1 Where Should We Build?

INVESTIGATION

1 CLASS SESSION

ACTIVITY OVERVIEW

NGSS CONNECTIONS

Students are introduced to the human impact on land and water use with a scenario that engages them in the issues in the context of a community's building project. The activity elicits and builds on students' ideas about the environmental impact of building on particular landforms. Students observe ways in which construction has changed the landscape as population has increased. When considering the impact of development, they apply the crosscutting concept of the *influence of science, engineering, and technology on the natural world*.

Prepare to teach the unit by reviewing *Quick Start to Issues and Science*, found at the front of this Teacher Edition. This guide breaks down the resources and equipment needed to teach the unit. It calls out critical tools for planning the unit such as the *NGSS Overview*, the *Phenomena, Driving Questions, and SEPUP Storyline* overview and the *SEPUP Scoring Guides*. For more detailed information on the program as a whole, see the "Issues and Science Program Overview" section of the *Teacher Resources*.

If this is your **first** SEPUP unit, read through "Planning for First-Time Users," found on the last page of the *Quick Start*.

NGSS CORRELATIONS

Performance Expectations

Working toward MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*

Disciplinary Core Ideas

MS-ESS3.C Human Impacts on Earth Systems:

Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (both negative and positive) for different living things.

Typically as human populations and per capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Science and Engineering Practices

Asking Questions and Defining Problems: Ask questions to identify and clarify evidence of an argument.

Crosscutting Concepts

Cause and Effect: Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.

Influence of Science, Engineering, and Technology on Society and the Natural World: All human activity draws on natural resources and has both short- and long-term consequences, positive as well as negative, for the health of people and the natural environment.

* *Performance expectations marked with an asterisk integrate traditional science content with engineering through a science and engineering practice or a disciplinary core idea.*

INVESTIGATIVE PHENOMENA AND SENSEMAKING

Investigative Phenomena, Sensemaking

Land development by humans has an impact on the environment.

Students begin to fill in any knowledge gaps they may have between their everyday awareness of building construction and its environmental effects. In Teaching Step 8, they share observations and collectively figure out what they know thus far. They discuss their current ideas and develop questions that need to be answered before they can fully understand the problem in the scenario.

WHAT STUDENTS DO

Students examine photographs of undeveloped and developed hillsides, wetlands, and clifftop areas. Students then use their observations about changes that have happened to these areas to make a preliminary decision as to which site would be best for building a school and field. They identify which evidence would help them make a more informed decision, and they consider this decision over the course of the unit.

MATERIALS AND ADVANCE PREPARATION

- *For the teacher*
  - 1 Visual Aid 1.1, "Developing Communication Skills" (optional)
  - 1 Visual Aid 1.2, "Group Interactions Classroom Rubric" (optional)
  - Driving Questions Board cards and instructions
- *For the class*
  - * 1 piece of chart paper
  - * markers

- *For each student*
  - 1 Student Sheet 1.1, "Observations Before and After Construction"
  - 1 Student Sheet 1.2, "Evaluating Group Interactions" (optional)

* *not included in kit*

The Driving Questions Board cards and instructions can be found in the front pouch of your printed Teacher Edition or as a download on the "Tools and Resources" page in your online Teacher Portal.

Students can find "Developing Communication Skills" in Appendix E: Literacy Strategies in the Student Book.

TEACHING SUMMARY

GET STARTED

1. Engage students' interest by introducing the issue used to drive the learning.
   a. Have students read the vignette that opens the unit.
   b. Identify the societal issue that students will explore in the unit.
   c. Begin a Driving Questions Board.
2. Introduce students to the fictional community of Boomtown.
   a. Identify the need for a new school in the rapidly growing community.
   b. Review the term *wetland*.
   c. (LITERACY) Initiate student questioning by eliciting students' ideas with a KWL chart.

DO THE ACTIVITY

3. If you have not previously done so, introduce the SEPUP model for collaborative work.
   a. Clarify which situations are appropriate for collaboration and which are appropriate for working independently.
   c. (SENSEMAKING) Introduce strategies for effective group interaction.
4. Have students make observations of three types of land areas before and after construction.
   a. Review Procedure Step 1 in the Student Book.
   b. Distribute Student Sheet 1.1, "Observations Before and After Construction."
   c. Share students' observations with the whole class.
   d. Discuss changes to land and water over a longer time.

5. If you have not previously done so, introduce scientific evidence in science.
    a. Explain how scientists define and use evidence.
    b. Distinguish *evidence* from *opinion*.
    c. Discuss the sources, quality, and quantity of evidence.
    d. Support students' understanding of key scientific vocabulary.

BUILD UNDERSTANDING

6. Reflect on the impact of building construction on the natural world.
    a. Introduce the driving question related to the investigative phenomenon.
    b. Ask students, "What are the positive and negative impacts of building the school?"
    c. Discuss how population growth plays a role in human impact on the environment.
    d. Ask students, "What ideas do you have about what should be required to build the school?"
7. If you have not previously done so, introduce the concept of *trade-offs*.
    a. Introduce the idea that decisions about solutions to scientific and engineering problems often involve trade-offs.
    b. Provide an example of trade-offs.
    c. Develop some examples of trade-offs in students' lives.
    d. Identify some trade-offs of the Boomtown sites.
8. Introduce crosscutting concepts.
    a. Explain that *crosscutting concepts* bridge disciplines of knowledge.
    b. Introduce the crosscutting concept of *cause and effect*.
    c. Relate *cause and effect* to this activity.
9. Consider the three building sites.
    a. Review students' site choices in Analysis item 3.
    b. Leverage students' prior knowledge and experiences related to issues in their community.
    c. (LITERACY) Continue to foster student questioning by revisiting the KWL chart as a class.

TEACHING STEPS

GET STARTED

1. Engage students' interest by introducing the issue used to drive the learning.

   a. Have students read the vignette that opens the unit.

   Anchoring Phenomenon

   The vignette of Lee and Lee's dad walking along the coast is derived from the front cover photo of the Student Book. After reading the text, have students examine the photo closely and/or read the description of the photo on the back cover. Ask them to generate some questions they have about the physical phenomena presented in the vignette. If students are not familiar with the term *phenomenon* (or its plural form, *phenomena*), explain that a *phenomenon* is an observable fact or event. In this unit, the focus is on investigating phenomena related to the constant changes in Earth's surface due to natural processes and human activity. Students will construct explanations based on evidence for what causes these geoscience phenomena.

   b. Identify the societal issue that students will explore in the unit.

   Defining Issues

   Have students read the description of what they will investigate in this unit on the bottom of the same page and discuss how the unit may or may not answer their questions. Most importantly, identify that students will investigate the issue of how geoscience processes and human activities change Earth's surface. Explain this issue in broad terms, and let students know that they will look at a specific example of how this issue could play out in a community.

   c. Begin a Driving Questions Board.

   Driving Questions Board

   In SEPUP, the Driving Questions Board elicits students' initial wonderings about the unit issue and the investigative phenomena. Throughout the unit, the class is prompted to revisit the Driving Questions Board. Ideally, student questions generated at the start of each learning sequence can be condensed through class discussion into a unified driving question. As a scaffold to teachers who are new to this teaching strategy, driving questions cards are provided for each learning sequence and can be displayed as the unified driving question.

   The driving questions are also identified on the Phenomena, Driving Questions, and SEPUP Storyline overview found in the NGSS and Common Core tab in the back of this Teacher Edition.

2. Introduce students to the fictional community of Boomtown.

   a. Identify the need for a new school in the rapidly growing community.

      Have students read the introduction. Use the map at the end of the activity to point out that there are three possible sites being considered for construction—a hillside, a cliff near the ocean, and a wetland. Clarify that physical shapes of the land, such as hillsides, cliffs, and marshes, are called *landforms*.

   b. Review the term *wetland.*

      Students are likely to be able to identify hills and cliffs but may be less familiar with wetlands. Describe a wetland as land saturated with water, such as a marsh or swamp. A marsh is a wetland area that is dominated by grasses, whereas a swamp is dominated by trees. If there are any wetlands in your area, ask students to offer some local examples. The wetland that is a potential building site in this unit, the Delta Wetlands, is found at the mouth of a river. However, since deposition is not introduced until later in the unit, it is not necessary to explain the origin of the marshy area or the delta in the fictional town of Boomtown at this time.

   c. (LITERACY) Initiate student questioning by eliciting students' ideas with a KWL chart.

      Introduce the usefulness of recording relevant evidence about the sites as the unit progresses to help make the decision on where to build in Boomtown. Use the chart paper to draw a KWL chart, and tell the class that you will complete this chart together as you do the activities. Tell students that the letters KWL refer to the three sections of the literacy strategy: "What do I *know*? What do I *want* to know? What did I *learn*?" KWL charts help students review what they already know, develop relevant questions, and process and apply the information they encounter in the activities.

KWL

      As a class, begin filling in the first two columns of the KWL chart regarding what students know about the changes that happen to land when it is built on. A sample completed KWL chart for this unit is shown in the "Building on the Mississippi" activity.

      Teacher's Note: If there is room in the classroom, post the KWL chart where students can see it. Periodically throughout the unit, you will revisit this chart with students' ideas and questions generated from the activities.

DO THE ACTIVITY

3. If you have not previously done so, introduce the SEPUP model for collaborative work.

a. Clarify which situations are appropriate for collaboration and which are appropriate for working independently.

In science, collaboration is essential to the development of new ideas and to a better understanding of scientific concepts. However, scientists must publish only their own work and must give others credit when they build on their ideas.

b. (SENSEMAKING) Introduce strategies for effective group interaction.

Facilitating Group Work

Explain or model what productive group interactions (both agreement and constructive disagreement) look like and sound like. Use Student Sheet 1.2, "Evaluating Group Interactions" and Visual Aid 1.1, "Developing Communication Skills" for this and subsequent activities. For more support on group interaction, use Visual Aid, 1.2, "Group Interactions Classroom Rubric," to evaluate how groups are interacting during the activity.

4. Have students make observations of three types of land areas before and after construction.

a. Review Procedure Step 1 in the Student Book.

Explain that the photographs in the Student Book show examples of three kinds of locations being considered—hillsides, wetlands, and seaside cliffs—both before and after construction. Emphasize that these are not before-and-after photographs of Boomtown, since Boomtown is still in the process of deciding where to build. In fact, none of the photographs are of the same place, nor are they taken from the exact same perspective. The photographs are simply intended to get students thinking about each kind of location before and after construction.

b. Distribute Student Sheet 1.1, "Observations Before and After Construction."

As students work together in pairs to observe and discuss the photographs, have them each record their responses on Student Sheet 1.1, "Observations Before and After Construction." Students then meet in groups of four to further discuss their ideas and review their observations. Each student will complete the Student Sheet and answer the Analysis items at the end of the activity individually.

c. Share students' observations with the whole class.

When most groups have finished the Procedure, project Student Sheet 1.1 and compile students' observations onto the Visual Aid while discussing their findings. Doing so provides a good opportunity to discuss the

difference between scientific observations and inferences. *Observations* are what students can see directly in the photographs, whereas *inferences* are the conclusions students make based on what they see. For example, students may observe that the wetlands have been filled in and have less water. From this, they may infer that area wildlife has been adversely affected. While this inference is a possibility, the only way to be certain would be to look at the actual situation and see if the wildlife has suffered as a result. This discussion anticipates the next two activities, during which students examine some indicators of human impact on the environment.

d. Discuss changes to land and water over a longer time.

While students are thinking about the changes that natural geological processes are likely to cause compared with those likely caused by human activity, encourage them to think about changes in larger time frames.

Brainstorm changes that could be observed over a few days or years, and then challenge students to extend their thinking to consider changes in landforms that naturally occur over thousands or many thousands of years. Let students know that they will further explore short- and long-term changes in this unit.

5. If you have not previously done so, introduce scientific evidence in science.

a. Explain how scientists define and use evidence.

Evidence and Trade-Offs

Procedure Step 4 provides an opportunity to introduce the definition of *evidence* provided in the Student Book. Explain that scientists collect information (data) with various tools and strategies, including observation and experimentation. Like scientists, students will use evidence to develop explanations, construct scientific arguments, and recommend solutions to problems. In this activity, students use observations to make a claim about the human impact of building in Boomtown.

b. Distinguish *evidence* from *opinion*.

Explain that *evidence* is information that supports a claim. In contrast, an *opinion* is the view someone takes about a certain issue based on their own judgment. An opinion might not be based on evidence. An informed opinion might be based on evidence; however, another person may have a different opinion based on the same evidence. To distinguish evidence from opinion in science, it is helpful to determine if a statement describes information gathered through reliable and appropriate procedures and if it is likely to be reproducible. The question is: Could someone else gather similar information under similar circumstances? If the answer is yes, the statement is not opinion and is likely to be evidence.

c. Discuss the sources, quality, and quantity of evidence.

When evaluating evidence, scientists consider the source, quality, and quantity of the evidence available. Biased or insufficient evidence compromises the validity of scientific conclusions. Scientific conclusions should logically follow the evidence collected and should not be overly generalized beyond the context of the investigation.

The criteria for quality evidence may vary among the scientific disciplines. However, evidence is generally considered of higher quality if it is obtained through systematic investigation and is reproducible, meaning that another investigation under the same set of circumstances would obtain similar data.

Criteria for quantity also vary but might include the sample size or number of trials in an experiment, the number of observations that support a conclusion, or the availability of multiple studies or multiple lines of evidence that lead to the same conclusion.

d. Support students' understanding of key scientific vocabulary.

Vocabulary Approach

When words are formally defined in an activity, such as evidence, they appear in bold type in the Student Book and are included in the Teacher Edition's Key Vocabulary list in the Activity Resources section. Encourage students to use these words when talking or writing about science. During discussions, listen for these words to see if students are using them correctly. Decide how you will support students' understanding of the vocabulary—perhaps by setting up a word wall in the classroom.

BUILD UNDERSTANDING

6. Reflect on the impact of building construction on the natural world.

a. Introduce the driving question related to the investigative phenomenon.

This activity starts a sequence of learning around the first driving question: How can people mitigate the negative impact on the land and water when building new construction? This driving question is identified in the Phenomena, Driving Questions, and SEPUP Storyline overview found in the NGSS and Common Core tab in the back of this Teacher Edition. Discuss students' ideas, and add them to the Driving Questions Board as needed.

b. Ask students, "What are the positive and negative impacts of building the school?"

Let students brainstorm ideas about the impact that the construction may have on the community and on the environment, and record a list of their ideas on the board.

- On the positive side, human activities often improve the quality of human life, such as the introduction of clean water, electricity, and Wi-Fi to areas that didn't already have it.
- Negatively, human activities often alter the biosphere, damaging or destroying natural habitats or causing the extinction of a species. For instance, in the mid-20th century, the Tecopa pupfish (a small fish that lived in the Mohave Desert) was pushed to extinction by humans after two springs were channeled together, resulting in a habitat unsuitable for the organism.

c. Discuss how population growth plays a role in human impact on the environment.

   If students have not yet pointed this out, discuss the fact that the new school building is needed as a result of population growth in Boomtown. Discuss the idea that as human populations and per capita consumption of natural resources increase, so do the negative impacts on Earth.

d. Ask students, "What ideas do you have about what should be required to build the school?"

   Brainstorm possible engineered strategies and technologies. Use this opening activity to allow students to consider possible design criteria and constraints for the building. Elicit student ideas about how requirements might influence the final design of the school. Point out that a building could minimize the environmental impact through thoughtful engineering and design.

7. If you have not previously done so, introduce the concept of *trade-offs*.

   a. Introduce the idea that decisions about solutions to scientific and engineering problems often involve trade-offs.

      In a decision involving trade-offs, something desirable is given up to gain another desirable outcome. Since many decisions involve trade-offs, students should understand that a perfect choice is often not possible. It is possible, however, to recognize and analyze the trade-offs associated with each decision.

Evidence and Trade-Offs

      This unit includes issues that relate to science and/or engineering, which may lead to decisions about the best solutions or designs for solving problems. One goal of this curriculum is to teach students that decisions about possible solutions often involve trade-offs and that identifying trade-offs involves analyzing evidence.

      Explain to students that in this unit, they will make several decisions about where and how to build the school and fields. In this activity,

students use Analysis item 2 to identify the trade-offs involved in the human impact of building the new school.

b. Provide an example of trade-offs.

For example, when asked, "Paper or plastic?" at a store checkout counter, most shoppers make the choice quickly. But there are several trade-offs attached to choosing paper or plastic. A shopper who chooses paper over plastic may do so to avoid generating plastic waste. In requesting the paper bag, though, they are contributing to other environmental problems, such as increased water and energy use and the higher amounts of solid waste and CO_2 emissions associated with making paper bags. Neither choice is ideal, and both choices have a downside. Identifying the trade-offs helps clarify the reasoning that is being applied to make a decision.

c. Develop some examples of trade-offs in students' lives.

To further explore trade-offs, brainstorm with the class a list of decisions they make every day that involve trade-offs. Choose one and talk through the associated trade-offs of deciding one way or another. This practice will familiarize students with ways of identifying and considering trade-offs in this and subsequent activities.

d. Identify some trade-offs of the Boomtown sites.

Explain that if the school is built on the hillside, you gain some advantages (e.g., views of the town, safety from flooding), but you also give up or trade off other advantages (e.g., safety from landslides). Discuss any other potential trade-offs. Focus the discussion on the land and water in the area, since the main scientific ideas in the unit are geological processes and the relationship of these constructive and destructive forces to nutrient contamination due to run-off.

8. Introduce crosscutting concepts.

a. Explain that crosscutting concepts bridge disciplines of knowledge.

Crosscutting Concepts

They can be a lens or touchstone through which students make sense of phenomena and deepen their understanding of disciplinary core ideas. Refer students to the chart in Appendix G: Crosscutting Concepts in the Student Book, and point out the symbols and definitions provided.

b. Introduce the crosscutting concept of *cause and effect*.

Review the symbol for *cause and effect* in Appendix G, which shows a simple diagram where A (the cause) might or might not cause B (the effect) to happen. For example, in this activity, removing an animal's habitat due to filling in a wetland leads to a reduction of wildlife. That is

an example of an obvious cause, but sometimes there are more complex causes, or chains of events, that cause an effect. Scientists investigate and then try to explain how things work or try to figure out what causes various events.

c. Relate *cause and effect* to this activity.

In this unit, students use the crosscutting concept of *cause and effect* to investigate the casual relationship between human activity and negative impacts on the environment. In this activity, the physical changes students observe in the photos establish a relationship, although students have not yet been formally introduced to correlation and casual relationships.

9. Consider the three building sites.

a. Review student site choices in Analysis item 3.

As a class, review the map and the landforms. Students will analyze maps of Boomtown in greater detail in subsequent activities, so use this opportunity to support the introduction of the fictional community of Boomtown and to connect the story to the landforms that students are observing. Use students' responses to build on their personal experience. While students have gained some ideas about construction in different areas from the photographs, there is a lot more they will need to know about Boomtown and the sites before making a final decision about where to build. Emphasize the importance of using evidence, or actual information about the sites, when weighing their relative advantages and disadvantages in order to make a decision.

b. Leverage students' prior knowledge and experiences related to issues in their community.

Analysis item 5 asks students to use their prior knowledge and personal experiences to compare the Boomtown to their local community. Use this opportunity to leverage students' prior experiences in the world and relate it to the scenario presented in the activity.

c. (LITERACY) Continue to foster student questioning by revisiting the KWL chart as a class.

To conclude the activity, collectively build ideas by revisiting the KWL chart and filling in the last column with students' observations from the activity. For example, students may have known that animals and plants are impacted by building, but they might have more questions about what building can do to the water in the area. They may have learned that wetlands are sometimes filled to build houses. Because this is just the introductory activity, students may find that they have many more things they want to know at this point than things they already knew or have learned.

STRATEGIES FOR TEACHING DIVERSE LEARNERS

Below are suggestions for differentiating instruction and assessment in this activity for diverse learners in your classroom:

Differentiated Instruction

- Students with learning disabilities: Have students write their responses to Student Sheet 1.1 with a partner instead of alone, or show their understanding by drawing diagrams or pictures rather than constructing verbal answers.
- English learners: Introduce a class word wall for the LAND, WATER, AND HUMAN INTERACTIONS unit as a visual reminder of the new key scientific terms and to make the words easily accessible. Consider adding an explanatory picture or diagram for some (or all) of the terms. Begin constructing it for this activity, and continue to add terms throughout the unit.
- Academically gifted students: Assign students either or both of the following tasks: (1) Create an argument, using evidence, that goes against their viewpoint on the question of where to build the school. (2) Address the limitations of the photographs presented in this activity.

These colored icons, ● ● ●, indicate opportunities to formatively assess students' proficiency with the three dimensions: ● = SEP, ● = DCI, ● = CCC.

SAMPLE RESPONSES TO ANALYSIS

●● 1. Based on the Building Sites Before and After Construction photos, explain how each of the following kinds of places were changed by the construction of buildings due to increased population:

a. Wetlands

The wetlands are changed because there is no longer any water in the area. The ground has become solid instead of marshy. There are no birds to be seen, and the grasses and trees were replaced with species that are not originally from the area. There doesn't appear to be anything that hasn't been changed as a result of building at this site.

b. Hillside

The hillside is changed because the trees were cut down and replaced with roads and houses. The surface of the earth has fewer peaks and valleys after building. The area outside of the immediate area does not seem to be changed.

c. Cliff

The cliff is changed because the house was built on top of the cliff. The cliff seems to have crumbled more in the area near the house, particularly right in front of it. The coastline seems to be less straight than it was, and barriers have been added. The areas beyond the single house do not show any change.

2. A **trade-off** is a desirable outcome given up to gain another desirable outcome. What are some of the trade-offs involving the human impact of building a new school and fields?

   Students' responses will likely vary. A sample response is shown here:

   One of the big trade-offs is that if we build the school, we give up the natural environment that was there. We are giving up the habitat for smaller animals in exchange for gaining an environment for humans.

3. Examine the map of Boomtown on the next page. Find each of the three sites being considered for the new school and fields:

   - Delta Wetlands
   - Green Hill
   - Seaside Cliff

   Based on what you know so far, on which site do you think Boomtown should build the new school? Use the map and your class's observations from this activity to form your opinion.

   Students' responses will likely vary. Look for answers that are based on the actual observations students made from the photographs. A sample response is shown here:

   Boomtown should build homes on the wetlands because the swampy areas are unattractive and the wetland is filled in with firm soil after construction. It is worse to cut down the beautiful green areas on a hill. Plus, it is better to build on a flat area because it is easier to access than on a hill.

4. **Revisit the issue:** List any questions you have about the following, which could help the City Council decide where to build the new school:

   Students' responses will likely vary. A sample response is shown here:

   a. Animals in the area

      Could the birds seen in the photos become endangered or extinct due to construction of the school?

   b. Plants in the area

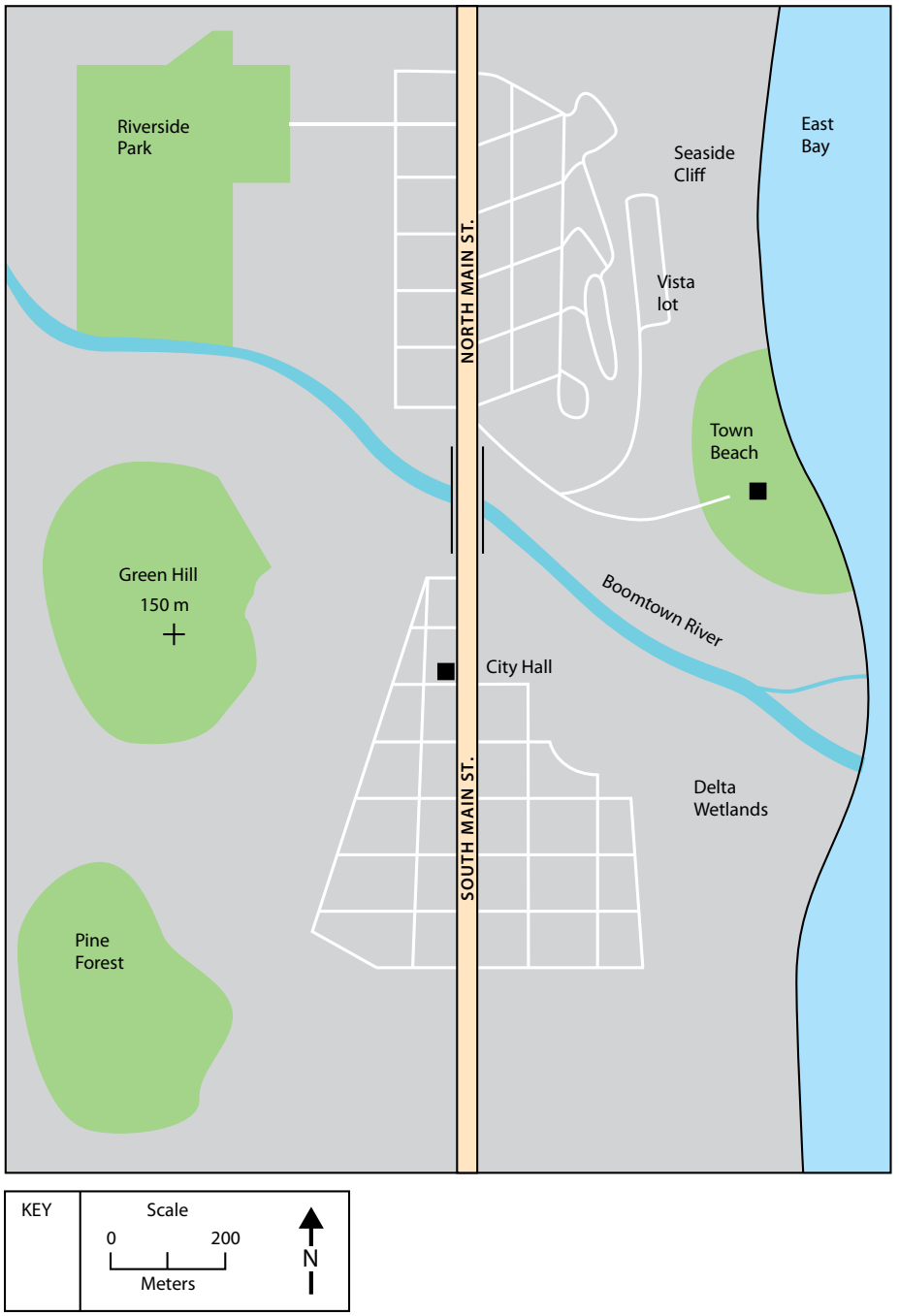
      Can plants also become endangered or extinct? How do plants contribute to the shape of the ground and the natural habitats in the area?

   d. The shape of the land

      Are some land shapes, such as a steep slope, harder or more expensive to build on?

   e. The health of the nearby water

      Could building affect the quality of the water?



5. **Reflection:** Compare Boomtown to where you live. How is it similar or different?

Students' responses will likely vary. A sample response is shown here:

Boomtown is not similar to my town in that it is flat where we live, and we are not near the ocean. It is similar in that there is a river and lake nearby. Also, our schools are overcrowded, and some people want a new school.

6. The phenomena you are investigating relate to changes in the land due to geologic processes and human activity. Think about Boomtown and your own community. What questions do you have about phenomena that change the land?

   Students' responses will likely vary. A sample response is shown here:

   I have questions about what happened to the things that are missing in the After photographs. For the cliff, where did the rocks at the bottom of the cliff go? For the hillsides, what happened to the dirt from the top of the hills? For the wetlands, where did the water go?

REVISIT THE GUIDING QUESTION

What is the human impact of constructing buildings?

Some examples of the human impact of constructing buildings were shown in the photographs. For instance, green space has been replaced by structures, fewer birds and animals inhabit the built-up area, and the land's shape has changed. Other impacts will be explored throughout this unit.

ACTIVITY RESOURCES

KEY VOCABULARY

evidence

human impact

trade-off

Name_____ Date_____

STUDENT SHEET 1.1

OBSERVATIONS BEFORE AND AFTER CONSTRUCTION

	Appearance before construction	Appearance after construction
Cliff		
Hillside		
Wetlands		

Name_____ Date_____

STUDENT SHEET 1.2

EVALUATING GROUP INTERACTIONS

Procedure

Use the following table to rate your group's performance.
Give evidence for your scores by answering questions 1 and 2.

GROUP INTERACTIONS	SCORE
Group stays on task and mananges time efficiently	
Group shares opportunities	

1. Give some examples of how your group stayed on task and managed the time efficiently.

2. Give some examples of how your group shared opportunities to contribute to the activity. Your examples might include times when you or your group members respected and treated others with courtesy, helped one another do the work, shared the work (not having one person do all the work alone), or stayed open-minded and willing to compromise.

Name *Sample student response* Date

STUDENT SHEET 1.1

OBSERVATIONS BEFORE AND AFTER CONSTRUCTION

	Appearance before construction	Appearance after construction
Cliff	*Sandy and rocky on the sides of the cliff; some vegetation on the top; small overhang at top; looks unstable.*	*House on top of cliff; sandy and rocky sides with more overhang than before; less vegetation on top; coastline is not as straight as before; barriers built in front of shore.*
Hillside	*Covered with trees and grass; hills have ridges and valleys.*	*There are now houses, roads, and cars; less grass, fewer trees, and soil churned up in some places; some areas are leveled.*
Wetlands	*Lots of water and birds; full of grasses, reeds, and some trees; land area looks swampy; no hills in the area; some trees and grass.*	*No water visible; no birds visible; lots of houses and concrete; trees and grass are present, but different kinds than before.*

VISUAL AID 1.1

DEVELOPING COMMUNICATION SKILLS

COMMUNICATION	SENTENCE STARTERS
To better understand	*One point that was not clear to me was . . .* *Are you saying that . . .* *Can you please clarify . . .*
To share an idea	*Another idea is to . . .* *What if we tried . . .* *I have an idea—we could try . . .*
To disagree	*I see your point, but what about . . .* *Another way of looking at it is . . .* *I'm still not convinced that . . .*
To challenge	*How did you reach the conclusion that . . .* *Why do you think that . . .* *How does it explain . . .*
To look for feedback	*What would help me improve . . .* *Does it make sense, what I said about . . .*
To provide positive feedback	*One strength of your idea is . . .* *Your idea is good because . . .*
To provide constructive feedback	*The argument would be stronger if . . .* *Another way to do it would be . . .* *What if you said it like this . . .*
To discuss information presented in text and graphics	*I'm not sure I completely understand this, but I think it may mean . . .* *I know something about this from . . .* *A question I have about this is . . .* *If we look at the graphic, it shows . . .*

VISUAL AID 1.2

GROUP INTERACTIONS CLASSROOM RUBRIC

When to use this rubric:
This classroom rubric is used when students work together as a group toward a common goal.

What to look for:

- Group members work together as a team.
- The ideas of all members are valued and considered by the whole team in working toward the common goal.

Level	Description
Level 4 Accomplished	Group members accomplish Level 3 and actively collaborate by doing the following: • Asking questions about one another's ideas • Helping one another accomplish the task • Building on one another's ideas
Level 3 Almost there	All group members participate equally, and respectfully consider one another's ideas.
Level 2 On the way	Unequal group participation OR group respectfully considers some, but not all, ideas.
Level 1 Getting started	Significantly unequal group participation OR group totally disregards some members' comments and ideas.
Level 0	Members do not work together OR single individual does entire task.
x	Student had no opportunity to work as part of a group.