

Connected by Water

WATER TREATMENT INQUIRY UNIT
GRADES 6 – 9

Comox Lake Watershed Protection and Water Conservation

FOR MORE INFORMATION, VISIT:
WWW.COMOXVALLEYRD.CA/WATERSHED

 **Comox Valley**
REGIONAL DISTRICT

The Connected by Water Inquiry Units teach students the importance of preserving our watersheds and conserving water.

High quality drinking water is produced by a healthy, properly functioning ecosystem. To have healthy water you need healthy ecosystems. Protecting our drinking water requires two important things - conserving it and protecting the source. The Comox Valley Regional District (CVRD) has developed these materials to support students in learning about their connections to the Comox Lake watershed, learning what makes a watershed healthy, and learning how to conserve water by using it efficiently at home. Our watershed is the entire area of land in which our drinking water flows, including streams, rivers, lakes, groundwater and shorelines. See www.comoxvalleyrd.ca/watershed for a more detail about the Comox Lake watershed.

The following resources are informed by the Watershed Protection Plan, and the Connected by Water project vision, all within the framework of the British Columbia Ministry of Education Curriculum. They are designed to support answering the driving question: **What allows me to have safe water that I can drink?**

An additional Connected by Water inquiry unit is available for intermediate grades (Grades 4-7), High School, (Grades 8-9) as well as a Water Treatment Inquiry Unit (Grades 6-9).

More information is available at:

<https://www.comoxvalleyrd.ca/watershed/resources-educators>

Optional learning kits are available at the SD71 Learning Resources Centre.

The project team would like to thank School District #71's Learning Resource Centre, Indigenous Education Team, Director of Instructional Services Geoff Manning, as well as the long list of Local environmental educators listed in the Additional Resources appendix. These educators including SD#71 teachers provided feedback and tested the materials. The Comox Valley Regional District provided funding and project direction.

These materials were developed by Christina (Tina) Willard-Stepan and Angela Holmes, Curriculum Development and Delivery Team of Connected By Water.

Together we are creating a legacy of acting together to ensure the health and long-term viability of our communities through using our drinking water wisely and protecting the source of our drinking water.

We respectfully acknowledge that we live, work, learn and play on the unceded traditional territory of the K'omoks First Nation.



Tables of Contents

Introduction to Educators	1	Water Treatment Activity: Floor Puzzles	14-16
Water Treatment Facility Field Trips	2	Water Cycle Refresher Floor Puzzle	14-15
British Columbia Curriculum Connections	3	Water Treatment Floor Puzzle	16
Core Competencies	3-4	Thinking Globally	17-19
The Comox Lake Watershed	5-6	Water Treatment Activity: Water Filter	20-22
What Makes a Healthy, Climate Resilient Watershed?	7	Appendix 1: The Legend of Queneesh	23
Water Treatment	8	Appendix 2: Water Cycle Refresher Floor Puzzle	24-34
Introduction to the Inquiry	9	Appendix 3: Earth Tap - Concept Map	35-41
Launching the Inquiry	10-11	Appendix 4: Design Thinking	42-48
Connection and Awareness	12-13		



Introduction to Educators

HOW TO USE THIS INQUIRY UNIT

Welcome to the Connected by Water Teacher Resource!

This Inquiry Unit can be used in its entirety, or each activity within the unit can stand alone. The end of this inquiry unit includes a very robust list of additional links and resources connecting you to many ideas and projects in the community, including options for field trips.

Consider integrating the unit while your school is working on social themes such as sustainability, Earth Day, or social responsibility.

These materials can be downloaded, and there are also physical inquiry kits available to book for School District #71 teachers at the Learning Resource Centre, which include copies of the books referred to within the lessons, as well as other supporting materials. There is a primary inquiry kit, intermediate inquiry kit, a High School inquiry kit, and a Water Treatment Inquiry for grades 8-9.

www.comoxvalleyrd.ca/watershed/teacherresources

Water Treatment Facility Field Trips

In-person field trips to the Comox Valley water treatment facility includes a hike on the Bevan trails, an introduction to the history of land use, a talk about what makes a climate resilient watershed, and a walk-through tour of the Comox Valley Water Treatment Facility with CVRD staff. They are a half-day in length, free to participants, and provided at this time to grade 6-9 on a first-come, first-served basis.

A robust list of resources for field trip planning is available here on the Learn71 Environmental and Outdoor Education website: learn71.ca/environmental-outdoor-learning-eol/

To inquire about field trip availability, please email pollinatecommunity@gmail.com





This Inquiry Unit and British Columbia's Curriculum

CORE COMPETENCIES

The BC Ministry of Education explains that Core Competencies, literacy and numeracy, and essential concepts and content are the foundations of the curriculum. Students will know, do and understand “Big Ideas” and what to do with this knowledge as they move from Kindergarten to Grade 12. Core competencies are sets of intellectual, personal, and social proficiencies that all students need to develop in order to engage in deep learning and lifelong learning.

Watch this video for a refresher on the Core Competencies: youtu.be/uP4ndQ5ckoY

An aim of the Connected by Water Inquiry Units is to teach students the importance of preserving our watersheds and conserving water. Tying the inquiry units to the core competencies allows students to gain an awareness and understanding of their watershed, take action to conserve and protect their watershed, and learn to use drinking water wisely. Listed below are some of the core competencies and curricular connections that are interwoven and interrelated in the Connected by Water Inquiry Units.

CORE COMPETENCIES



CRITICAL THINKING

I can analyze evidence from different perspectives

PERSONAL AWARENESS AND RESPONSIBILITY

I can imagine and work towards change in myself and the world

SOCIAL RESPONSIBILITY

Contributing to community and caring for the environment

I contribute to group activities that make my classroom, school, community, or natural world a better place.

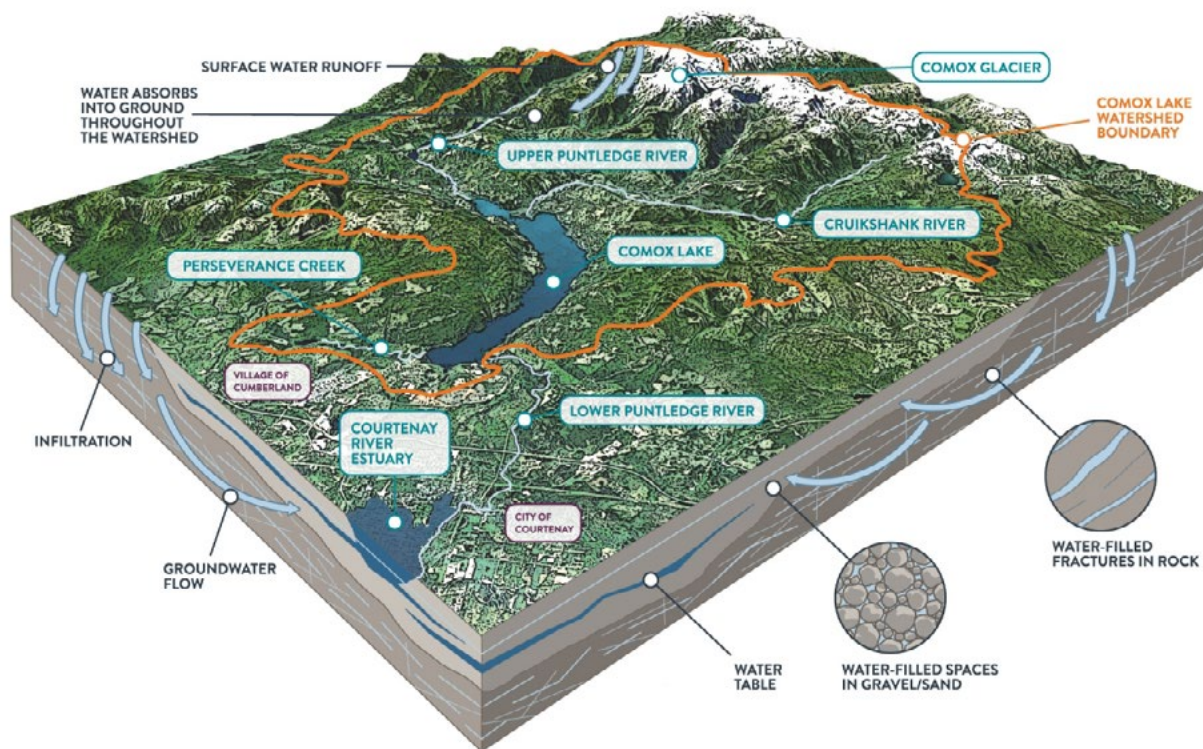
I can identify how my actions and the actions of others affect my community and the natural environment and can work to make positive change.

I can analyze complex social or environmental issues from multiple perspectives. I can take thoughtful actions to influence positive, sustainable change.

<https://curriculum.gov.bc.ca/competencies>

The Comox Lake Watershed

The Comox Lake watershed is located in the traditional territory of the K'ómoks First Nation and provides drinking water for the Comox Valley water system. This watershed is an interconnected system of mountains, forests, rivers, creeks and streams and an ecological corridor that links Vancouver Island mountains with the Salish Sea.

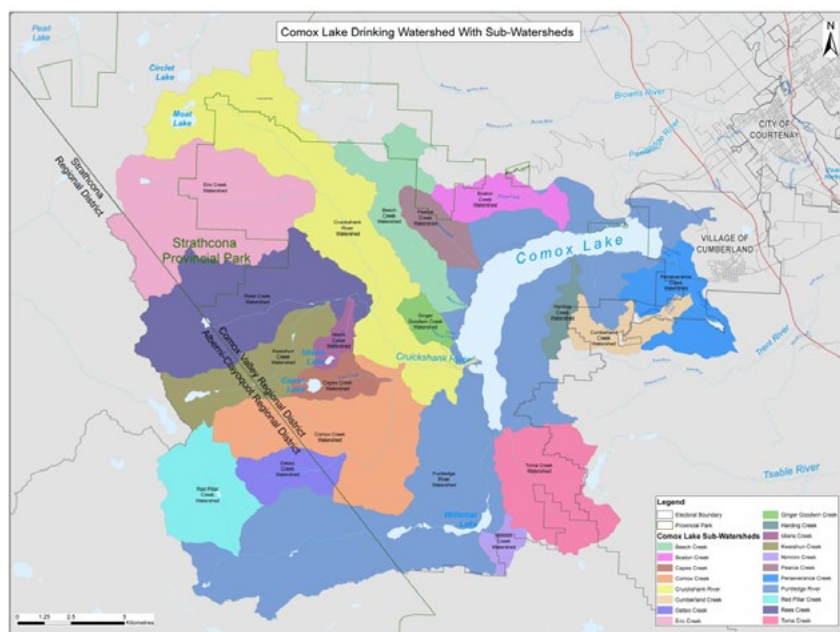


www.comoxvalleyrd.ca/watershed

The watershed is 461 square kilometres in size and reaches to the top of the Comox Glacier and the mountains surrounding Comox Lake. Within the Comox Lake watershed there are multiple sub-basins named for the creeks and rivers that flow through them. These include the Upper Puntledge, Cruikshank, Boston Creek and Perseverance Creek sub-basins. Much of the water that hits the ground as snow or rain anywhere in the Comox Lake watershed eventually flows into Comox Lake.

The Comox Lake Watershed

The Comox Lake watershed has been managed for multiple values including mining, logging and recreation activities for over 140 years. While coal mining operations ended in the 1930's, a large portion of the watershed is still currently privately owned and managed for timber supply. Comox Lake itself is a reservoir controlled by BC Hydro for power generation. Swimming, boating and camping also takes place but public access is limited to specific sites at the east end of the lake.



www.comoxvalleyrd.ca/watershed

The watershed also provides important habitat for fish and wildlife including species at risk like the Roosevelt elk, little brown bat and northern red-legged frog. Comox Lake flows into the Puntledge River providing stream flows that support many species of salmon.

Other landowners within the watershed include the Village of Cumberland (Perseverance Creek sub-basin, Cumberland Lake Park), Comox Lake Land Corporation (cabin owners at east end of lake), the Comox Valley Regional District (Coal Beach), the Courtenay and District Fish and Game Society and BC Parks (Strathcona Park and Comox Lake Bluffs Ecological Reserve).

The Comox Lake watershed is the source of drinking water for over 49,000 residents of the Comox Valley through the Comox Valley Water System and the Cumberland Water System. Although the Comox Valley Regional District (CVRD) is constructing a new water treatment plant, the cost of treating our drinking water will be directly related to the quality of water that is drawn from Comox Lake.

View this short video [Watershed for Beginners: How to Care for Comox Lake](#).

The Comox Lake Watershed

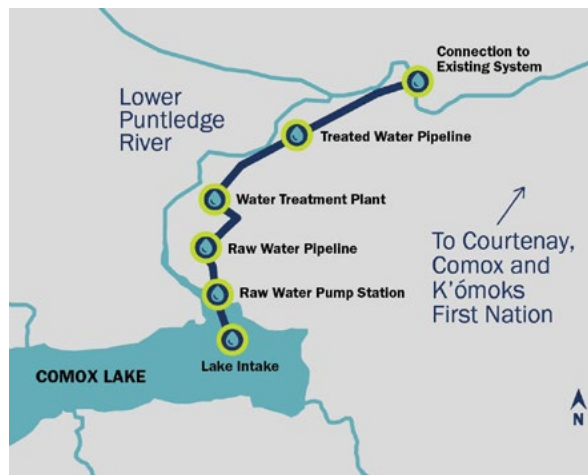
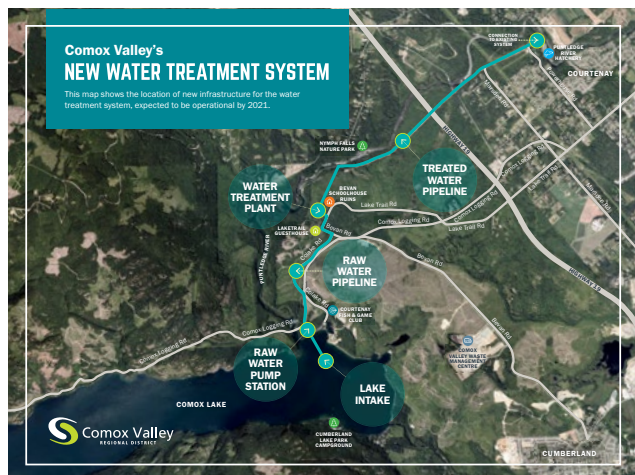
The following image includes themes around what makes a healthy, climate resilient watershed: functioning creeks and streams, ecosystem health, fire protection, clean water, water conservation, and connection to place. The activities included in all of our Connected by Water teacher resources will help you to generate meaningful conversations with your learners in keeping with these themes.



Water Treatment

New Water Treatment Facility Complete, Providing High Quality Drinking Water to Comox Valley Residents.

Fresh, filtered and fully disinfected drinking water is now flowing to 50,000 residents in the Comox Valley – an achievement celebrated with an event on September 21, 2021 at the Comox Valley Regional District's new Water Treatment Facility on Lake Trail Road.



ABOUT THE PROJECT

Construction of the Comox Valley Water Treatment Project is now complete. The new system, which began construction in fall 2019, now provides a safe, reliable source of drinking water that meets provincial surface water treatment objectives guidelines. The completion of this system means:

- Elimination the need for turbidity-related boil water notices.
- Removal the risk of viruses and bacteria in our drinking water
- A secure supply of reliable, high quality drinking water for decades to come

Introduction to the Inquiry

An inquiry unit is often launched with an invitation or a provocation. Students' questions about the phenomenon they are experiencing through their senses are placed at the center of the learning.

In our rainy “wet coast” we seem to have lots of water. It is hard to imagine that the truth is we do not. If all the water on Earth is connected by the water cycle, we essentially have one big shared source of water. Every living organism on the planet needs water. That is a lot of life to support!

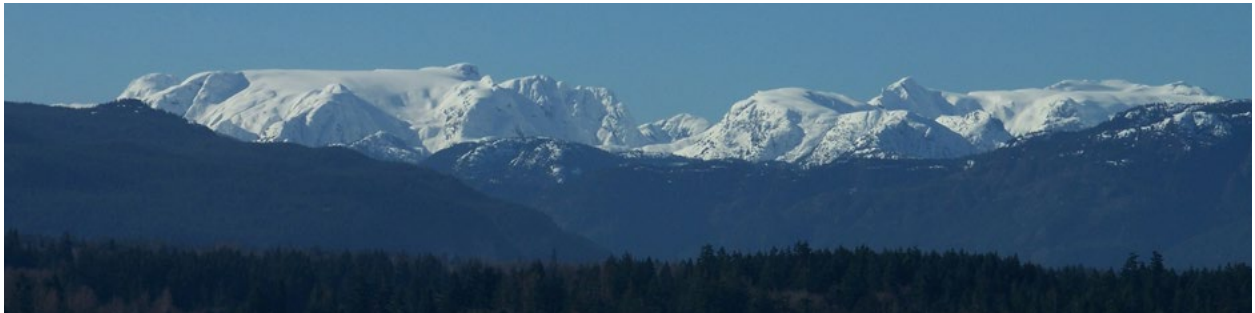
All water on earth is connected - let's call it a global well. This global well includes oceans, icecaps and glaciers, groundwater, lakes, inland saltwater seas, moisture in the soil, water in the atmosphere and rivers. This global well feeds our local Comox Lake watershed, and all other watersheds/water sources that all people, plants and animals use for daily activity and their survival.

Driving question: What allows me to have safe water that I can drink?



Launching the Inquiry

ACTIVITY: THE LEGEND OF QUEENEESH



Read aloud the Local K'ómoks Nation Legend of Queeneesh with the class (see Appendix 1) or show the student-made video of the storytelling from this link:

Legend of Queeneesh

Observing and Supporting Learning

Prompting questions for your inquiry:

- What do you know about the Comox Glacier?
- How is water important in the K'ómoks Nation?
- How do they use resources from the watershed to help them?



DRIVING QUESTION

What allows me to have safe water that I can drink?



LEARNING ACTIVITY:

Show this picture of water faucet.

Place a clear glass of water at the front of the class.

Observing and Supporting Learning

Prompting questions for your inquiry:

What are you thinking? Noticing? Wondering?



Connection and Awareness

ACTIVITY:

STARTING THE CONVERSATION

Use the quotes, questions and quiz below to gauge students' knowledge about water, sustainability and climate resilience, and to support the group in entering into the inquiry from a place of curiosity. Post quotes onto board or read aloud. For larger groups, have them share in pairs before returning to the whole class for discussion.

POP QUIZ - How long can you live without the following:

Food?	3 weeks
Electrical power?	Weeks to years
Cell phone?	indefinitely
Water?	3 days

"It is almost unimaginable that an object or thing, natural or unnatural, is not owned or controlled by a private person, organization, or government."

—Jonathan Leeming, Conservationist, *One World*

"The question of how much we impact the environment can be tough to answer, simply because we are rarely aware of the consequences of our actions."

—Jonathan Leeming, Conservationist, *One World*

"For many of us, clean water is so plentiful and readily available that we rarely, if ever, pause to consider what life would be like without it."

—Marcus Samuelsson

"Some people think that humans were put on the earth to dominate, abuse and use it as we see fit."

—Jonathan Leeming, Conservationist, *One World*

Prompting questions for your inquiry:

Can you name an aspect of the environment that is not owned or controlled by a private person, organization or government? Do you know who owns our watershed?

How do you think your actions in your everyday life might affect our local watershed and water conservation?

What would be different about your life if we did not have enough water for all of our current needs?

Do you think that humans have a responsibility to look after the environment?

Connection and Awareness

ACTIVITY: WATER CYCLE REVIEW

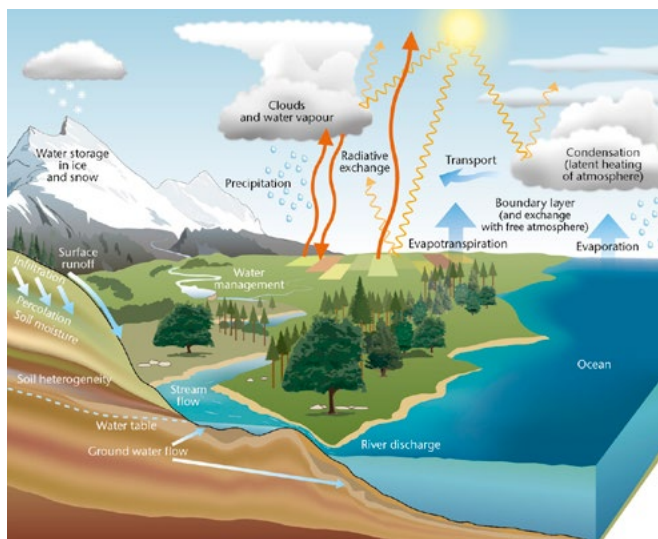
Depending on class knowledge, below are some resources for you to review the basics of watersheds and the water cycle.

What is a watershed?

Like a big bathtub, a watershed is an area of land where all water within it eventually flows out to a common “drain”, such as a river, lake, or ocean. The boundaries of a watershed are higher places, such as hills or mountains, and work like the sides of the tub. Rain, snow, groundwater, and even pollution that fall within watersheds eventually drains to the river, lake, or ocean.

Water and watersheds connect us. Think of your watershed like a neighborhood. What happens in your yard, and your neighbor’s yard, in the streets, and in the parking lots of your city affects the health of your local watershed and the water supplies.

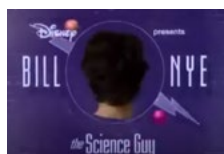
A changing climate affects the amount and quality of water within your watershed. What affects your local watershed also affects our global well because it’s a big cycle.



Source: www.freedrinkingwater.com/resource-water-cycle-student-guide.htm



Interactive Water Cycle Diagram



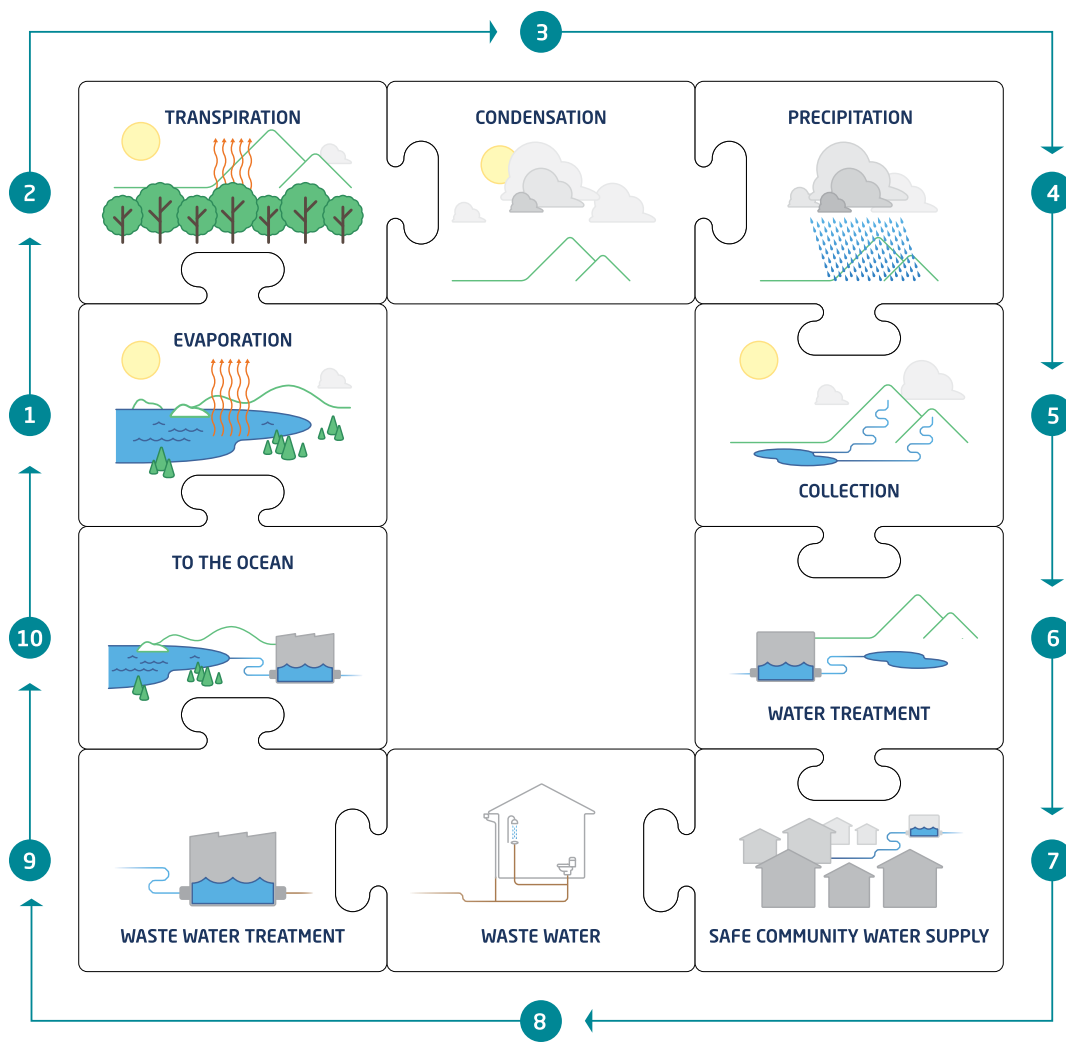
Bill Nye 3 minute Water Cycle Video

Water Treatment

ACTIVITY: INTERACTIVE WATER CYCLE REFRESHER – FLOOR PUZZLE

Materials:

Large floor puzzle pieces printed and cut out from Appendix A or full-size set from SD71 Learning Resource Centre.



Water Treatment

ACTIVITY:

INTERACTIVE WATER CYCLE REFRESHER – FLOOR PUZZLE CON'T

Instructions:

1. After reviewing basic water cycle from previous lesson, invite the class to assemble the water cycle (minus the 'water treatment' 'home/drinking water', 'wastewater' 'wastewater treatment' and 'back to watershed' pieces) in the form of the floor puzzle to determine the order of the full cycle
2. Invite discussion about how humans have developed systems to provide safe drinking water by inserting our technology into the system.
Questions – what are we taking out of the water? (pathogens, pollutants/contaminants and sediment – definitions in glossary below)
3. Insert the 'water treatment' 'home/drinking water', 'wastewater' 'wastewater treatment' and 'back to watershed' pieces into the system
4. Brainstorm a list of water sources where people all over the world might get their drinking water from (pumps, wells, rivers, lakes, desalinated salt water)
5. Where do we get our drinking water from?

Glossary of terms:

Pathogen: A microscopic organism that causes disease when it enters the body. Most pathogens come from the guts of animals, Examples of this include the intestinal parasite: giardia or the intestinal bacteria: e coli

Pollutant/Contaminant: is a polluting or poisonous substance that causes harm. Examples would be a diesel or oil spill from a vehicle accident or a chemical spill from a factory

Sediment: is a naturally occurring material that is broken down by processes of weathering and erosion. It is transported by the action of wind, water, or ice or by the force of gravity toward low ground. Extreme weather events, land use, poor road or trail building, and landslides can all increase the amount of sediment in the water. Sediment makes it hard to filter out potential pathogens because they are trapped inside clay particle and other materials

Water Treatment

ACTIVITY:

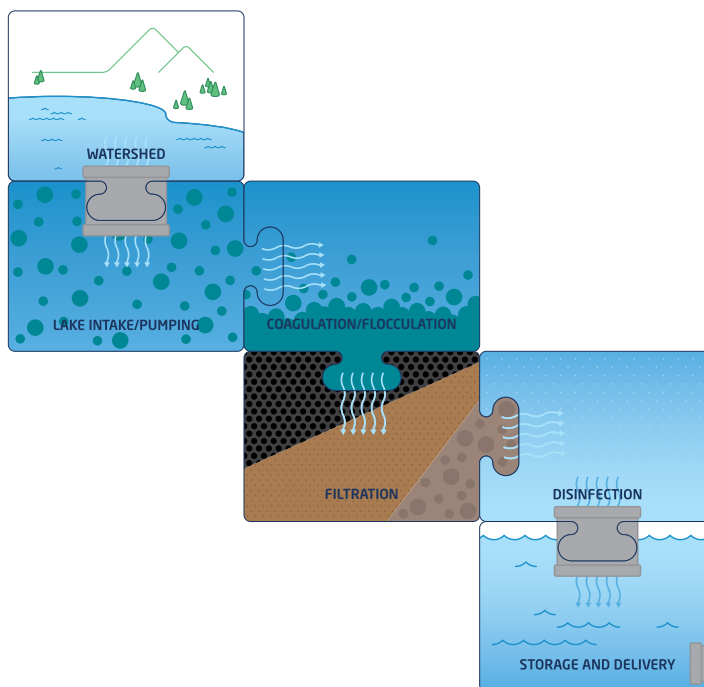
INTERACTIVE WATER TREATMENT – FLOOR PUZZLE

Materials:

Large floor puzzle pieces printed and cut out from Appendix B or full-size set from SD71 Learning Resource Centre

Instructions:

1. Following the water cycle review floor puzzle activity, introduce the stages within our water treatment system by using the second floor puzzle.
2. This puzzle shows a basic water treatment process for surface water. The water from the lake enters the Water Treatment Centre from a deep-water intake in Comox Lake and goes through the following processes in this order: coagulation, filtration, disinfection, and storage and delivery.



Glossary of terms:

Coagulation/Flocculation: Alum and other chemicals are added to the water. This causes particles to chemically stick together into floc.

Filtration: The process of removing remaining small impurities.

Disinfection: Chlorine or other kinds of disinfection methods like UV are applied to kill any bacteria and other living organisms that may be in the water.

Storage and Delivery: Water is stored in tanks while the process of disinfection completes, and then is transported through pipes to our homes and workplaces

Modified from: sites.udel.edu/k12engineering/activities/what-to-do-with-dirty-water/

Thinking Globally

ACTIVITY:

THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

On 25th September 2015, leaders from 193 member states of the United Nations, met to discuss the world's problems and decide on a plan to tackle them. They named this plan the 17 Sustainable Development Goals (SDGs). The three big aims of the goals are that we fight inequality and injustice, end extreme poverty, and tackle climate change. The Global Goals are the most ambitious agreement for sustainable development that world leaders have ever made.

Introducing students to these goals helps them to understand larger international issues, as well as introducing them to what people all over the globe are doing to improve the lives of everyone. Access to clean drinking water is a part of the SDGs.

SUSTAINABLE DEVELOPMENT GOALS



There are many resources available for teaching the SDG's to students available here:
worldslargestlesson.globalgoals.org/

Thinking Globally

ACTIVITY: WHAT WATER MEANS TO YOU

Materials:

- Projector and internet access for video: [UNICEF - Tell us what water is to you](#)
- Free account at www.mentimeter.com to create class Word Cloud – set up in advance with the words ‘Water is.....’
- Equipment for students to create their own video (optional)

Instructions:

1. Pose the question – ‘What is water to you?’
2. Show UNICEF video
3. Create Word Cloud as a class



Extension:

Consider inviting students to make their own class video

Thinking Globally

ACTIVITY: NOVEL STUDY

Thirst by Varsha Bajaj – A Novel Study

A best-selling book, selected for the 2022 Global Read aloud, *Thirst* is an excellent read that introduces students to global water issues from the personal perspective of main character Minnie and her brother who do not have consistent access to safe, treated drinking water.

*“Bajaj brings awareness to the world water crisis and social equality with *Thirst*, a moving, hopeful story”*

—Shelf Awareness, starred review.

The author’s website:

www.varshabajaj.com/books/thirst/

A quick online review for you:

[Online Review, *Thirst* by Varsha Bajaj](#)

Thorough online teacher resources guide for novel study,

[Teachers Guide -*Thirst*-by Varsha Bajaj](#)



Image from: www.varshabajaj.com/books/thirst/



Water Treatment

ACTIVITY: DESIGN YOUR OWN WATER FILTER

Introductory Information:

The Comox Valley Water Treatment Plant meets provincial health standards by using filtration, UV disinfection, and chlorination to remove the risks of viruses and bacteria in our drinking water. This technology will provide a secure supply of reliable, high quality drinking water now and into the future.

This activity will allow learners to immerse themselves in design thinking principles by building their own water filters. Groups of 3-4 students are recommended.

Basic instructions are provided below, as well as a link to a more robust illustrated version created by the Global Water Stewardship Group that includes extra activities.

Design Thinking:

A great video about a class applying design thinking to water treatment in San Diego, CA

[Intro to Design Thinking for Water Treatment](#)

See Appendix 4 for Cycle of Design Thinking chart and planning placemats

Water Treatment:

Here is a link to a video made by the Safe Drinking Water Foundation

[What is Conventional Water Treatment?](#)

Materials:

This list is for one demo model – multiples will be needed for students to work in pairs or small groups

- Clean, clear plastic water or soda bottle
- Utility knife and/or scissors
- Rubber band
- Cotton ball
- Coffee filter (paper towels or napkins work too)
- Sand (aquarium sand works great)
- Pebbles or gravel, (aquarium gravel works great)
- Activated charcoal/carbon (can be found in the fish section of the pet store and may be provided by the SD71 Learning resource Centre, depending on availability)
- Dirty/untreated water from outside, or tap water will do
- Black pepper, oregano, or similar
- Gelatin powder or fruit punch powder
- 2 cups of tap water
- Clear cup or container and spoon to mix dirty water

Water Treatment

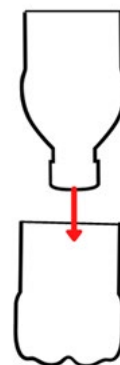
Instructions:

Click here and follow the link to an illustrated version of this ‘Build your own water filter’ activity created by the Global Water Stewardship Group that includes diagrams, instructions, a word search, and reflection questions.

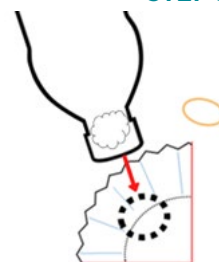
Build Your Own Water Filter

1. Cut bottle in half. Invert the top half of the bottle and place it in the bottom half. The top half of the bottle will be used to create the filter and the bottom half to catch the filtered water.
2. Remove the cap from your bottle and place a cotton ball inside.
3. Fold a coffee filter in half and then in half again. Cover the mouth of the bottle with the folded filter and secure it with a rubber band. Set the top part back inside of the bottom part of the bottle.
4. Sketch out your layers using the handout provided in link.
Question for inquiry: What order will you put your materials if you want to filter solids from largest to smallest?
5. Build your filter with pebbles, activated charcoal and sand.
6. Add two cups of water to a clear cup or container. To the water, add ‘pollutants’ that are large, medium and small size particles. Mix well with a spoon.
Large pollutants: leaf particles, rocks and pebbles, trash
Medium pollutants: pepper or other spices
Small pollutants: gelatin or fruit punch powder
7. Before filtering the “dirty” water, have students predict which “pollutant” will be most difficult to remove from the water and why?
8. Filter your water. Mix well and pour HALF of your “dirty water” into your filter. Set the other half to the side to compare to your filtered water.
9. Record your results
10. Invite student groups to build their own filters using a mix of materials and following the same process.

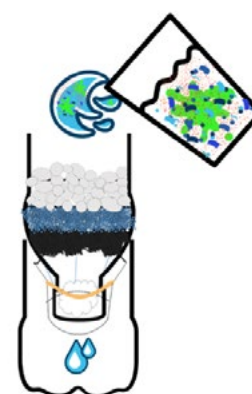
STEP 1



STEP 3



STEP 8



Water Treatment

REFLECTION

ACTIVITY:

WHAT IS MY RELATIONSHIP WITH WATER?

Introduction:

First Peoples view water in a holistic sense, recognizing its unique qualities and roles in the world. Water is seen in cyclical forms that mirror the Western view of the water cycle, but also include a seasonal cycle. First Peoples have a relationship with water that acknowledges water as a unique, living entity. Bodies of water often house spirits or have a matter of personage. The relationship is viewed as an understanding of reciprocity and care. In contemporary views, many First Nations have Waterkeepers who understand and protect this relationship. This lesson examines our relationships with water from a variety of approaches. Students consider how they respect and use water at a personal level.

Materials:

- Journal and writing utensils for each student
- Projector for video Water is Life. Water is Sacred. (10 min long) about the water song. Video created by Indigenous Education, School District 71.
www.youtube.com/watch?v=Bu30WE4qatc

Instructions:

1. Share 'Water is Life. Water is Sacred' video
2. Share these Guiding Questions for students to do a final broad reflection either in word or drawings
 - a. What is your relationship with water?
 - b. What are your connections to water?
 - c. How well do we use the freshwater resources in our region?
 - d. What are some critical issues around the ways we use water?
 - e. What might I change about my own relationship to water after this experience?
3. Students can brainstorm their responses to the question using a web or mind map, notes, or diagrams.
4. After students have had time to respond, discuss the question as a whole class.
5. Ask students to listen for the key ideas, and summarize them at the end of the discussion
6. Ask students further questions about their relationship with water, such as:
 - a. Is water important to your identity?
 - b. If so, how?
 - c. Do you take water for granted?
 - d. Could we show more respect for water? If so, how?



Appendix 1: The Legend of Queneesh

Queneesh is the K'ómoks name for the gleaming white glacier which can be seen from all over the Comox Valley. The Legend of Queneesh tells us how a great white whale saved the K'ómoks people. It began long ago when the K'ómoks people still lived in big cedar plank houses along the shores of Puntledge River estuary.

One night an elder of the village, Quoi qwa lak, had a powerful dream. It warned him of a coming time when the rain would fall for many days and nights. In his dream he was told that this rain would cause a great flood and the K'ómoks people would be in danger.

In order for them to survive the flood, they would have to make canoes, cedar bark rope and clothing and preserve food for the coming disaster. Gye gya janook, Chief of the K'ómoks, directed all of the people of the village to work together so that they would be ready when the rain began to fall.

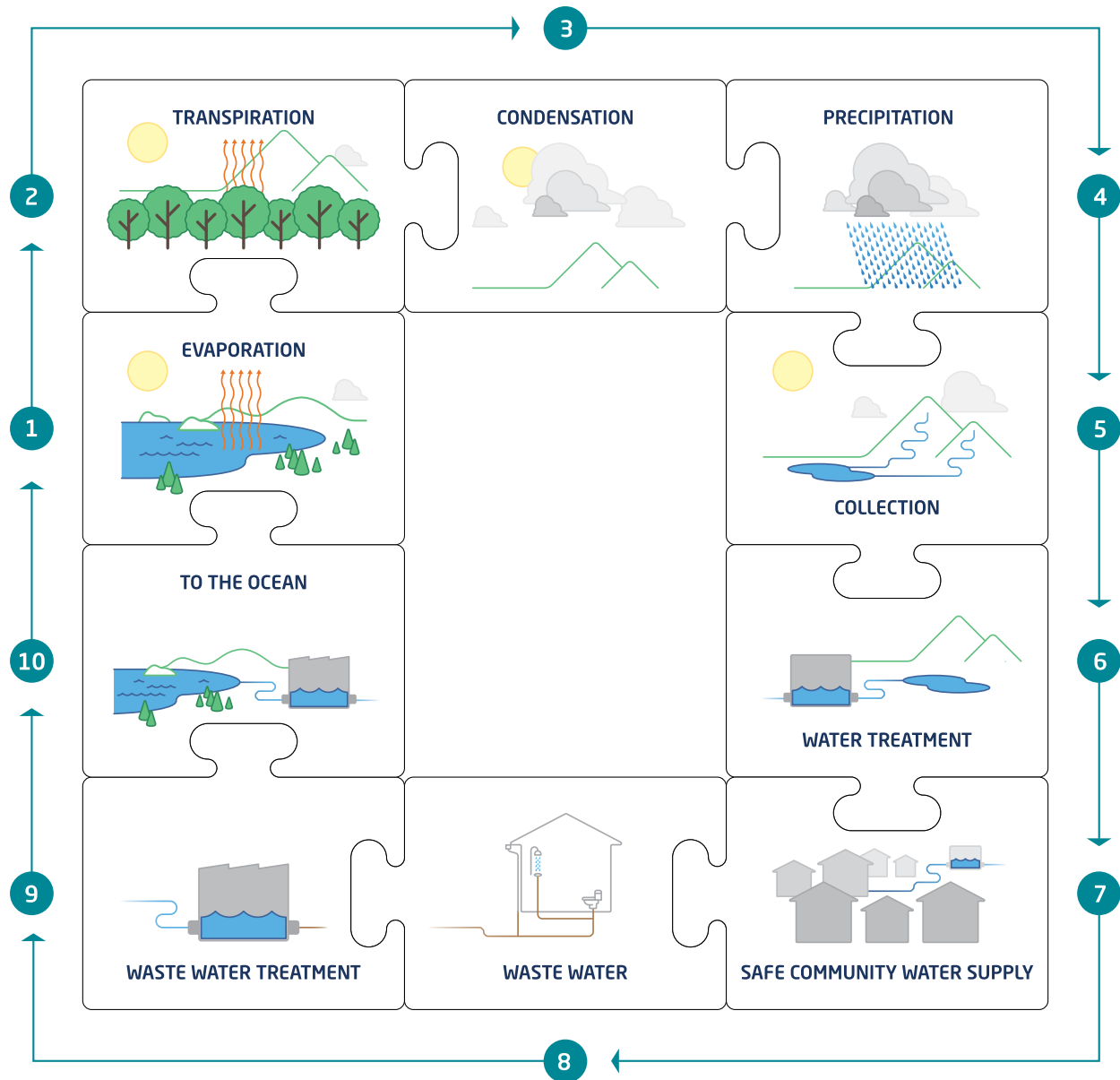
Quoi qwa lak himself supervised the making of a strong cedar bark rope that was many miles in length. The rope had to be long enough to reach from the village to the top of the glacier.

As foretold, the rains began to fall just as everything was ready. The river rose rapidly to flood stage. Young men carried the long cedar rope from the village to the mountains and attached it securely to the glacier. The people tied their loaded canoes to the rope so they wouldn't get swept away to sea by the flood waters.

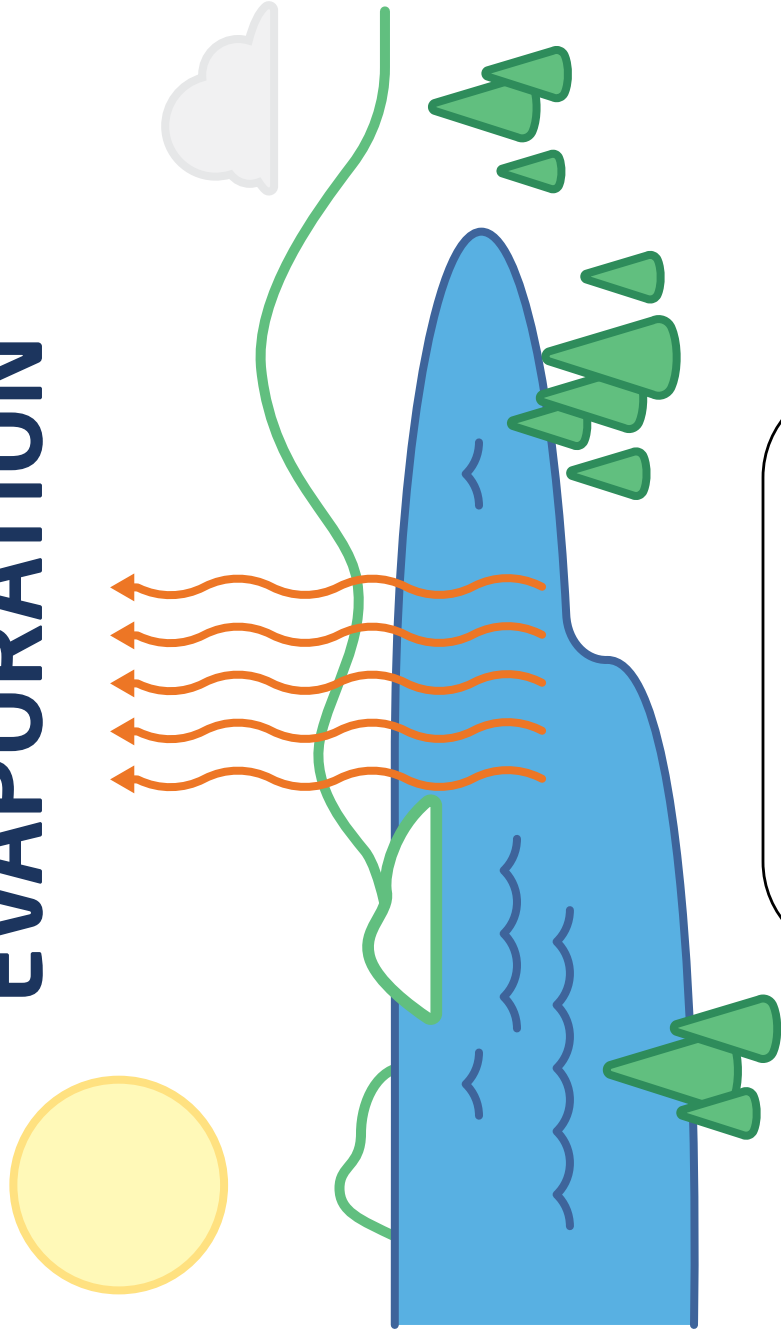
Soon the land was covered with water and still it continued to rain. The people were afraid as the water continued to rise up to the glacier where they had anchored their canoes. Suddenly the glacier began to float, breaking up through the rising waters like a giant grey whale breaching. The people were awestruck as they watched the glacier become a huge white whale.

"Queneesh, Queneesh!" they called. Queneesh almost floated free of the mountain, but the rain stopped and the flood waters began to recede. The K'ómoks people were saved. Some are still heard to whisper to him "Kwo la whee gai, Queneesh". "Thank you, thank you."

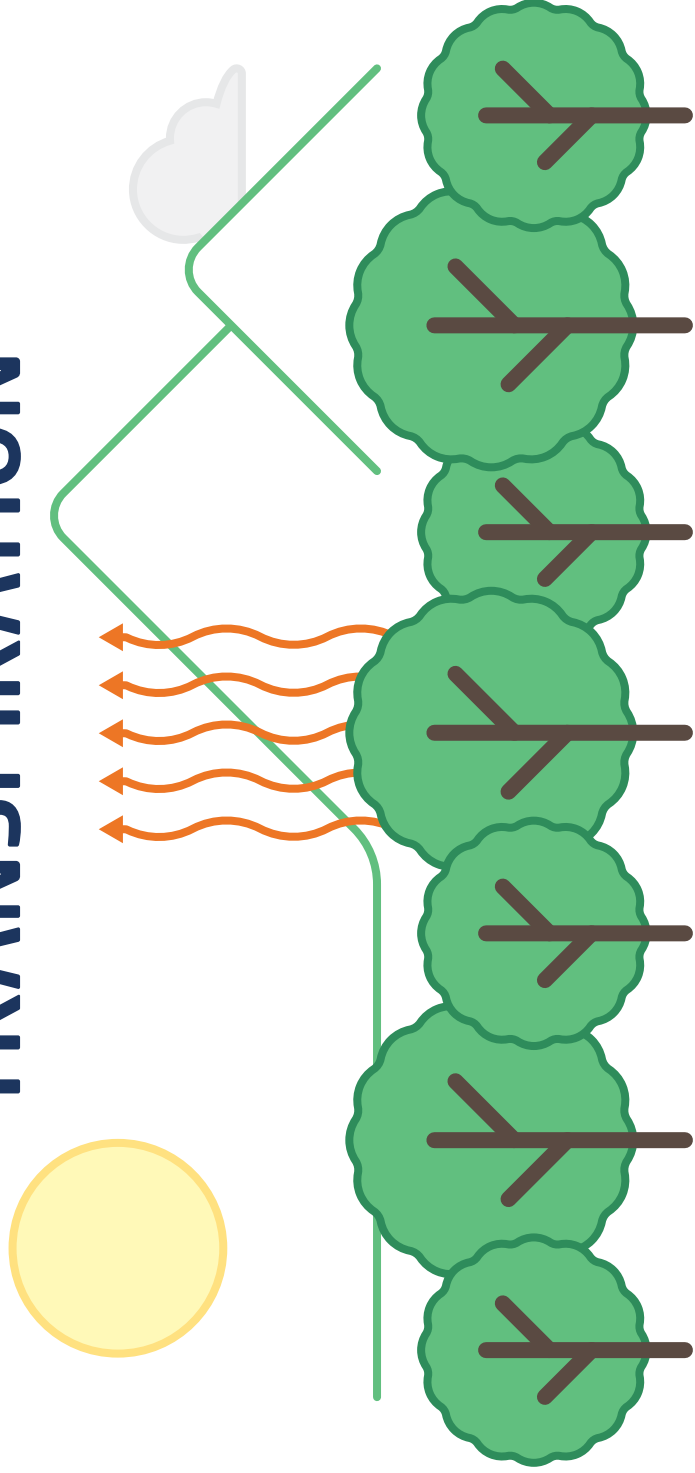
Appendix 2: Interactive Water Cycle Refresher – Floor Puzzle Pieces



EVAPORATION



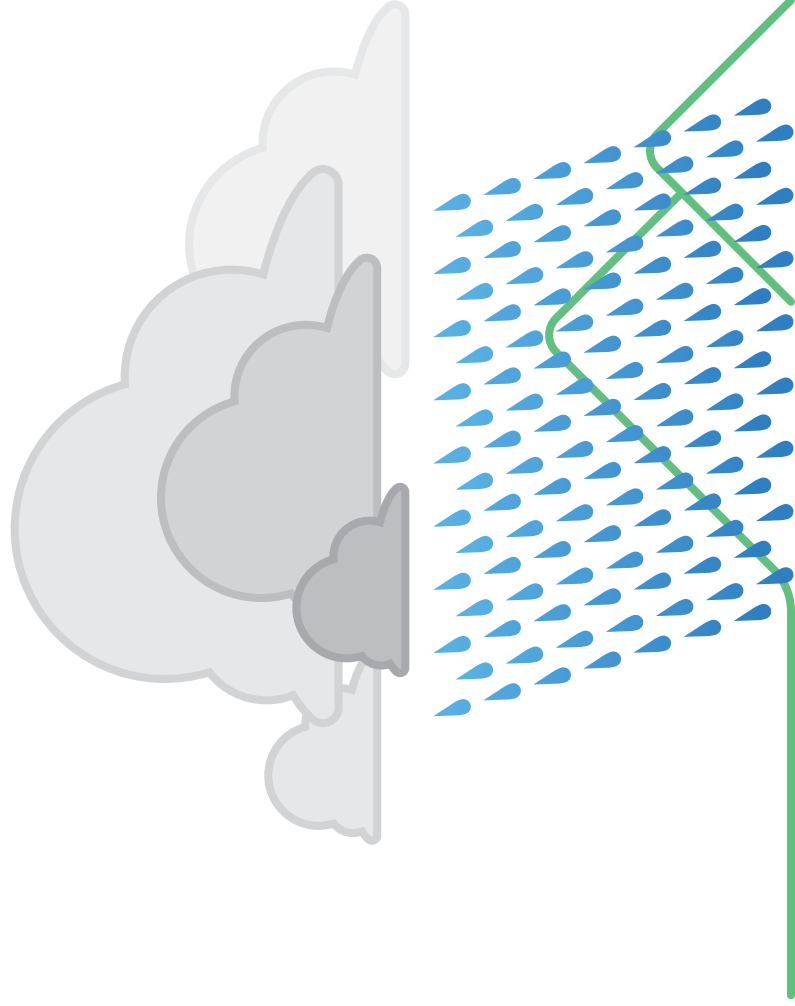
TRANSPIRATION

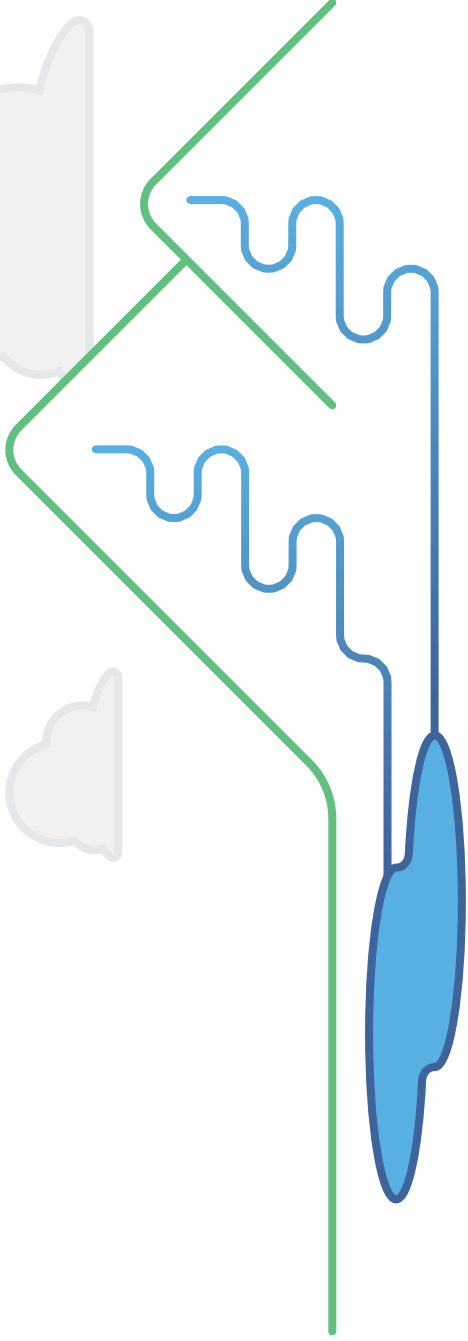
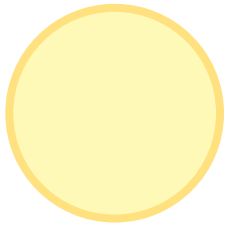


CONDENSATION

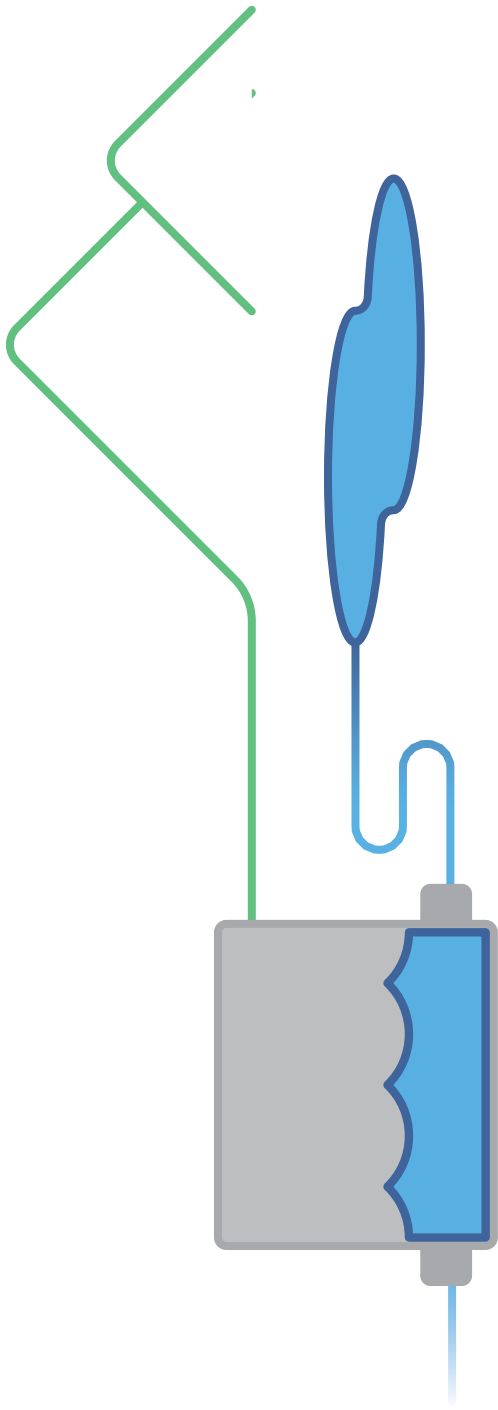


PRECIPITATION

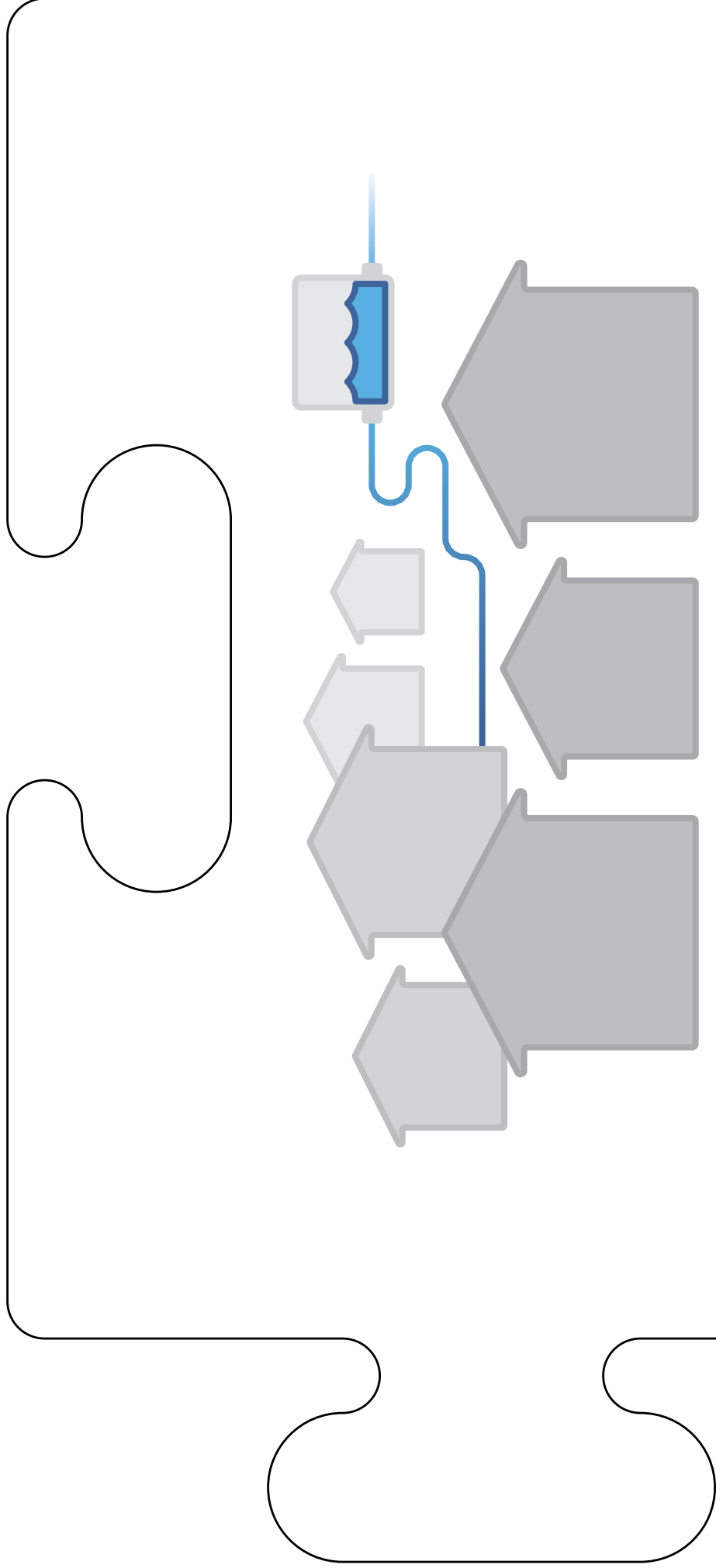




COLLECTION

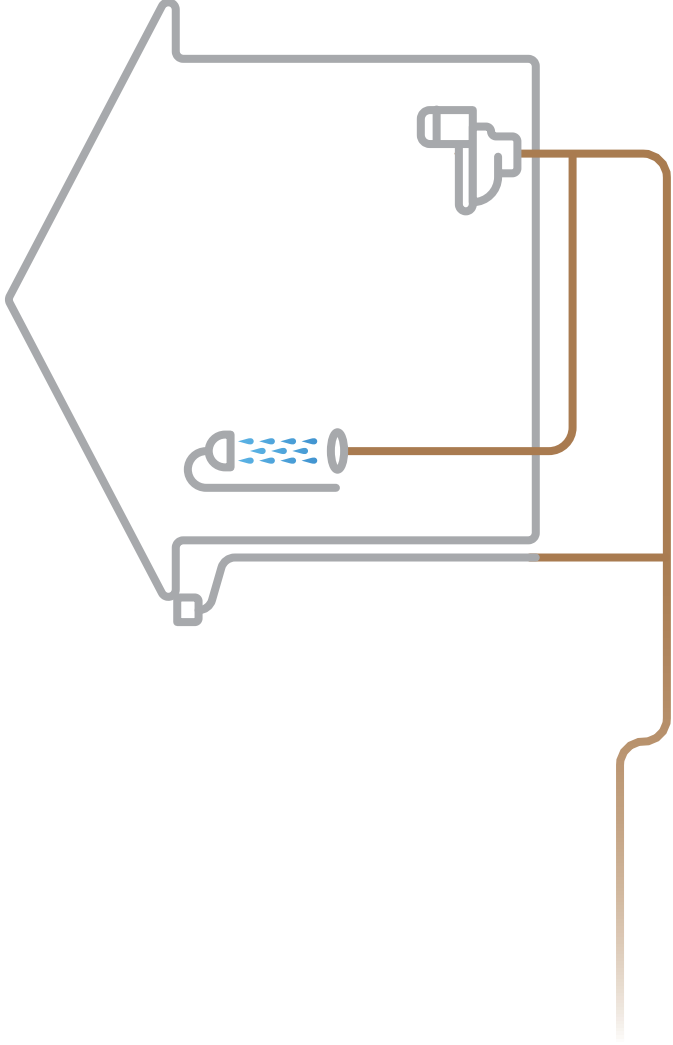


WATER TREATMENT

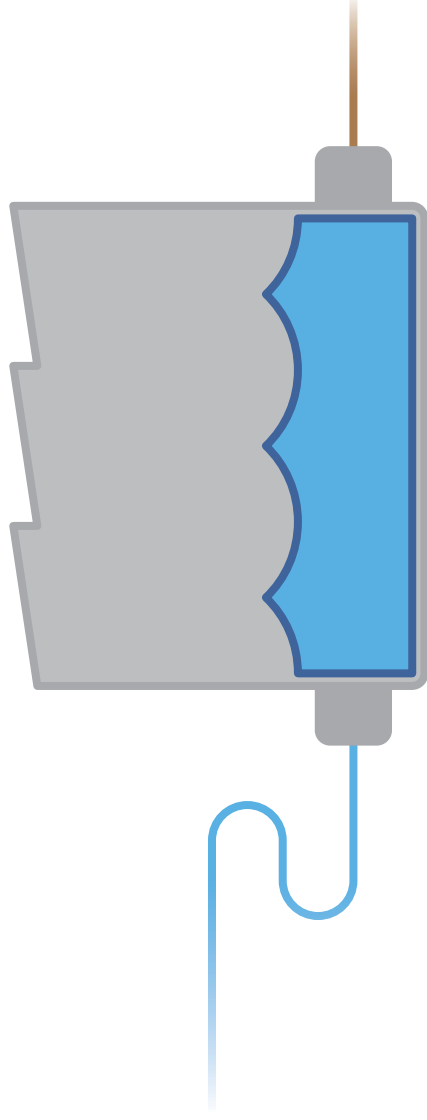


SAFE COMMUNITY WATER SUPPLY

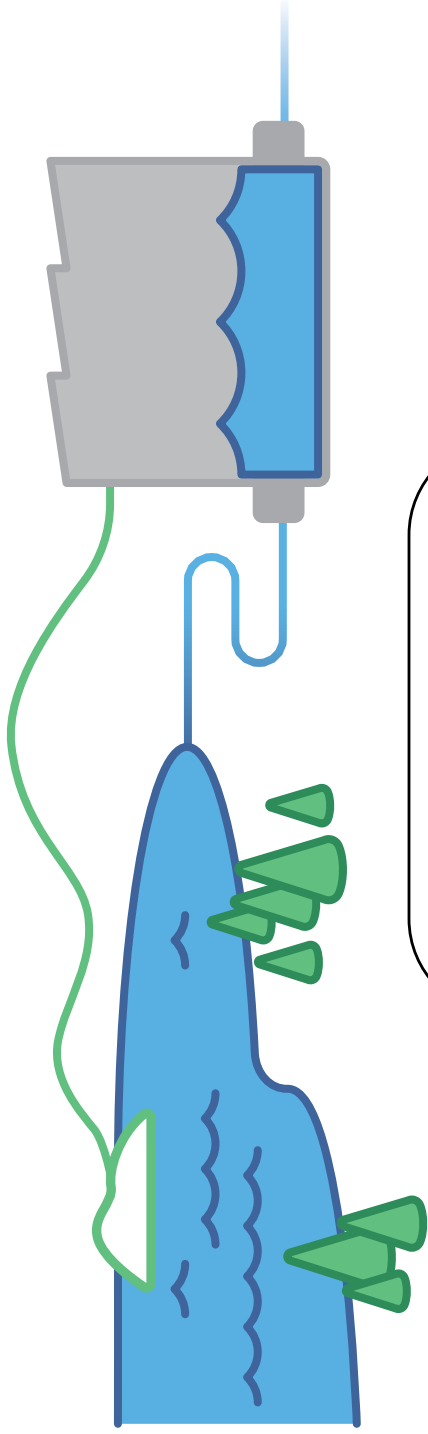
WASTE WATER



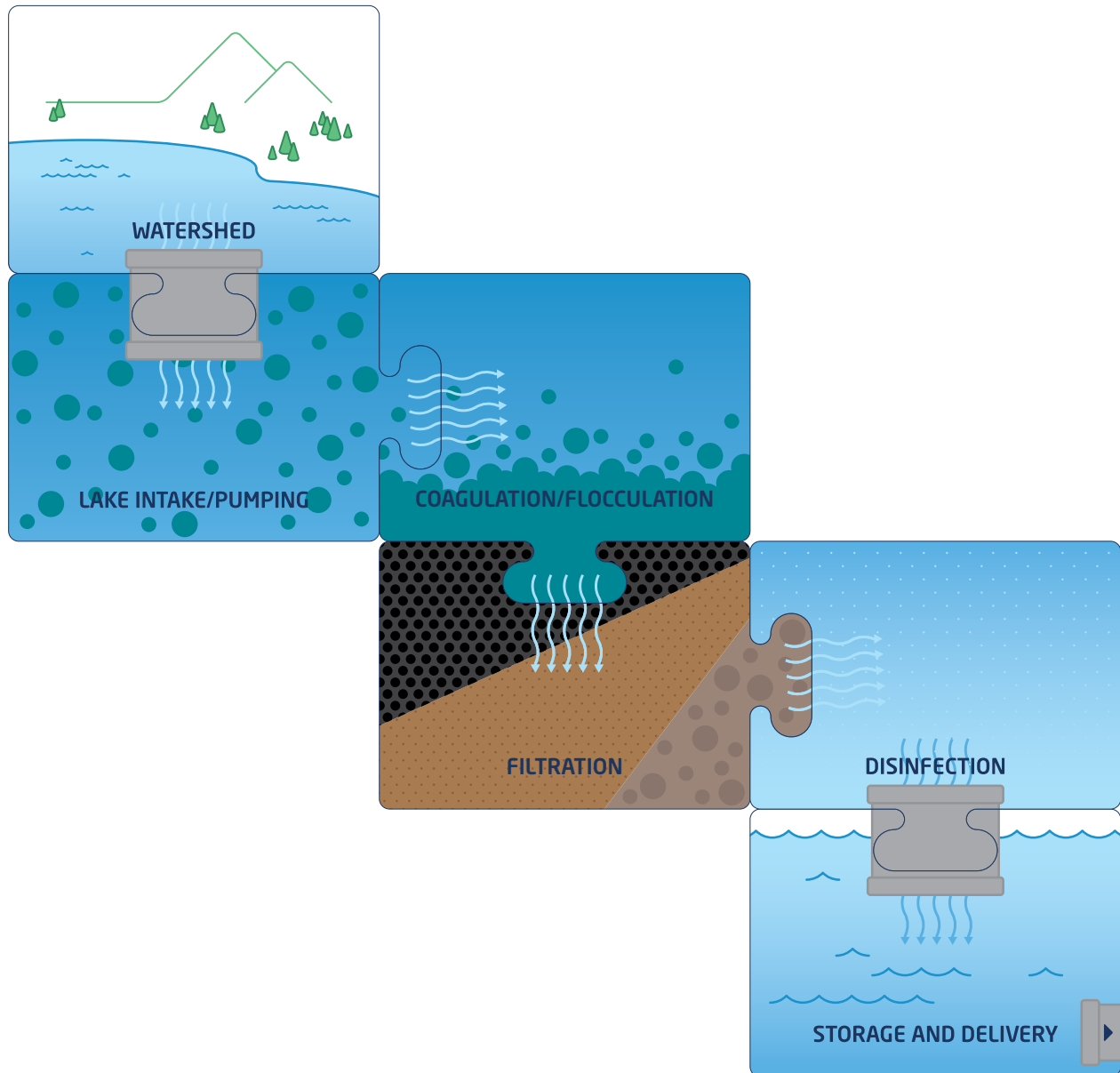
WASTE WATER TREATMENT

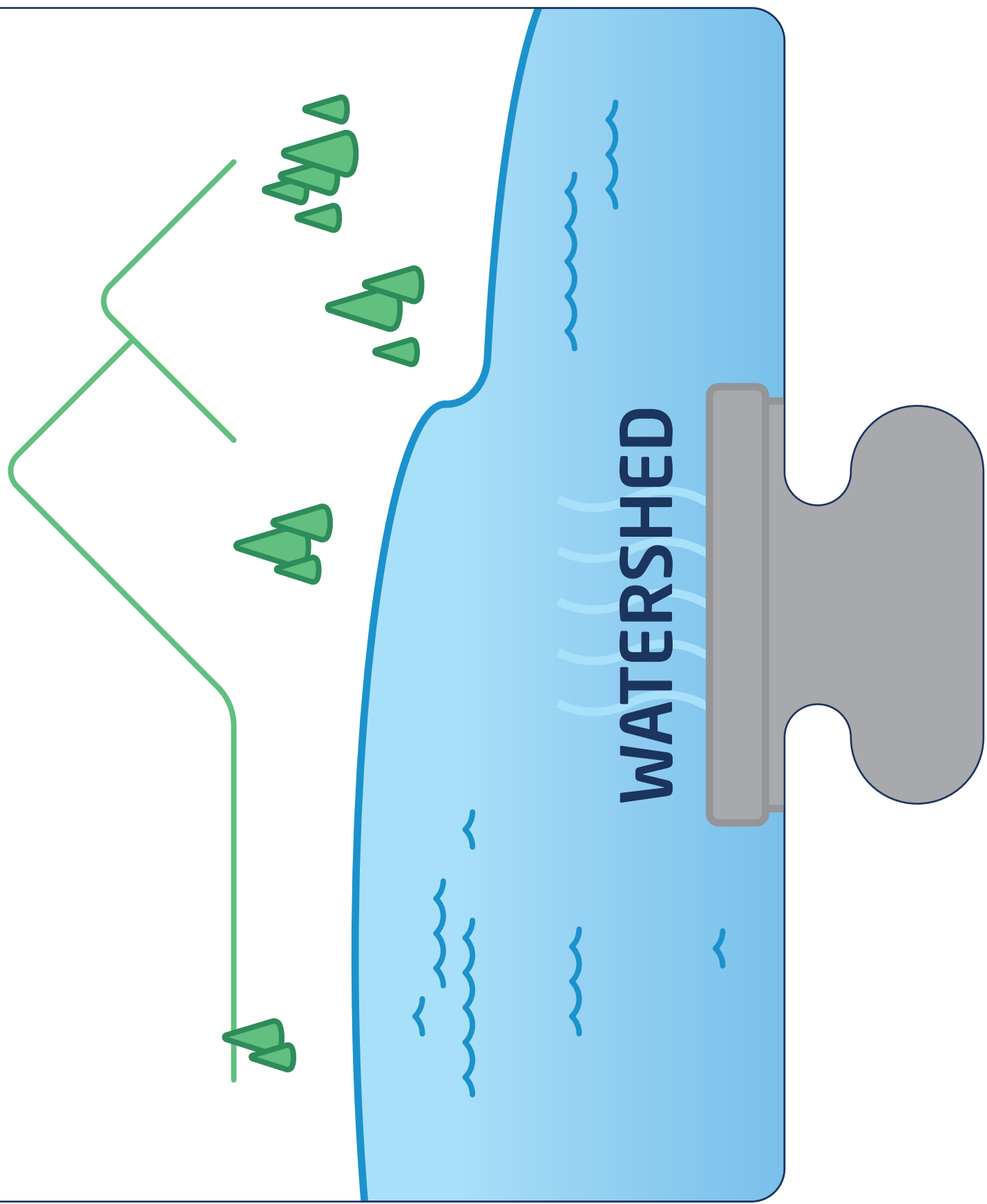


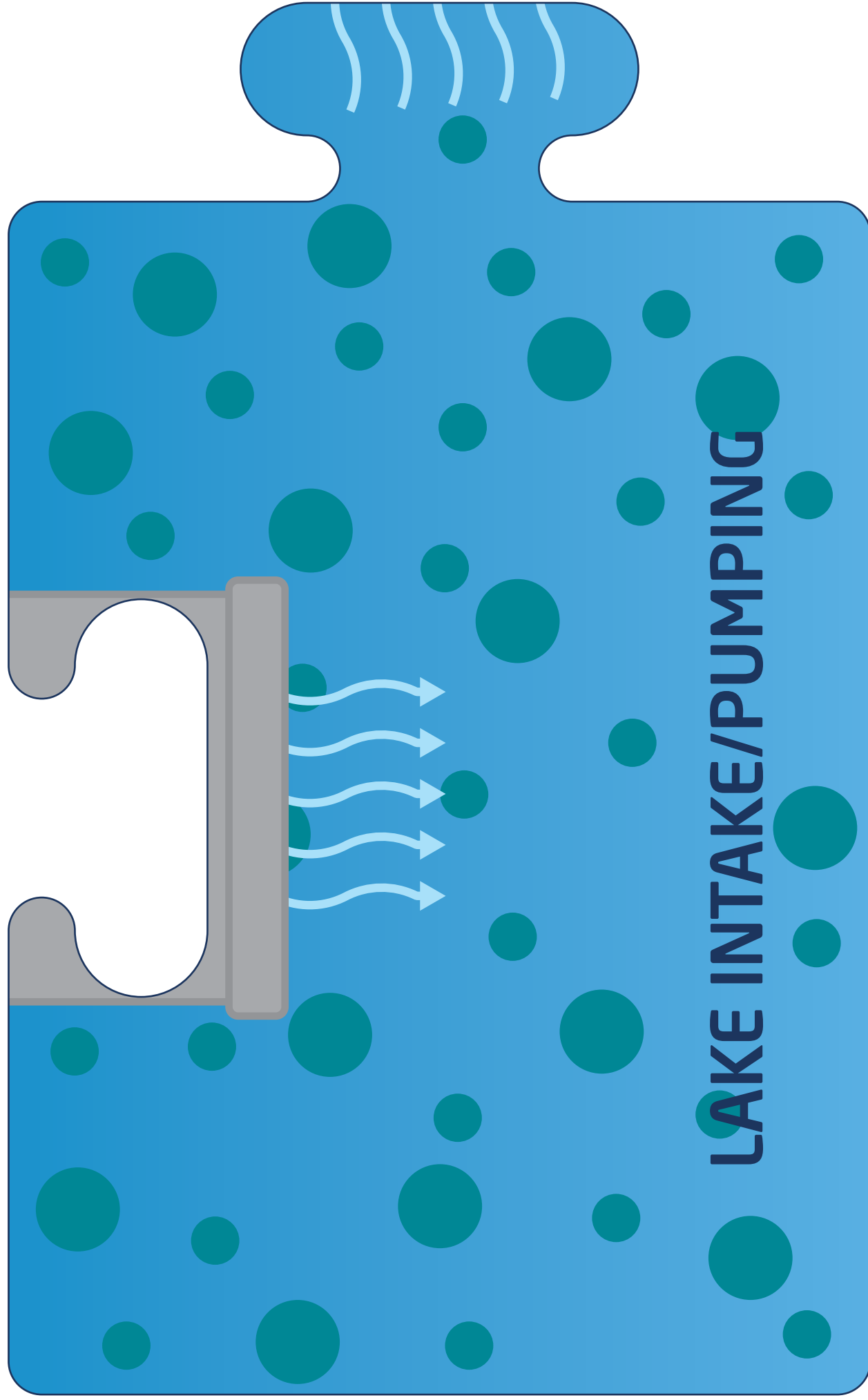
TO THE OCEAN



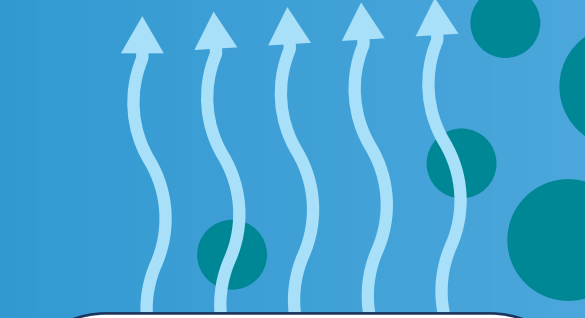
Appendix 3: interactive Water Treatment – Floor Puzzle

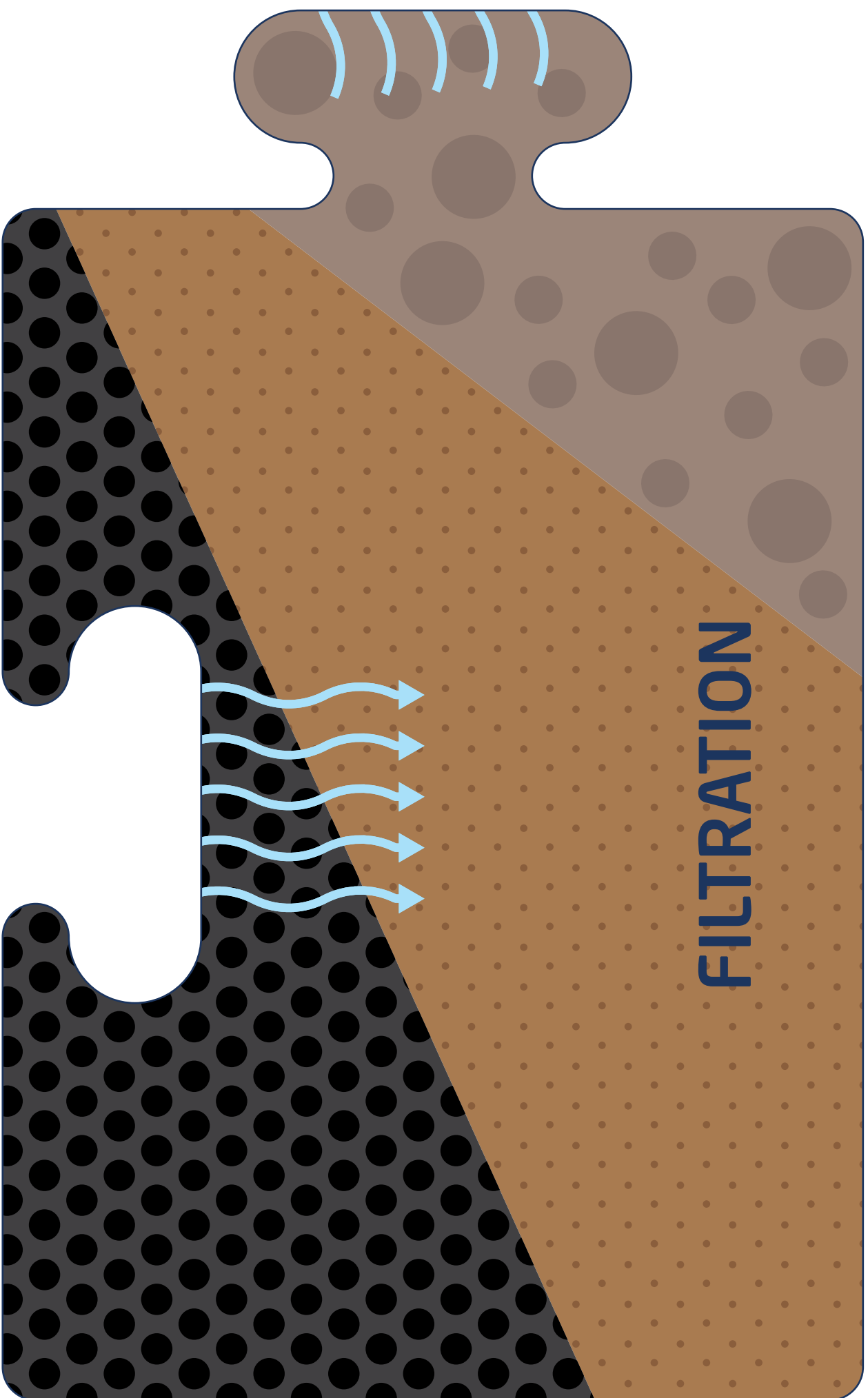


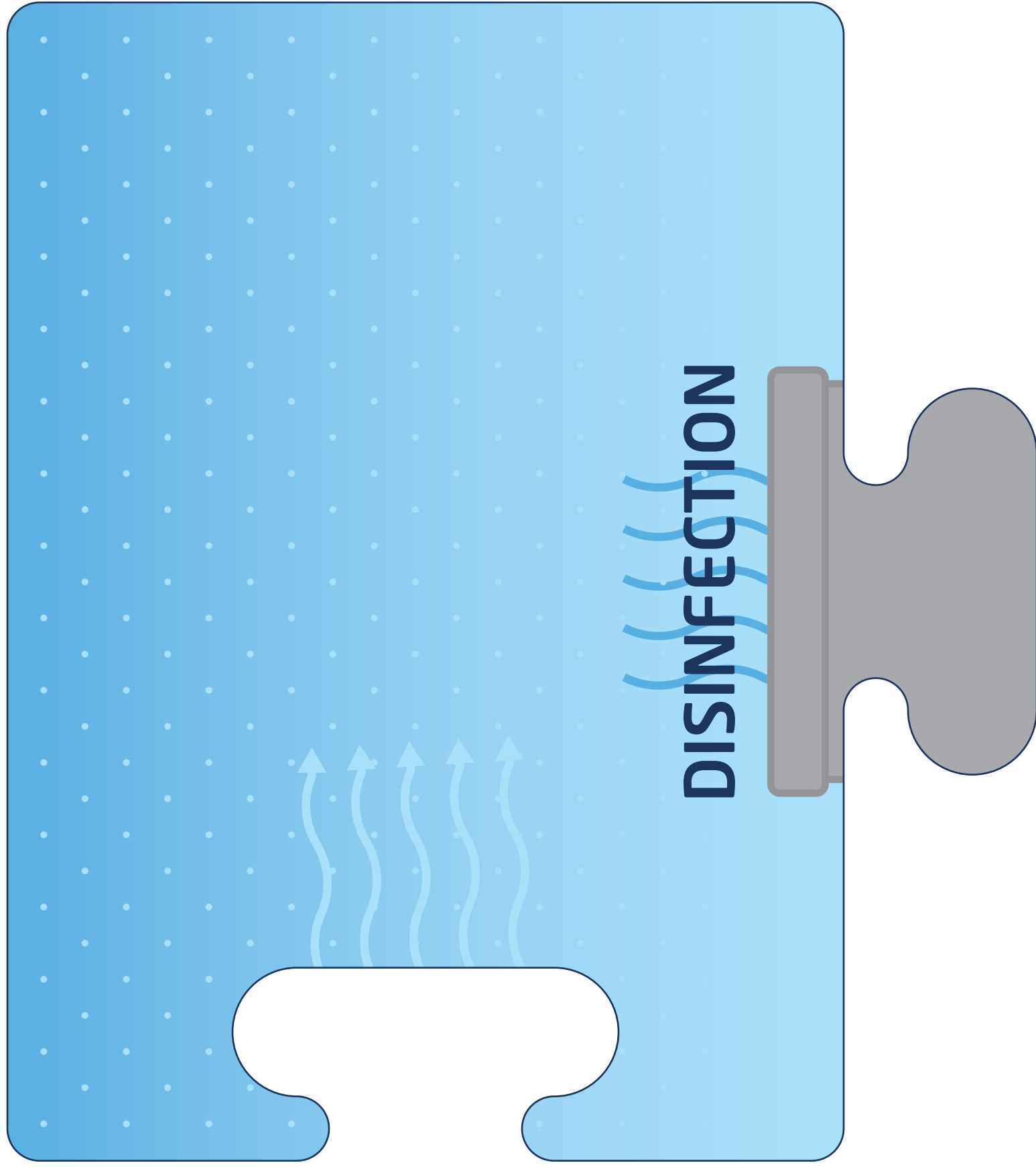


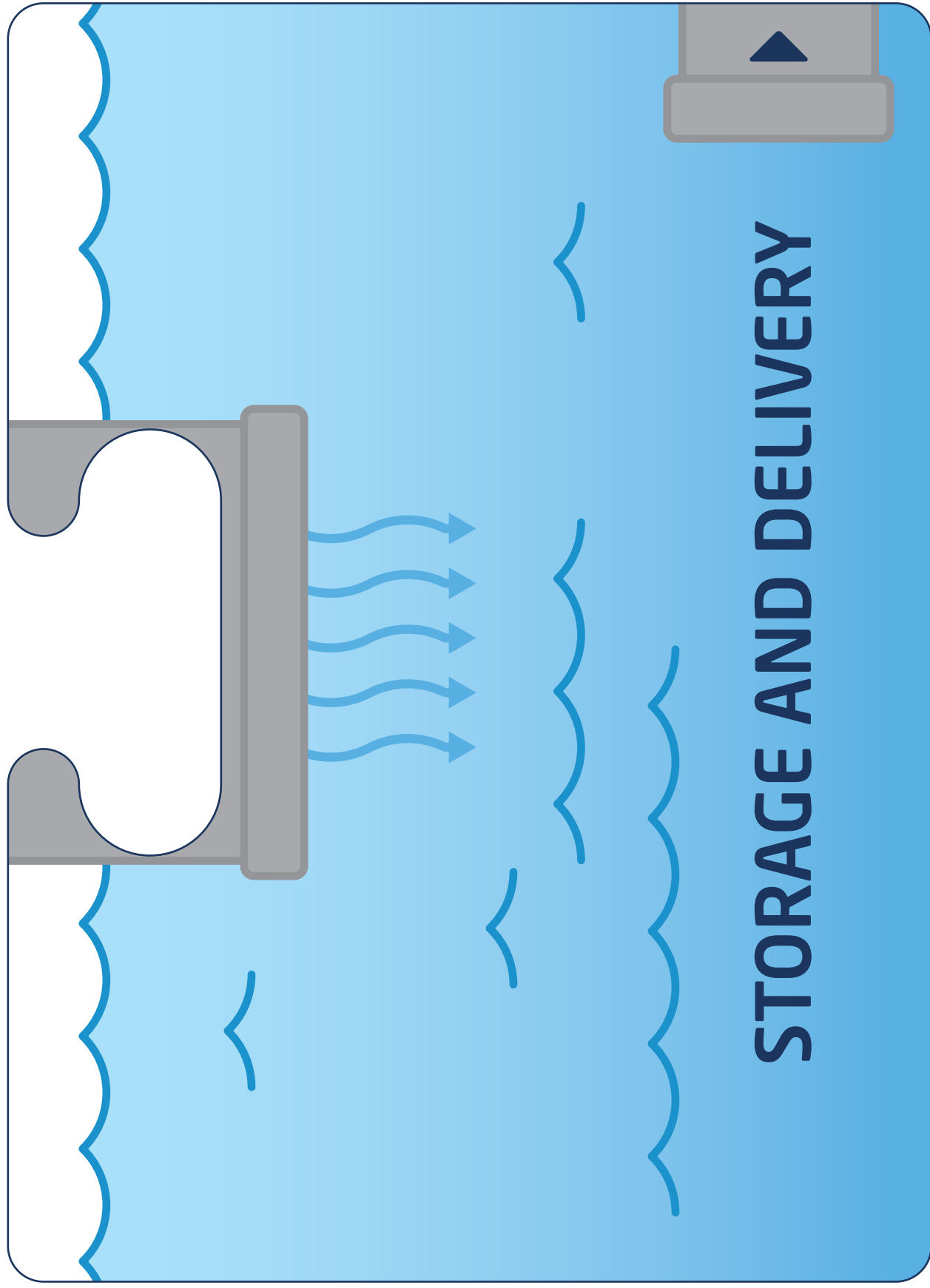


COAGULATION/FLOCCULATION









Appendix 4: Design Thinking

Design Thinking Resources were provided by SD71 teachers Dawn Anderson and Serina Allison.

EMPATHIZE Understanding people, within the context of your design challenge.	<ul style="list-style-type: none">• Learn from experts• Uncover emotions• Seek stories• Understand big picture (<i>Consider all living species</i>)
DEFINE Outline the challenge you are taking on (POV)-craft a meaningful and actionable problem statement, narrow in.	<ul style="list-style-type: none">• Reflect on the design process.• Consider feedback and alter if needed.• Consider guidelines for evaluating project.
IDEATE Understanding the problem and coming up with general solution ideas. Open minded thinking with group.	<ul style="list-style-type: none">• Brainstorm with group- all ideas, ask for clarity• Build on others' ideas• No judgement• Mind map, sketch ideas• Step beyond obvious ideas
PROTOTYPE Create an artifact intended to answer your question/problem. There will be many before one is "it".	<ul style="list-style-type: none">• Create quick objects and experiences• Role play to get ideas fine-tuned• Build to think and learn and generate more/new ideas• Build with the user in mind
TEST Test to see if what you have created is going to work, embrace feedback, refine for user group.	<ul style="list-style-type: none">• Test with users to gather feedback and gather more information to make it better.• Embrace feedback• Gain deeper understanding of target goal and user need.
ASSESS Consider what you created and feedback. How did you do? What could still be done?	<ul style="list-style-type: none">• Reflect on the design process.• Consider feedback and alter if needed.• Consider guidelines for evaluating project.

1. EMPATHY Interview Notes (2(3) x 4mins)

a. Name:

Who:

b. Name:

Who:

c. Name:

Who:

2. DETAILED INTERVIEW Empathy Con't (2 x 3mins)

This is what I am hearing:

What am I missing?

Final input:

Who else should I speak to?

3. DEFINE Defining the Issue (3mins)

Problem Statement (what do we need to do?)

Insights (considerations for the user you have learned about)

Questions (diving deeper/you have/moving forward)

4. IDEATE I Sketch 5 ideas (5 x 2mins) *If you are not sure what to add or change go back and look for more empathy/ input

5. GAIN FEEDBACK FROM A PARTNER Ideate Con't (2 x 5mins)

6. REDESIGN (SKETCH) YOUR IDEA Based On Feedback (5mins)

7. PROTOTYPE AND NEXT STEPS, PUTTING INTO ACTION (TEST)

Prototype method: 3-D Software, 3-D Drawings, Model, Stage/Demo

Action/Next Steps: who needs to approve this project? How is thisProject funded? Task checklist and roles.

8. REFLECTION

How did the project go?

Where were the obstacles?

What went well?

What would you do differently next time?