

Revelstoke Dam Visitor Centre Tour

Power Smart for Schools


Field trip activities



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Arriving at the dam: Notes for teachers

Plan to arrive at the Revelstoke Dam Visitor Centre parking lot 20 to 30 minutes before the start time of your guided tour. This will allow for time to do the first suggested student activity before going into the visitor centre to meet your tour guide. Ensure that students have their copies of the **Discovering a hydroelectric dam worksheet** and writing tools. Throughout this section, you will find a number of suggested student activities indicated by this icon .

ARRIVAL AT REVELSTOKE DAM

After passing through the security gate, drive along the road towards the parking lot and visitor centre. Along the way, you will start to see views of the dam. There is a “DANGER Dam Outflow – Keep Out” safety sign.

ACTIVITY FOR STUDENTS

- Have students look out for the “DANGER Dam Outflow—Keep Out” sign and suggest why it’s important to stay away from dam outflows.

ARRIVAL AT THE PARKING LOT

The dam wall can be seen rising above the lot. There is a sidewalk along the foot of the dam for visitor viewing. Before going into the visitor centre, have students observe the dam and penstocks from the outdoor visitor viewing area.

OBSERVATION AND SKETCHING ACTIVITY FOR STUDENTS (SELF-GUIDED)

- Allow students time to look at the dam and to make comments about what they see.
- Have students complete questions 1 to 3 of the worksheet.

HERE IS SOME INFORMATION TO TELL STUDENTS ABOUT THE DAM AND PENSTOCKS.

This dam is on the Columbia River. It holds back the water that is stored in the reservoir. We can’t see the reservoir from here, but later we will see it in pictures at the visitor centre.

Can you see the large grey pipes running down the front of the dam? These are called penstocks. The penstocks are pipes made out of steel. Water from the reservoir travels down the penstocks and we will find out why very soon.

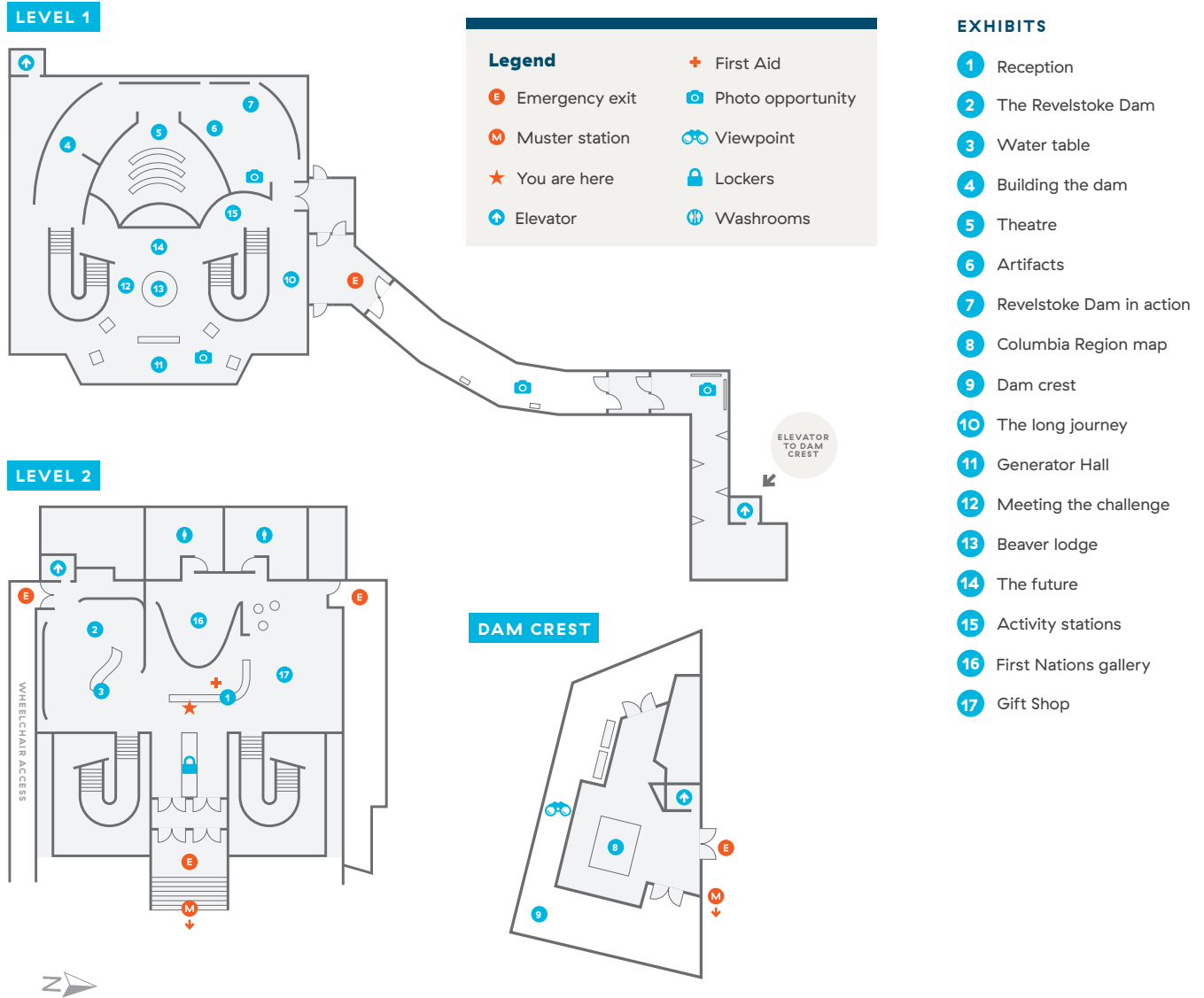
Today, we are going to be learning about how a dam works and discovering some new vocabulary to do with hydroelectricity. Let’s write the new words we learn on our Glossary notes page of the worksheet.

THE VISITOR CENTRE

Before going into the visitor centre, divide the class into groups with an adult volunteer responsible for each group (if possible). Smaller groups will be able to see the displays and other sights and move around the centre more safely and easily than as a whole class.

When you are ready, go into the visitor centre and check in at reception.

REVELSTOKE DAM MAP



THE SPILLWAY

If you have time before your tour guide arrives to greet you, have students look at the photo of the dam behind the reception desk. This photo shows the spillway in use.

Here is some information to tell the students about the spillway:

Can you see all that water cascading out of two gates to the side of the dam? This is the spillway. The spillway is for safety. It is used to release water from the reservoir if the water levels are high. The water is released into the Columbia River below.

Later we will be able to look at the actual spillway when we go to the top of the dam. Can you imagine how powerful this moving water is? How would it affect the water in the river below the dam?

Sudden releases of water can cause strong surface and underwater currents and increase the water level. For safety it is important to stay away from areas where water from a dam flows out, and obey all warning signs.

Do you remember the “DANGER Dam Outflow—Keep Out” safety sign we saw?

STUDENT ACTIVITY (SELF-GUIDED)



- Complete questions 4 and 5 of the worksheet.
- Count the number of penstocks in the photo. Compare the number of penstocks shown on the photo with the number recorded for question 3 of the worksheet.
 - In 2010, a fifth generating unit was installed at Revelstoke Dam, which meant that another penstock was needed to transport water to a fifth turbine. This photograph was taken before the fifth penstock was added.
- Students will be able to complete the rest of the worksheet during the guided tour.

Guided tour: Notes for teachers

Here are some of the displays (and locations) you may see as part of your guided tour. These notes provide a summary of information from the displays.

AREA 2 ON MAP: INTRODUCING BC HYDRO AND THE REVELSTOKE DAM

Display: Welcome to the Revelstoke Dam: Engineering marvel

A reservoir is a human-made structure designed to hold water. Revelstoke Dam is actually two dams. The one you saw near the parking lot is a concrete dam. To the side of the concrete dam is another dam. This dam is filled with earth. Together, they hold back the water in the reservoir.

STUDENT ACTIVITY



- Question 6 of the worksheet.

The next section is downstairs in the gallery below.

AREA 4 ON MAP: BUILDING THE REVELSTOKE DAM

STUDENT ACTIVITY



- Questions 7 to 10 of the worksheet.

Answers can be found on the displays in this area:

- Display: Planning the Revelstoke Dam – question 7
- Display: The whole dam story – question 8
- Display: The dam in photos (tunnel network) – question 9
- Display: The dam in photos (installing the power in the powerhouse) – question 10

AREA 7 ON MAP: THE REVELSTOKE DAM IN ACTION

DISPLAY: HOW THE DAM WORKS

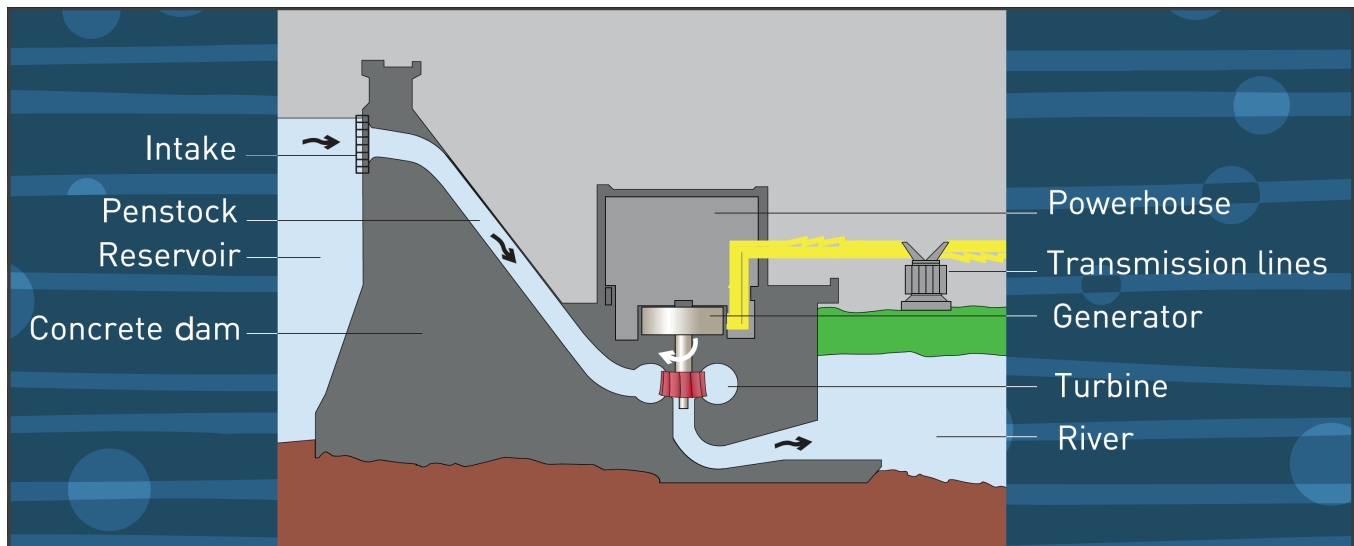
This display shows a cross-section of the dam.

Water from the reservoir enters the five penstocks and travels downwards to the turbines. Each penstock is connected to a separate turbine. The water travels at high speed down the penstocks and onto the blades of the turbines. The turbines spin and rotate a drive shaft connected to a generator.

A generator is made up of two parts, the rotor and the stator. The outer edge of the rotor has magnets around it and the inner edge of the stator is made up of coils of wire known as windings. The magnets spin inside the windings and an electric current is created in the windings.

The water used to spin the turbines continues its journey down the draft tube and exits via the tailrace into the river below the dam. This is what makes hydroelectricity a renewable resource. The water used in the process is not used up and is returned to the river immediately after use.

The water exiting the tailrace can cause strong surface currents and increase the water level. For safety, you should stay away from dam outflows at all times.



STUDENT ACTIVITY



Draw and label a diagram of the dam and answer question 12 of the worksheet.

DAM CREST ELEVATOR HALLWAY

As your group makes its way to the view from the top of the dam you will see signs on the walls with short facts about the dam and the Columbia River.

STUDENT ACTIVITY

Find the interesting facts on the signs posted in this hallway and record the answers to questions 13 to 18 of the worksheet.

AREA 9 ON MAP: THE LOOKOUT

To the right are the spillway and the switchyard. The switchyard connects to the provincial power grid — the network of power wires that deliver electricity throughout the province of British Columbia. Revelstoke Dam is one of many BC Hydro dams that create electricity to deliver to our schools, homes and businesses.

From here you can see the river below the dam. After the water has been used to generate electricity, it joins the river below and continues its journey, eventually leading to the Pacific Ocean.

The reservoir is right behind you. Visitors are not able to get close enough to see the reservoir from here because it is not open to the public.

Your tour guide will take you back to the visitor centre to view the Generating Hall.

AREA 11 ON MAP: GENERATING HALL

Look through the windows over the generating hall. The large squares on the hall floor show where each turbine and generator is located. They are in the powerhouse underneath the generating hall and connected to the penstocks you viewed from the parking lot. A turbine and generator are collectively known as a unit, located within a unit bay.

In front of the windows is a model that shows a turbine and generator unit in operation. The turbines used at Revelstoke Dam are Francis turbines, named after the man who developed this type of turbine in 1848, James B. Francis.

STUDENT ACTIVITY 

Draw and label a picture of the Francis Turbine model and answer question 20.

TIME TO EXPLORE AND PLAY

(Areas 10 to 14 on map)

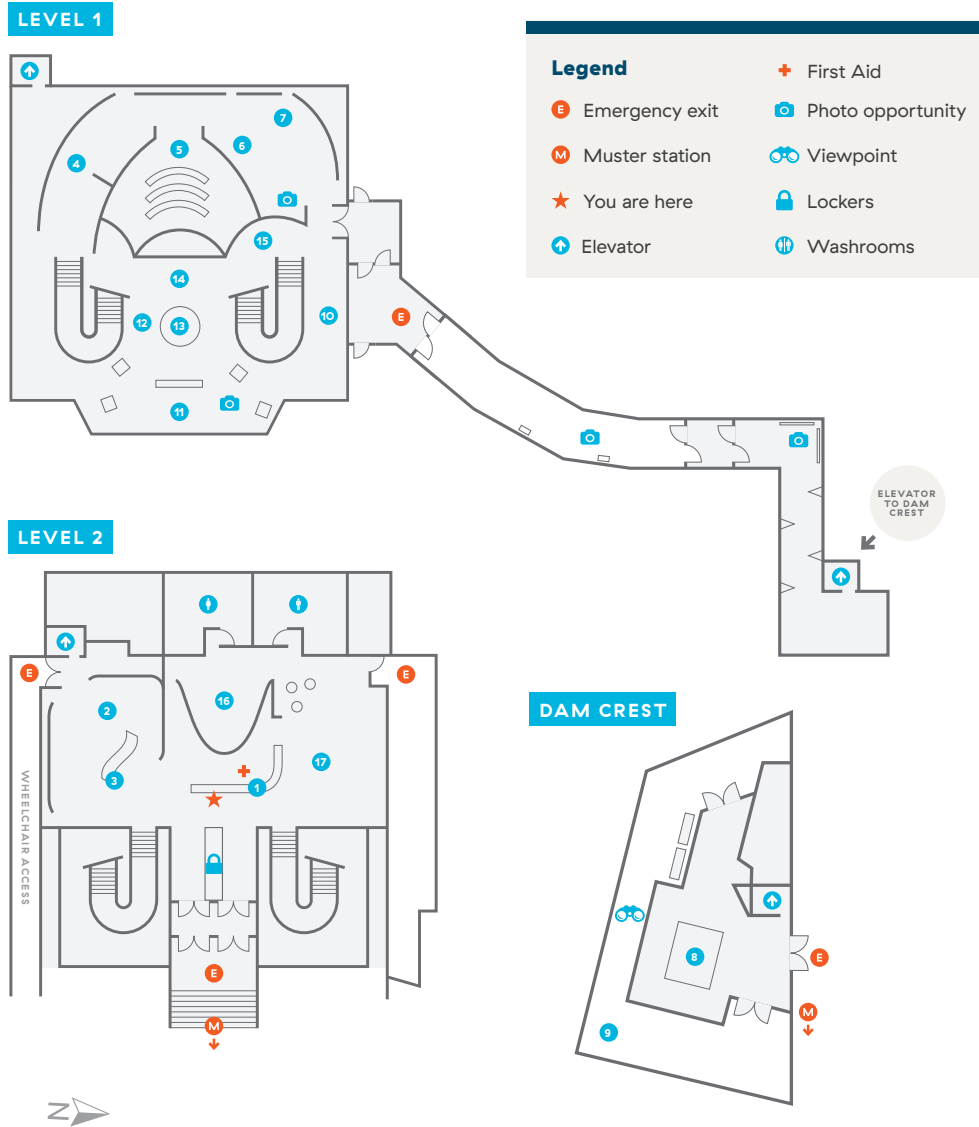
STUDENT ACTIVITY 

Exploration of the interactive displays in this area of the Visitor Centre.

Discovering a hydroelectric dam

Name: _____ Date: _____

REVELSTOKE DAM MAP



Self-guided activity

1: Sketch and label a picture of the dam and penstocks.



2: Write three words to describe the dam.

3: How many penstocks can you see?

THE SPILLWAY

4: What is the role of the spillway?

5: Why is it important to stay away from dam outflows?

The guided tour

Complete the rest of the worksheet during the guided tour. To help you find the information you need, the titles of the displays are given.

AREA 2 ON MAP

Display: Welcome to the Revelstoke Dam: Engineering marvel

6: What does the dam wall do?

AREA 4 ON MAP

Display: Planning the Revelstoke Dam

7: Before the dam could be built, workers had to build something else to direct the river water away from the dam site. What did they have to build?

Display: The whole dam story

8: Revelstoke Dam is made up of three parts. List the three parts:

Display: The dam in photos (tunnel network)

9: Why is there a network of tunnels inside the two dams?

Display: The dam in photos (installing the power in the powerhouse)

10: The powerhouse has unit bays each holding a turbine and a generator.

What is a turbine and what does it do?

What does a generator do?

AREA 7 ON MAP

Display: How the Dam Works

11: Draw and label a diagram of the dam to show how it works. Use the display board for information.

Try to use these words when labelling your diagram:

reservoir dam penstock turbine generator transmission lines

12: What are the walls of the two main parts of the dam made of?

Dam crest elevator hallway

As you walk through the hallway to the elevator, you will see interesting facts on signs. Be sure to look on both sides of the signs to find the answers.

13: How high is Revelstoke Dam?

14: How deep is the reservoir when it is full of water?

15: How many Olympic-sized swimming pools could you fit inside the reservoir?

16: What is the name of the river that supplies water to the reservoir?

17: How long is the Columbia River?

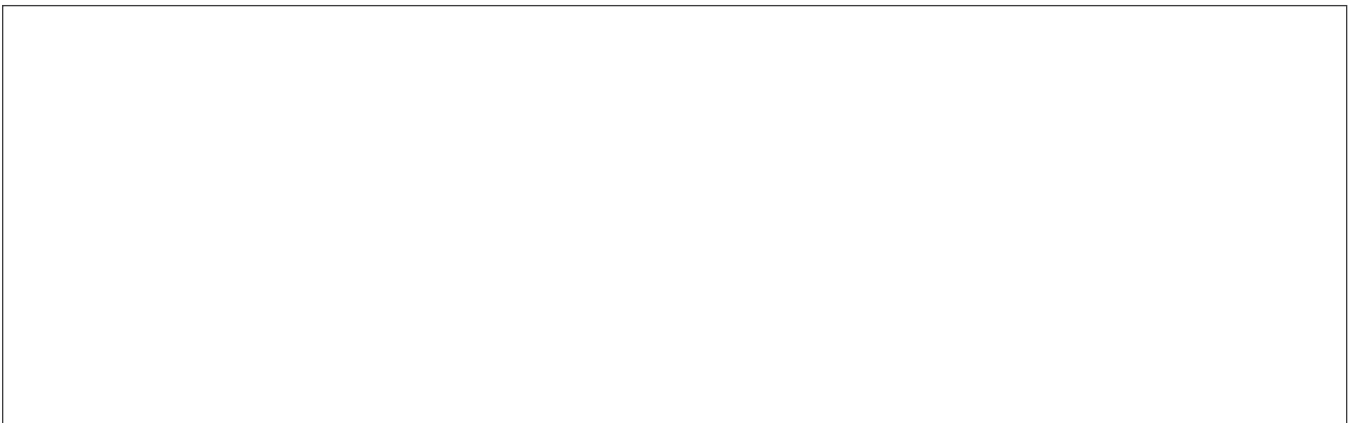
18: The Columbia River produces more hydropower than any other river in North America. How many dams are there on the Columbia River?

AREA 11 ON MAP

19: Draw and label a diagram of the Francis Turbine model.



20: Why is this type of water turbine called a Francis Turbine?



Glossary notes

Each time you learn a new word to do with hydroelectricity or discover a bit more about how hydroelectricity works, write it here in your glossary.

Hydroelectricity word puzzle

Test your knowledge of the story of hydroelectricity. Solve the clues and place the answers in the word puzzle.

CLUES:

1. A hydroelectric power generating plant makes this type of energy E _ _ _ _ _
2. Collects and stores water R _ _ _ _ _
3. Used to hold back the water D _ _
4. Safety gates used to let some water out of the reservoir S _ _ _ _ _
5. Pipe used to carry water to the turbines P _ _ _ _ _
6. Moves the turbine blades W _ _ _ _
7. A wheel turned by moving water T _ _ _ _ _
8. Water leaves the turbine and falls into this tube D _ _ _ _
9. Water returns to the river below the dam through this T _ _ _ _ _
10. Creates electricity G _ _ _ _ _
11. Part of the generator that moves R _ _ _ _
12. Part of the generator that stays still S _ _ _ _
13. Where the turbines and generators are installed P _ _ _ _ _
14. The name of the power lines that carry electricity away from the powerhouse
T _ _ _ _ _

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Discovering a hydroelectric dam answer key

1. Sketch and label a picture of the dam and penstocks.
2. Write three words to describe the dam.
3. How many penstocks can you see?
5
4. What is the role of the spillway?
A spillway is for safety. It is designed to release water if the reservoir water levels are high.
5. Why is it important to stay away from dam outflows?
Sudden releases of water can cause strong surface and underwater currents and increase the water level. For safety, it is important to stay away from areas where water from a dam flows out and to obey all warning signs.
6. What does the dam wall do?
The dam wall holds back the water in the reservoir.
7. Before the dam could be built, workers had to build something else to direct the river water away from the dam site. What did they have to build?
Workers built a tunnel to divert the water away from the dam-building site.
8. The Revelstoke Dam is made up of three parts. List the three parts:
1: Concrete dam
2: Earthfill dam
3: Powerhouse
9. Why is there a network of tunnels inside the two dams?
There is a network of tunnels so workers can regularly monitor the dams for safety.
10. The powerhouse has unit bays each holding a turbine and a generator. What is a turbine and what does it do?
A turbine is a device, such as a wheel with blades. It turns when a moving fluid pushes it. When water hits the blades, the turbine moves. The turbine is connected to the generator. The mechanical energy of the turbine drives the generator.

What does the generator do?
A generator makes electricity. The generator has two parts, a rotor and a stator. The rotor is covered with magnets and turns inside the stator. The stator is made up of coils of copper wire and does not move. When the rotor spins, electricity is generated.
11. Draw and label a diagram of the dam to show how it works. Use the display board for information.

Try to use these words when labelling your diagram:

reservoir dam penstock turbine generator transmission lines

12. What are the walls of the two main parts of the dam made of?

The wall with the penstocks is made of concrete. There is a second dam with earth walls (and fill).

13. How high is Revelstoke Dam?

175 metres

14. How deep is the reservoir when it is full of water?

140 metres at the dam

15. How many Olympic-sized swimming pools could you fit inside the reservoir?

20,000

16. What is the name of the river that supplies water to the reservoir?

The Columbia River

17. How long is the Columbia River?

2,000 kilometres long

18. The Columbia River produces more hydropower than any other river in North America. How many dams are there on the Columbia River?

14

19. Draw and label a diagram of the Francis Turbine model.

20. Why is this type of water turbine called a Francis Turbine?

This type of water turbine is called a Francis Turbine after the man who developed it in 1848, James B. Francis.

Hydroelectric word puzzle answer key

1. A hydroelectric power generating plant makes this type of energy **ELECTRICITY**
2. Collects and stores water **RESERVOIR**
3. Used to hold back the water **DAM**
4. Safety gates used to let some water out of the reservoir **SPILLWAY**
5. Pipe used to carry water to the turbines **PENSTOCK**
6. Moves the turbine blades **WATER**
7. A wheel turned by moving water **TURBINE**
8. Water leaves the turbine and falls into this tube **DRAFT**
9. Water returns to the river below the dam through this **TAILRACE**
10. Creates electricity **GENERATOR**
11. Part of the generator that moves **ROTOR**
12. Part of the generator that stays still **STATOR**
13. Where the turbines and generators are installed **POWERHOUSE**
14. The name of the power lines that carry electricity away from the powerhouse **TRANSMISSION**

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