain how they are affected by human activities

E. Community Action

- E1. Developing Solutions: assess a variety of strategies for resolving environmental and natural resource management issues, locally, nationally, and/or globally
- E2. Community Land Use and Infrastructure: assess impacts of community land use and infrastructure on humans and the natural environment, and assess ways of reducing these impacts
- E3. Ecological Footprints: analyse impacts of various human behaviours on the natural environment, and assess the role of behaviour, ethics, and technology in reducing these impacts