

1 Welcome to Reading Hydro

Look at the brightly painted building in front of you. It's the turbine house for a hydroelectric plant. The River Thames drops by about 1.4 metres here. On average 37 cubic metres of water flows down the river each second. We use some of this water to generate electricity.



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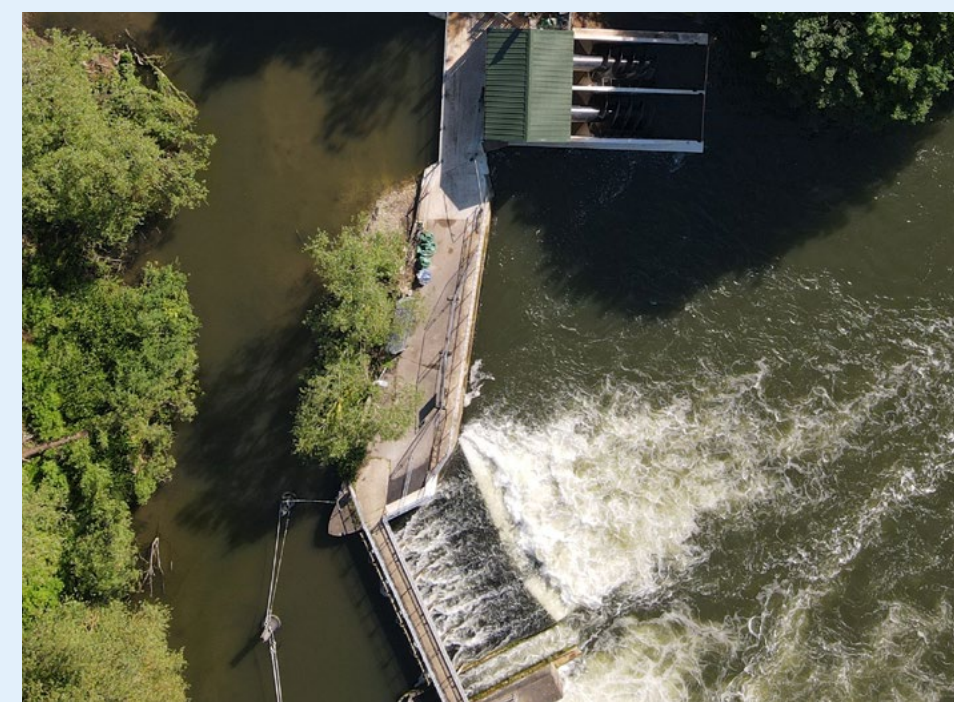
What does Reading Hydro do?

There's a lot of energy in moving water. People have made use of it for centuries. A water mill by View Island was mentioned in the Domesday book of 1086. But by the middle of the 20th century all the water mills in Reading had gone.

Fast forward to the 21st century. Local people saw the opportunity to use the water to turn turbines and generate electricity at this site. Hydroelectric power reduces use of fossil fuels and helps tackle the climate crisis. Reading Hydro was set up in 2016 and has turned that idea into reality.

Our hydroelectric plant has two Archimedes screw turbines. They are in the river behind the turbine house. The generators and other electrical equipment are inside. We made a fish pass beside the turbines. This provides a way for fish and eels to travel up the river.

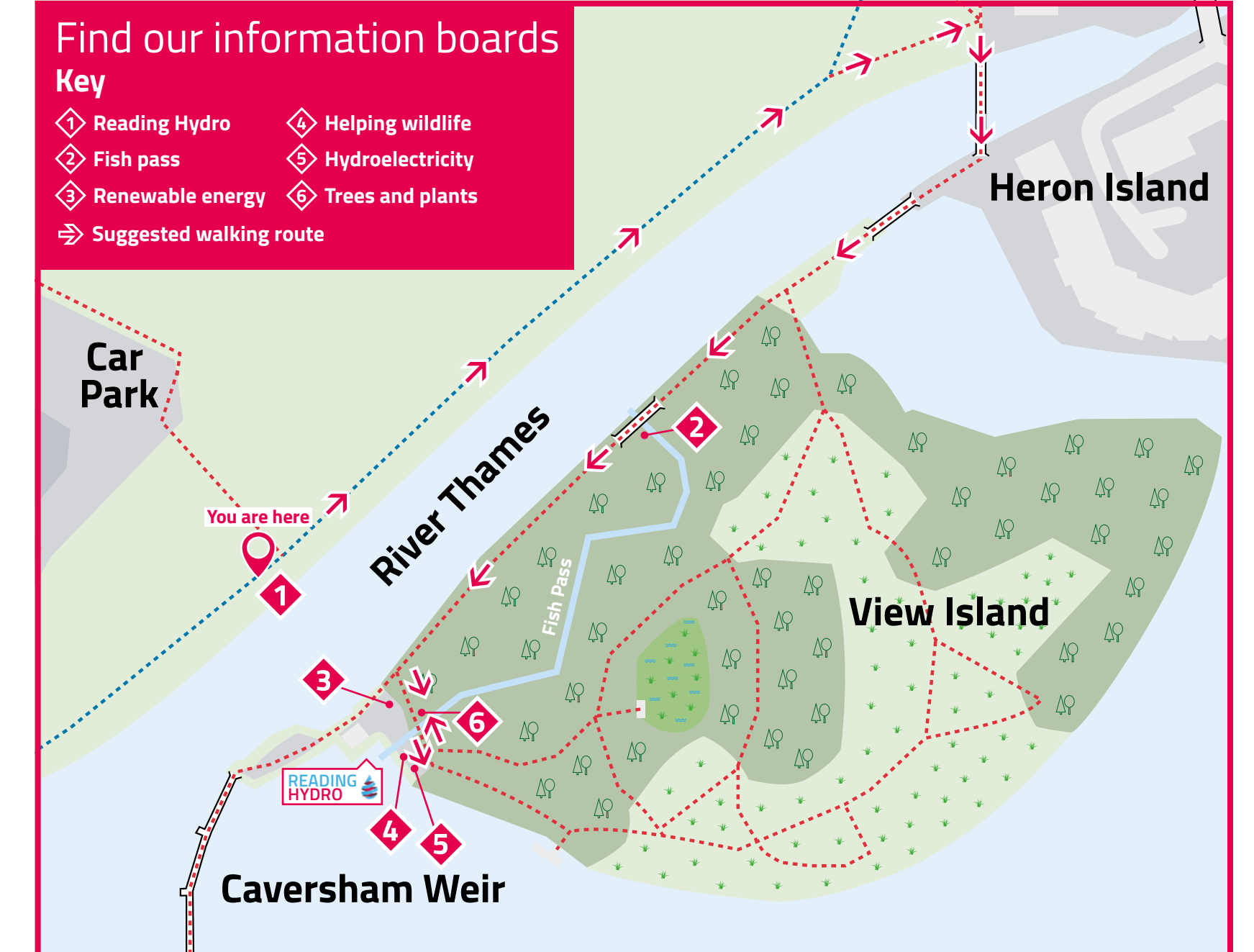
We expect to generate about 320 MWh (megawatt hours) of electricity every year. That's the amount that 90 average homes use. Thames Lido, across the river, buys most of this electricity from us.



For the community

Reading Hydro is a Community Benefit Society. This is a type of charitable company. It's run by volunteers. Anyone who supports our aims can become a member. Over 150 volunteers have helped to deliver the project, and are helping to run it. Volunteers built and painted the turbine house. Others built the fish pass.

750 members, mostly from the local community, invested in Reading Hydro to raise the £1.2 million to build the plant. It's a community-owned asset. We'll use the money from selling electricity to run and maintain the plant, and gradually repay investors. Any surplus will be used for a community fund to support local projects.



See for yourself!

Take a look at our map and follow the route to our numbered information boards. This takes you past the top of the fish pass to our turbine house, and then to the screw turbines. The route is wheelchair accessible up to Board 3.

Can you find Board 2 at the top of the Fish Pass?



The Fish Pass



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Reading Hydro thanks the 150 volunteers and 750 investors who made this possible

2 The fish pass

From here you can see part of the fish pass. It was built by Reading Hydro volunteers to help fish and eels move up the River Thames.

What is it for?

The fish pass helps fish and eels swim upstream, and not get stopped by the weir and turbines. Some fish passes have steps, but this one uses a long gentle slope. It has a 'technical section' (in front of you now) and a 'natural section'.

The slope of the fish pass varies so that water flows at different speeds (from about 0.5 to 1 metre per second) to cater for fish that like both slow and faster moving water. The flow is fastest (up to 2 metres per second) at the entrance.

The technical section

The technical section of the fish pass has a concrete base and sides. We bolted recycled plastic reeds to the base to slow the water flow. This makes it easier for fish to swim up the pass.

There are pools in this section so that fish have somewhere to rest on their journey. It's hard work swimming uphill!



Brushes

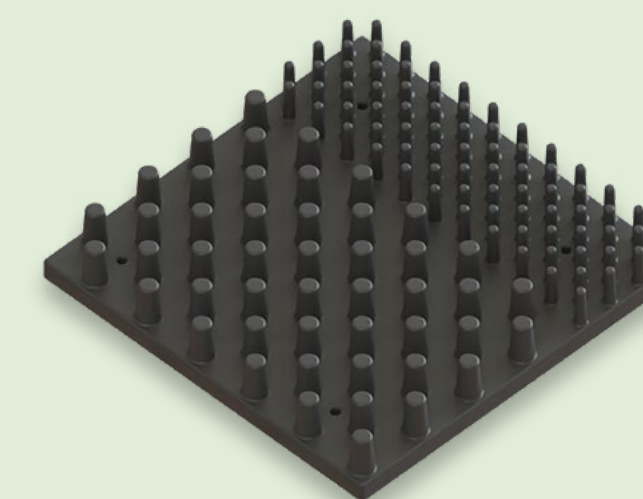
The natural section

The section of the fish pass near the turbines is like a natural stream. It was made from an old flood channel. The sides of the channel are natural, and we put gravel and sandy material on the base.

The entrance where the fish swim into the fish pass is narrow. This makes the water flow faster from the fish pass than from the turbine channel. The faster flow attracts fish, which might otherwise get confused and swim into the channel. We also put a special ridged 'eel tile' on the base of the fish pass entrance beside the turbines. These help eels to wriggle their way up into the pass against the flow of the water.



Narrow entrance



Eel tiles

How fast is the water moving at the entrance to the fish pass?

What have we done to help eels swim up the fish pass?



Eel

Types of fish

Chub and pike are the most common fish found near the weir. We hope to attract barbel, lamprey and eels to the fish pass as well. Look at Board 4 to find out more about the eels and fish that might use the fish pass.

Eels are critically endangered – why do you think their numbers might have declined?



Chub



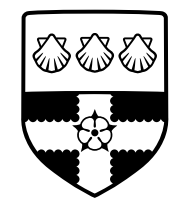
Pike



Common Barbel



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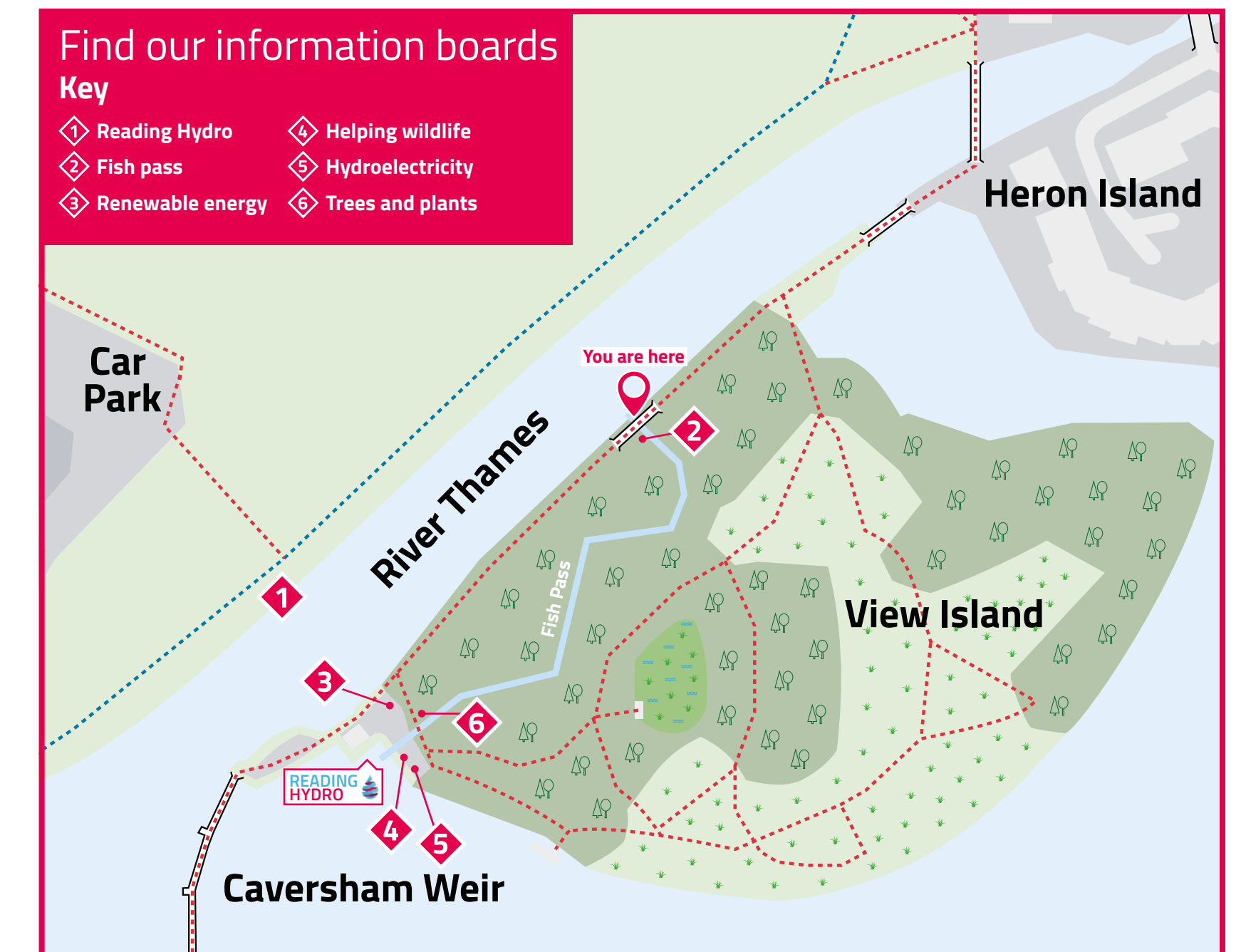


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Find our information boards

Key

- Reading Hydro
- Fish pass
- Renewable energy
- Helping wildlife
- Hydroelectricity
- Trees and plants



Construction of the fish pass by volunteers



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B Climate heating and renewable energy

From here you can see the turbine house built by Reading Hydro volunteers.
It contains the equipment that converts the power of the water to electricity.

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Why do we need renewable sources of energy?

Climate heating means we are causing the Earth to get hotter. Some places are predicted to get too hot to live in. Sea levels are rising. The weather is harder to predict. There are more storms and heatwaves. This makes farming more challenging.

Climate heating happens because our day-to-day activities produce 'greenhouse gases' like carbon dioxide. These gases trap

heat in the air around us. One activity that produces carbon dioxide is generating electricity by burning fossil fuels such as gas, coal and oil. We need to use more renewable sources of energy to generate electricity without producing carbon dioxide.

Can you describe one difference between electricity produced by fossil fuels and electricity produced by a hydroelectricity scheme?

Water power



Aerial view of Caversham Lock and Surrounding Area (about 1920). Photo kindly provided by Reading Library's Illustrations Commission.

Using the flow of water to generate power is not new. Over 2,000 years ago people used water to turn millstones to grind corn to produce flour. The Domesday Book of 1086 mentioned a watermill near this site. The channel behind you took water to this mill, now it takes water to our hydroelectric plant.



From the 18th century the industrial revolution led to improvements in the efficiency of water-generated power and it was used to run machinery, such as cotton spinners.

Our hydroelectricity replaces electricity generated from fossil fuels. This helps cut climate heating. The energy in flowing water is 'renewable' – it won't run out when we use it to generate electricity.

How has the way we use water to provide power changed?

What's on the walls of the turbine house?

Each climate stripe represents the average global temperature for a single year. The dark blue stripes are the coldest years and the dark red stripes are the hottest. The first stripe on the left is for 1850 and the last one is for 2017. We have left a space to add stripes up to 2030.

The climate stripes were created by Professor Ed Hawkins MBE. He is a climate scientist at Reading University.

What do the climate stripes tell us about how the temperature is changing?

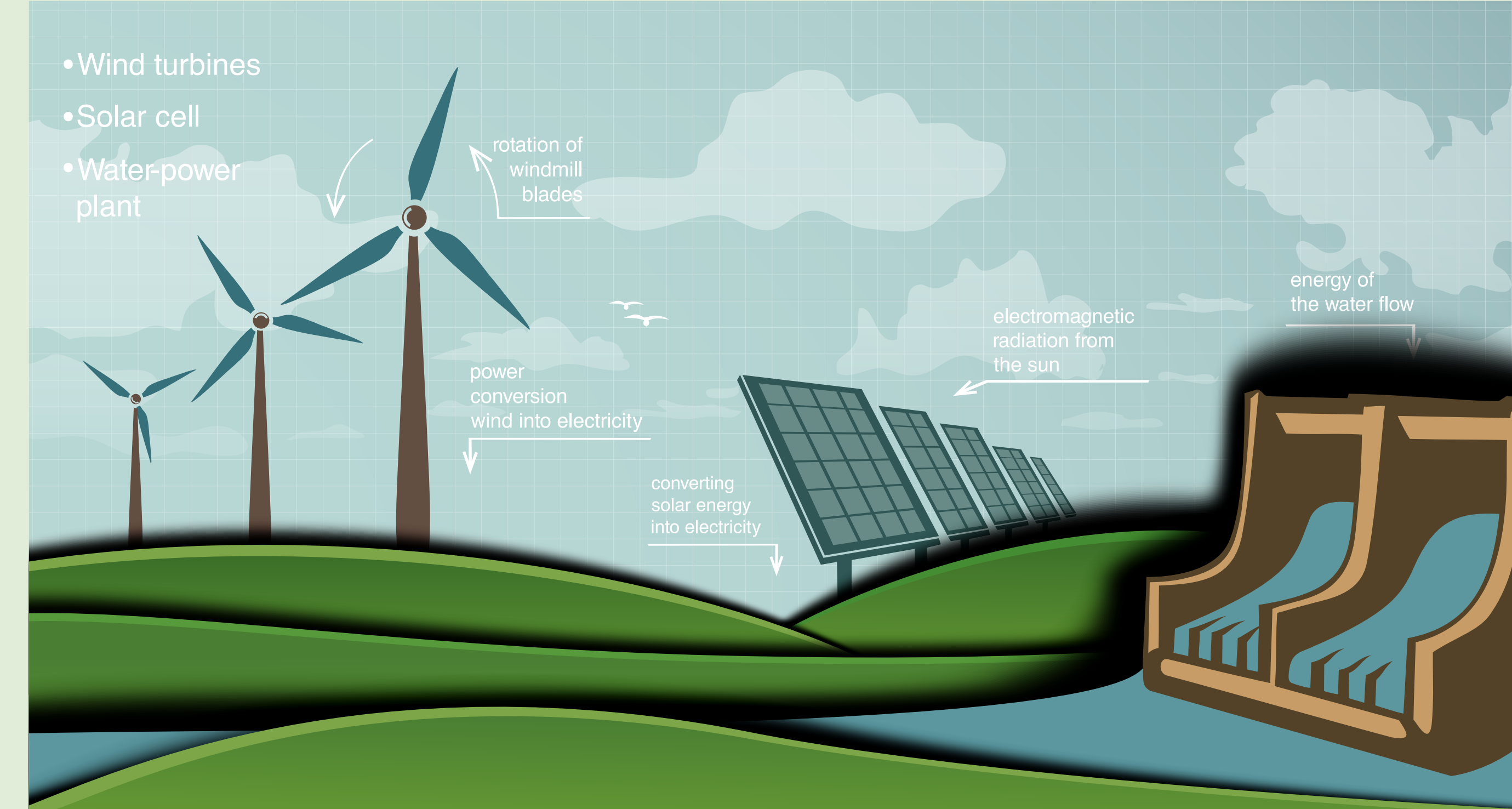


The mural is called 'Community Energym'. It imagines drops of water from the River Thames going to the gym! They use exercise machines to generate electricity. Archimedes and Mother Thames both help.

Guglielmo Miccolupi, of Commando Jugendstil, won our competition to design the mural. Guglielmo and other volunteers painted the mural and the climate stripes.

Why is Archimedes pictured in the mural?

Other sources of renewable electricity



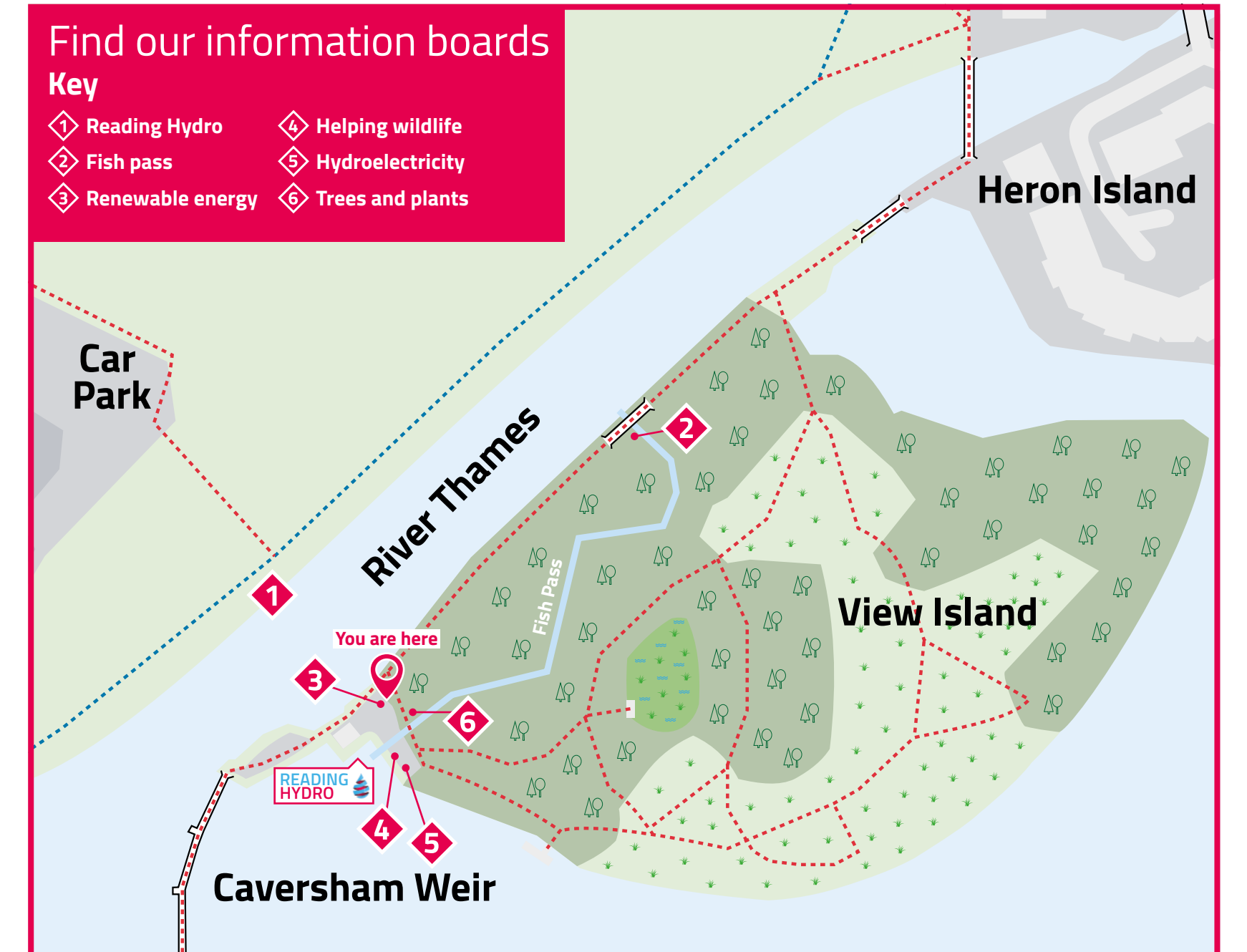
Wind and sunshine are other forms of renewable energy used to generate electricity. But wind turbines work only when the wind blows, and solar panels only when the sun is out. However, the Thames flows all year round. This means that

our hydroelectric plant should generate electricity 24/7 for much of the year.

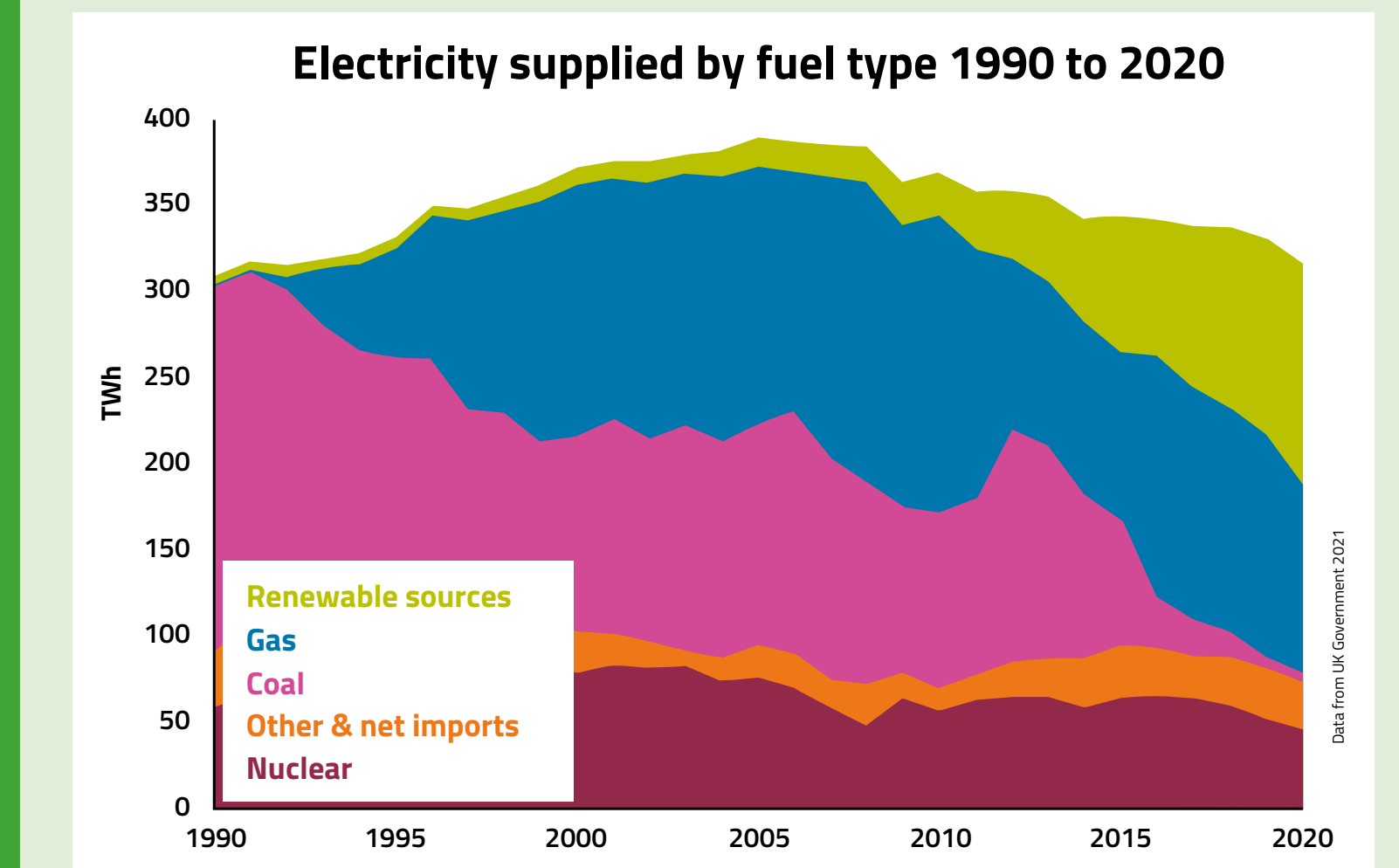
Most electricity is generated a long way from the homes and businesses that use it. Reading Hydro's scheme is in the centre of a town, so all the electricity

we generate is used nearby. This reduces the waste that happens with long distance transmission.

What is one advantage of hydro power compared to wind power and solar power?



Electricity in the UK



Many nations committed to tackling climate heating in 1990. Since then the UK has made big cuts in the carbon dioxide produced from generating electricity. We've done this by using much less coal and much more renewables.

But we need to produce more renewable electricity to reduce generation from gas. And in future we'll need even more to run all-electric cars and heat homes.



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4 Helping wildlife on View Island

Reading Hydro volunteers made habitats to attract bats, birds and insects. They also made a safe passage for fish.

Bats

The trees provide good places for bats to roost. We've made bat boxes to attract them. Some of the boxes are on trees. Others are built into a wall of the turbine house.

Come in summer around sunset or sunrise. You might see a Daubenton's bat catching insects over the water. A Noctule bat might be flying high above the tree-tops.

Have you ever seen a bat? Where? When? What did it look like?

Noctule bat



Daubenton's bat



Birds

The trees on View Island are an excellent habitat for birds. We've made bird boxes and attached them to some of the trees. They will encourage birds like blue tits and wrens to nest.

See if you can spot a starling, grey wagtail, mute swan, or a brightly coloured kingfisher.

These birds are all in decline in the UK – you can find out more at bto.org

Blue tit



Common starling



Grey wagtail



Kingfisher



Insects

Centipedes, woodlice and beetles like to live in decaying wood. We've left piles of logs and sticks on View Island to provide homes for them.

The decaying wood and leaves also give frogs and hedgehogs somewhere to hibernate in winter. They like to feed on burrowing insects.

Do you know any other animals that hibernate?

If you are lucky you might see the magnificent Stag beetle. The male can grow to 8 cm long.

How many insect homes can you find near the fish pass?

Stag beetle



Common woodlouse



An insect home



Fish

We built the fish pass to help fish swim up the river. It has both slow and faster flowing water. This is to attract different fish, such as chub and pike.

Small chub often swim together in shoals.

Can you see any in the water?

Chub



Pike



Eels

Eels were once common in the River Thames. They are now critically endangered. Our fish pass lets young eels, called elvers, swim up the river past the weir and turbines. They then spend up to 25 years growing in the river, to up to 10 times their size. During this stage of their life cycle they are called yellow eels. When they are big enough they swim back to the Sargasso Sea to spawn.

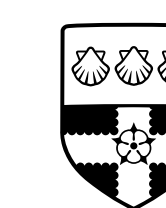
What is the name of the eels that you might see in the fish pass?

See more information on Board 2 The Fish Pass

Eel



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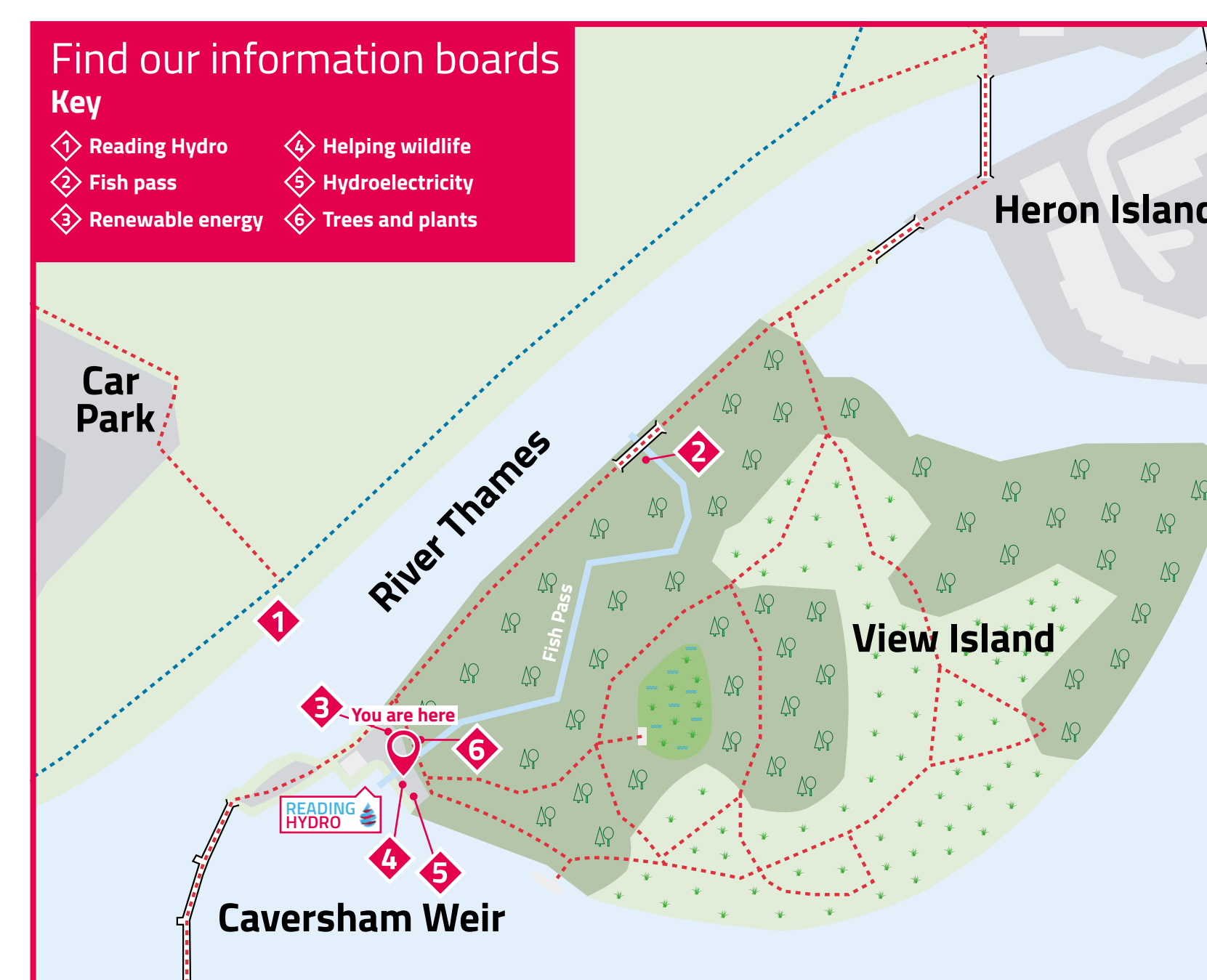
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3 Renewable energy

4 Helping wildlife
5 Hydroelectricity
6 Trees and plants

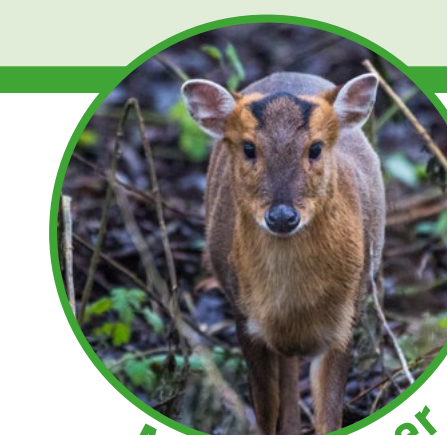


Other animals

In the spring, summer, and autumn you might see frogs, hedgehogs or deer on the Island.

Do you know where frogs and hedgehogs go in the winter?

Hedgehog



Muntjac deer



Common Frog



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5 Hydroelectricity generation

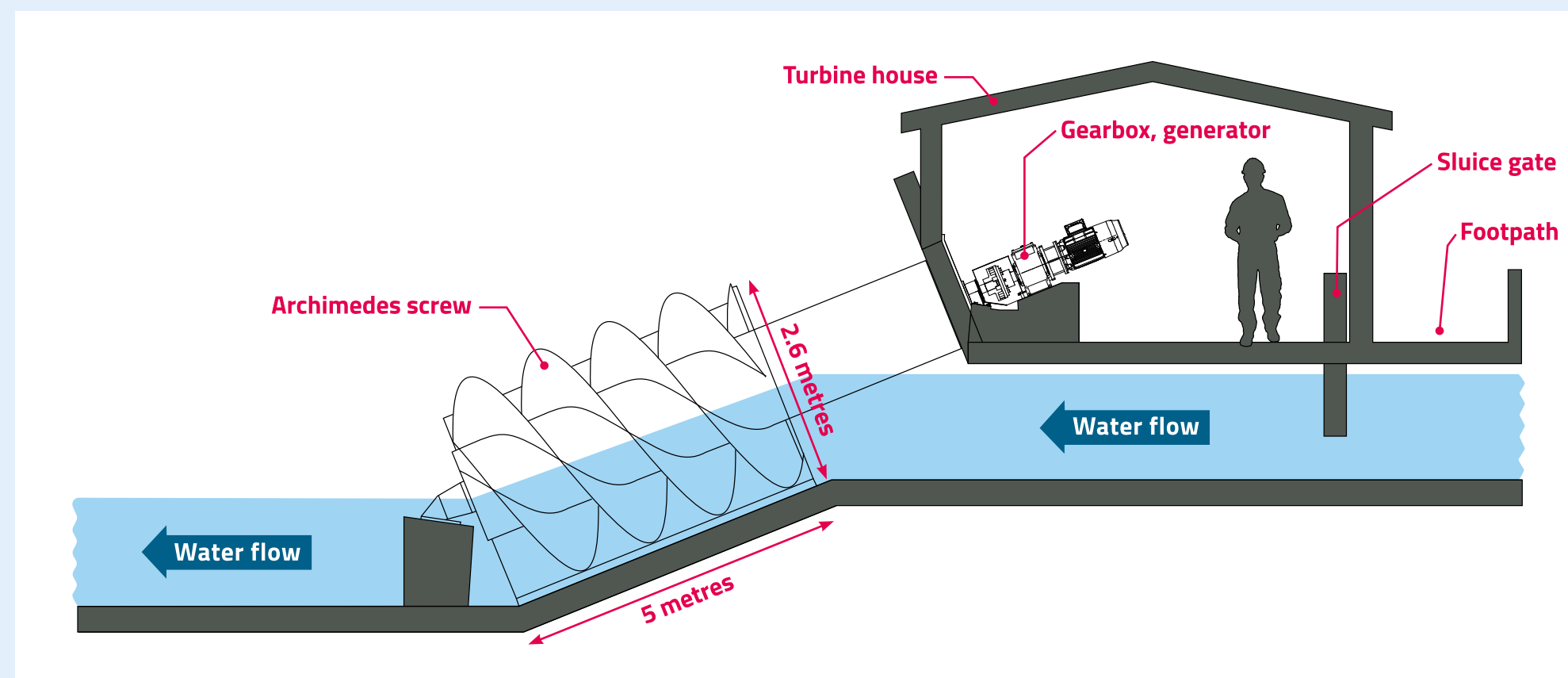
From here you can see Caversham Weir.
Reading Hydro has installed a hydroelectric plant
on the river to generate electricity.

How do we generate electricity?

In front of you are two Archimedes screw turbines, powered by the river. They do the hard work! Water passes down the screw and pushes against the blades. This makes the turbine rotate. Up to 3,100 litres of water can pass through each screw every second.

Inside the turbine house each turbine is connected to a gearbox which drives a generator. The generator converts the rotation of the turbine (kinetic energy) into electricity. Sluice gates move up and down to let the right amount of water into the screws. Everything is controlled automatically to keep the system working. We just need to monitor the control panel and maintain the system.

Are the turbines turning at the moment? Can you count how many times they turn in a minute?



How much electricity can be generated?

The amount of electricity generated depends on the water flow through the turbines. It also depends on the 'head' of the water. That's the height the water drops as it goes over the weir. The electric power is high when the flow and head are high.

Each generator can produce a maximum of 23 kW of electricity. The turbines and generators automatically shut down if the river is in spate (very high) or the flow is too low. When river conditions improve they start again.

We expect the scheme will generate about 320 MWh (megawatt hours) of electricity in a year. That's enough for 90 average homes.

You can find out how much electricity each turbine is producing on our website.

What is the maximum amount of electricity that can be generated when both screws are turning?

What determines how much electricity is produced?



The turbines being installed

Did you know?

In 250 BC, Archimedes gave his name to screws used to lift water for irrigating crops. In fact screws were being used like this in Egypt many years before Archimedes had the idea!



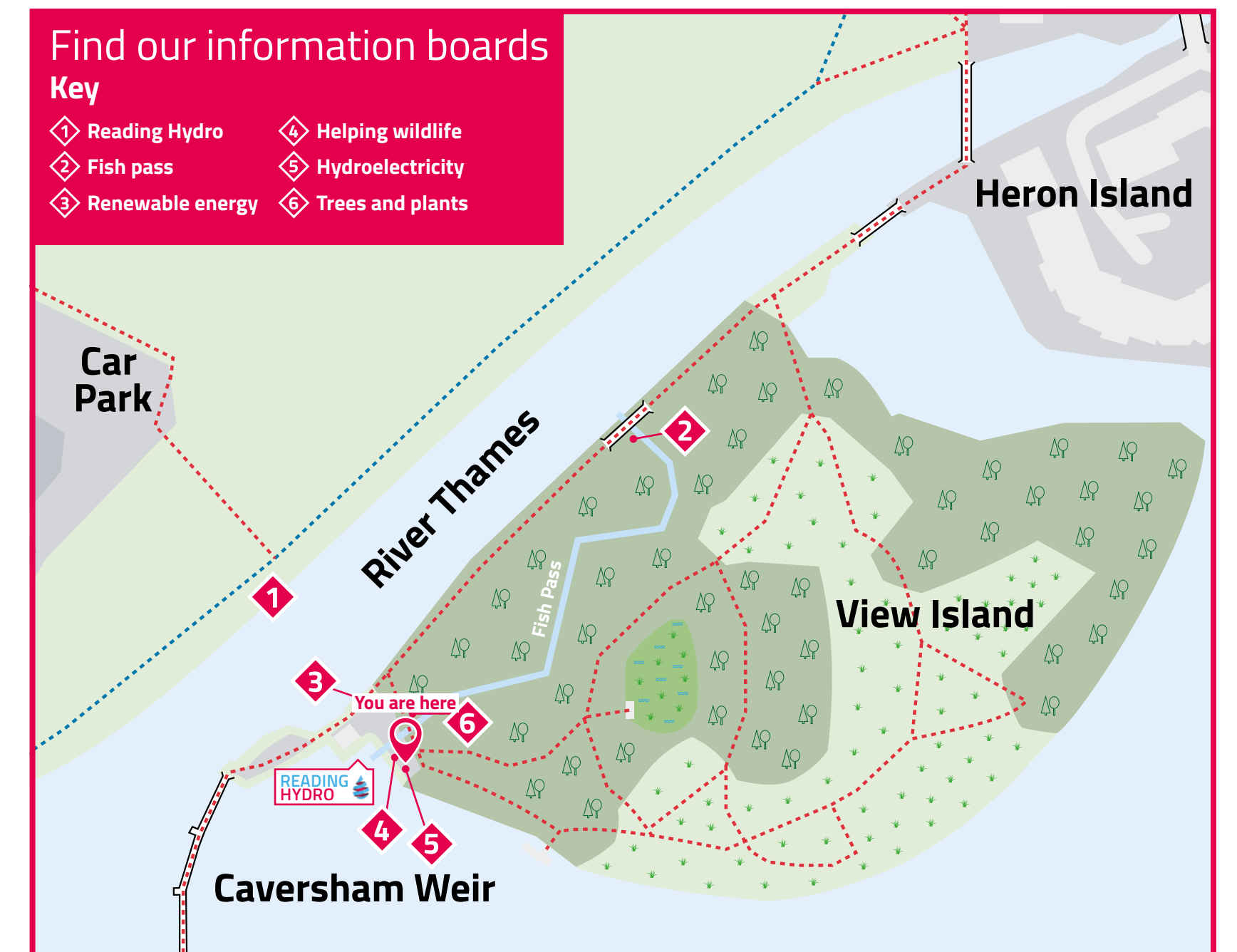
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The turbines arriving from The Netherlands

What happens to the electricity?

Thames Lido, on the opposite bank of the Thames, uses most of our electricity. It goes through a cable under the river. The electricity has only this short distance to travel so any losses from the cable are small, reducing waste.

Did you know that 60 volunteers helped to pull the cable through a conduit under the river?



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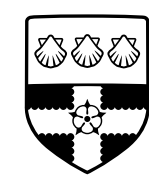
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6 Trees and plants

Reading Hydro volunteers helped restore View Island.
They cleared rubbish and planted small trees and other plants.

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Canopy trees

Most of View Island is covered with trees.
The tallest trees include ash, sycamore and crack willow.

The crack willow got its name because its trunk can grow
so fast that it splits open under its own weight!

Can you find all of these trees?



Shrubs

Underneath the canopy of
the tall trees are smaller
trees and shrubs like elder
and brambles.

*What summer fruit is found
on brambles?*



Flowering plants

From July to October you may see
the Spear thistle. It has purple fluffy
flowers. Butterflies feed on its nectar
and birds eat its seeds.

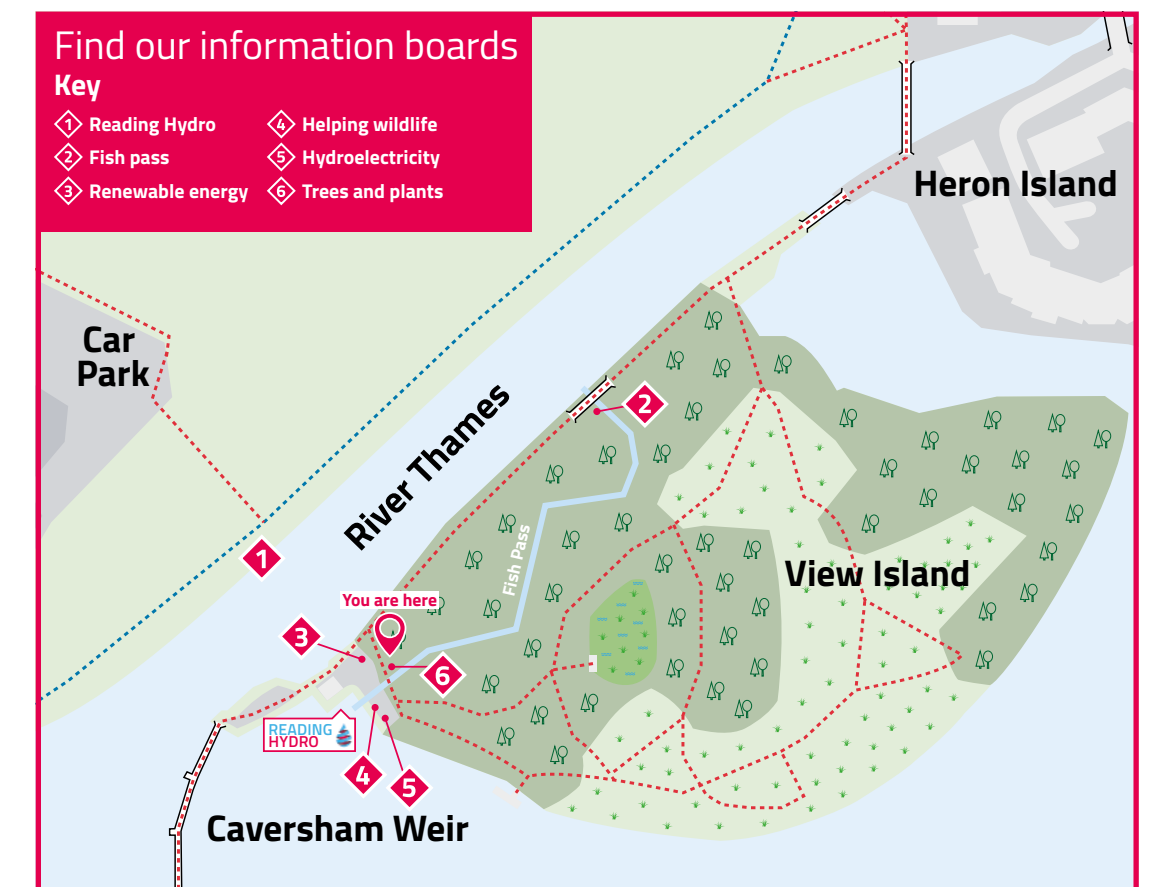
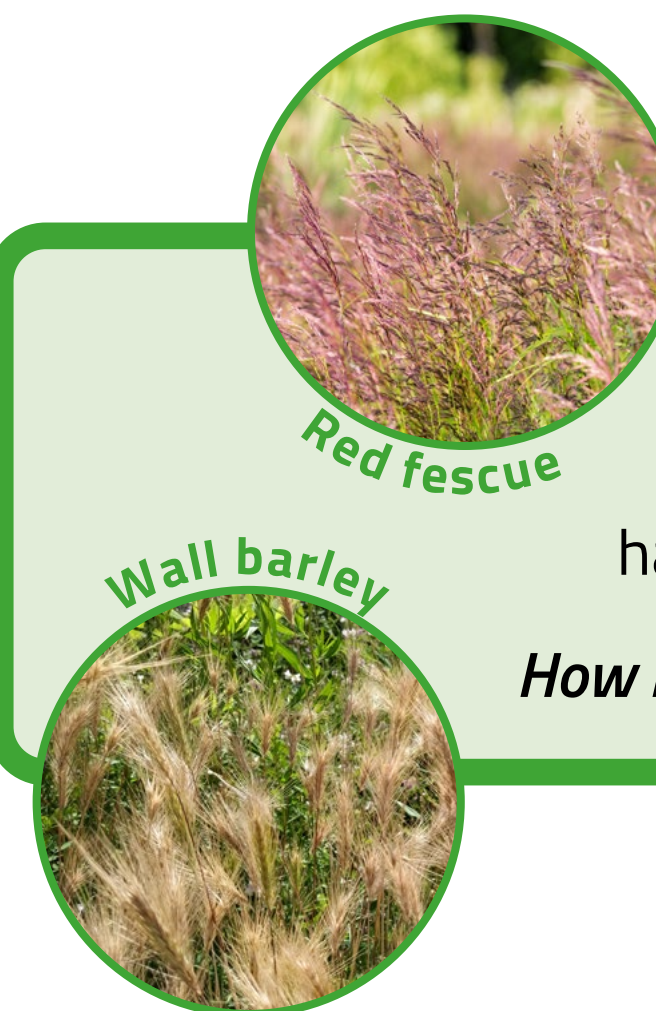
Which parts of the thistle provide food?



Grasses

There are also areas of grassland. These
have lots of different grasses and flowers.

How many different types of grass can you see?



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