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**[WABS ACCESS STEM PBL Unit/Lesson Plan Template](https://docs.google.com/document/u/1/d/1lzkUygoxlsEvaoczfdcXTIwzbba2y2ON/edit)**

**U**NIT OVERVIEW

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| **Title of PBL Unit: Duwamish River Project/Stormwater Treatment at KCIA**  **Target Grade Level(s): 10**  **Subject(s): History/Social Studies**  **Author(s): Rose Johnson** |

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| **Problem Statement: How can King County International Airport effectively steward stormwater runoff?** |

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| **Unit Overview and Table of Contents:**  **This unit is part of a multidisciplinary project working with KCIA in adapting their stormwater management system for severe rain events. In the social studies/history domain, we start with some pre-teaching before introducing the problem statement. This pre-teaching consists of lessons about the geography of the Duwamish and Green River Valleys and watersheds, the history of the indigenous people and settler/colonialism of the region as well as contemporary community activism and environmental clean-up of this superfund site. This knowledge will establish the ethics of the problem as well as an understanding of the impacts.**  **After the problem is introduced, social studies content shifts to addressing questions of engaging stakeholders and communities as well as professional writing, proposals and presentations as well as connecting prior learning to the problem at hand.**  **Social Studies/History Lessons:**   1. **The Duwamish River System Geography and Change Over Time: examining maps.** 2. **History of the Duwamish and people.**     1. **Tribal History**    2. **Settler Colonialism and Removal of the Duwamish People, treaties and land rights, industrialization, common good vs. individual rights, the straightening of the Duwamish, Duwamish fight for federal tribal recognition.**    3. **Field Trips: sbaqwah Park** [**https://goo.gl/maps/fQGHe2dQYmEjTW7x6**](https://goo.gl/maps/fQGHe2dQYmEjTW7x6) **həʔapus Village Park & Shoreline Habitat** [**https://goo.gl/maps/pLww8KWnEFApo2eH6**](https://goo.gl/maps/pLww8KWnEFApo2eH6)   Duwamish Longhouse and Cultural Center<https://goo.gl/maps/gF6kTrjfpHxpwip68>   1. **Present Day: State of the Duwamish**    1. **What is a superfund site? EPA report**    2. **What are the current issues and concerns?**    3. **Philosophy of resources- conceptual frameworks stewardship vs. management. Do we have an obligation to future generations? Water as a community resource.**    4. **Community groups:** Duwamish River Community Coalition, Puget Soundkeepers 2. Supporting the challenge:    1. How to engage stakeholders, interview skills.    2. Communicating to stakeholders, gaining community support and inclusion of community voice. |

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| **Standards:**  **The College, Career, and Civic Life (C3) Framework for Social Studies State Standards:**  ***D1.5.9-12***  **Individually and with others, students determine the kinds of sources that will be helpful in answering compelling and supporting questions, taking into consideration multiple points of view represented in the sources, the types of sources available, and the potential uses of the sources.**  **D2.Civ.1.9-12**  **Individually and with others, students distinguish the powers and responsibilities of local, state, tribal, national, and international civic and political institutions.**  **D2.Civ.10.9-12**  **Individually and with others, students analyze the impact and the appropriate roles of personal interests and perspectives on the application of civic virtues, democratic principles, constitutional rights, and human rights.**  **D2.Civ.13.9-12**  **Individually and with others, students evaluate public policies in terms of intended and unintended outcomes, and related consequences.**  **D2.Civ.14.9-12**  **Individually and with others, students analyze historical, contemporary, and emerging means of changing societies, promoting the common good, and protecting rights.**  **D2.Civ.6.9-12**  **An Essential Standard.Individually and with others, students critique relationships among governments, civil societies, and economic markets.**  **D2.Civ.9.9-12**  **Individually and with others, students use appropriate deliberative processes in multiple settings.**  **D2.Eco.1.9-12**  **Individually and with others, students analyze how incentives influence choices that may result in policies with a range of costs and benefits for different groups.**  **D2.Geo.2.9-12**  **Individually and with others, students use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions and their political, cultural, and economic dynamics.**  **D2.Geo.4.9-12**  **Individually and with others, students analyze relationships and interactions within and between human and physical systems to explain reciprocal influences that occur among them.**  **D2.Geo.7.9-12**  **Individually and with others, students analyze the reciprocal nature of how historical events and the spatial diffusion of ideas, technologies, and cultural practices have influenced migration patterns and the distribution of human population.**  **D2.His.14.9-12**  **Individually and with others, students analyze multiple and complex causes and effects of events in the past.**  **D4.Communicating Conclusions.3.9-12**  **Individually and with others, students use writing, visualizing, and speaking to Present adaptations of arguments and explanations that feature evocative ideas and perspectives on issues and topics to reach a range of audiences and venues outside the classroom using print and oral technologies (e.g., posters, essays, letters, debates, speeches, reports, and maps) and digital technologies (e.g., Internet, social media, and digital documentary).**  **D4.Communicating Conclusions.6.9-12**  **Individually and with others, students use disciplinary and interdisciplinary lenses to understand the characteristics and causes of local, regional, and global problems; instances of such problems in multiple contexts; and challenges and opportunities faced by those trying to address these problems over time and place.** |

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| **21st-Century Skills: 1-3**  **Learning & Innovation**  **1- Creativity and Innovation**  **1.A.1**  **Use a wide range of idea creation techniques (brainstorming etc.)**  **1.A.2**  **Creates new and worthwhile ideas using both incremental and radical concepts**  **1.A.3**  **Elaborates, refines, analyzes and evaluates their own ideas in order to improve and maximize creative efforts**  **1.B.1**  **Develop, implement and communicate new ideas to others effectively**  **1.B.2**  **Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work**  **1.B.3**  **Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas**  **1.B.4**  **View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes**  **1.C.1**  **Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur**  **2-Critical Thinking and Problem Solving**  **2.A.1**  **Use various types of reasoning as appropriate to the situation**  **2.B.1**  **Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems**  **2.C.1**  **Effectively analyze and evaluate evidence, arguments, claims and beliefs**  **2.C.2**  **Effectively analyze and evaluate major alternative points of view**  **2.C.3**  **Effectively synthesizes and makes connections between information and arguments**  **2.C.4**  **Effectively interpret information and draw conclusions based on the best analysis**  **2.C.5**  **Reflect critically on learning experiences and processes**  **2.D.1**  **Effectively solve different kinds of non-familiar problems in both conventional and innovative ways**  **2.D.2**  **Effectively identify and ask significant questions that clarify various points of view and lead to better solutions**  **3-Communication and Collaboration**  **3.A.1**  **Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts**  **3.A.2**  **Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions**  **3.A.3**  **Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)**  **3.A.4**  **Utilize multiple media and technologies, and know how to judge their effectiveness as well as assess their impact**  **3.A.5**  **Communicate effectively in diverse environments (including multi-lingual)**  **3.B.1**  **Demonstrate ability to work effectively and respectfully with diverse teams**  **3.B.2**  **Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal**  **3.B.3**  **Assume shared responsibility for collaborative work, and value the individual contributions made by each team member** |

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| **Locally and/or Personally Relevant for Students: The Duwamish River is Seattle’s only river. Most students live in or near Seattle. The school site is actually on the Duwamish, directly between KCIA and the river.** |

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| **Connections to Career and Educational Pathways: In our work with KCIA, students will have the opportunity to speak with professionals, particularly a variety of engineering professionals as well as have the opportunity to propose ways to address an authentic issue, creating a process to treat and manage stormwater overflow. Additionally, students will receive and interpret the problem using a RFP document almost identical to the document the county uses when seeking contracts.** |

**LESSON OVERVIEW**

This section should be repeated for each individual lesson that makes up the unit.

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| **Lesson Number and Title: #1. The Duwamish River System Geography and Change Over Time: examining maps.** |

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| **Problem Statement: How does the geography of the Duwamish River Valley affect the communities within it?** |

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| **Lesson Objectives: Understand how the geography of the area has changed in a short time period and how that change has affected the communities residing there.** |

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| **Lesson Standards: D2.Geo.2.9-12**  **Individually and with others, students use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions and their political, cultural, and economic dynamics.** |

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| **Materials: Projector or printed images of maps and video player. Individual student devices and internet connection.** |

**If relevant to a single lesson, please include:**

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| **Lesson 21st-Century Skills: Use interactive technology: maps** |

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| **Lesson-Locally and/or Personally Relevant for Students: The Duwamish River is Seattle’s only river. Most students live in or near Seattle. The school site is actually on the Duwamish, directly between KCIA and the river.** |

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| **Lesson-Connections to Career and Educational Pathways: cartography** |

**LESSON PREPARATION**

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| **Time Required: 1-2 55 minute class periods, depending on level of engagement** |

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| **Grouping of Students for Instruction: recommend mixed ability grouping, may pair students with a device if needed.** |

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| **What is the instruction? (Consider the PBL procedure that is being addressed here): students hypothesize possible impacts and relationships** |

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| **Possible Accommodations: Students with vision impairment should be partnered with someone that can describe an image for them.** |

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| **Possible Extensions: Have students create their own map of the relationship between geography and water where they live. Have students walk along the river noticing signs of a healthy ecosystem and signs of distress.** |

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| **Possible Assessment: Question responses from interactive map activity** |

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| **References and Resources:**  **Images: Duwamish mid 1880 vs today, Duwamish River c1876, 1911 proposed Duwamish Waterway, green river watershed map**  **Online video:** [**https://crosscut.com/video/deeply-rooted/tale-two-waters**](https://crosscut.com/video/deeply-rooted/tale-two-waters)  **Online interactive map:** [**https://gismaps.kingcounty.gov/iMap/**](https://gismaps.kingcounty.gov/iMap/) |

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| *Teacher* | *Students* |
| *Display or hand out image “***Duwamish mid 1880 vs today”**  **Do not show the label to students. Instead ask students to respond to the questions. Give them some time to observe the images and form their ideas. You can have them pair share then share out to the larger class.** | *Answer the questions:*  **What do you notice about the two images? What do you wonder about? What do you think you are looking at?** |
| *Tell the students about the upcoming project:*  We are launching a project in which we will partner with King County International Airport to improve the existing stormwater system, particularly for major rain events, predicted to increase due to climate change. To understand the importance of this project, we will explore the history and people of the Duwamish River Valley who are most impacted by storm water run-off in this area. |  |
| *Project the following 2 images explaining the opener. At this time, share the dates and labels of the images.*  Duwamish River c1876, Proposed Duwamish Waterway. Ask students why they think this waterway was proposed and how it might have impacted the area. | *Why do you think the idea to create the Duwamish Waterway was proposed in 1911? What impacts do you think this project might have had on the river valley?* |
| *Project the image “Green River Watershed Map”* | *What do you notice about the scale of this system? Can you locate where you live in relation to this watershed?* |
| *Show the video:* [*https://crosscut.com/video/deeply-rooted/tale-two-waters*](https://crosscut.com/video/deeply-rooted/tale-two-waters) | *What stood out to you in this video? What are 3 key learnings from this video? What questions came up for you or what do you want to learn more about?* |
| *Demonstrate the interactive map at:* [*https://gismaps.kingcounty.gov/iMap/*](https://gismaps.kingcounty.gov/iMap/)  *Be sure to demonstrate zooming in, applying different layers and how to use the legend.*  *Students should focus on the following layers:*  *Environmentally Sensitive Areas, Flooding info, Groundwater, Hydrography and Hydrology, Stormwater Services.*  *Have students answer the questions and turn in to gauge understanding of concepts and items to return to in future instruction.* | *Use the layers (icon upper right side) to explore aspects of the watershed and ecology. (hint: apply only one layer at a time and use the legend with layer applied to interpret data)*  *1. Find the school’s location on the map (if applicable).*  *2. Where are the Environmentally sensitive areas in relation to the river and the airport?*  *3. Identify the valley boundaries using the “elevation contours” layer.*  *4. Explore the hydrology of the area- from where does the water flow to the river?*  *5. Where is flooding most likely to occur? How is flooding related to agriculture?*  *6. What do you notice about the locations of stormwater services? How do you explain the locations?* |