John Smeaton Discovery Award

Student Pack

CREST AWARDS

LEEDS YEAR OF CULTURE 2023

Supported by Leeds City Council

Student information sheet 1

Student PUBLIC SPACES:

In the late 1800s towns spread onto surrounding fields, people living in cities became more separated from the countryside and its benefits. Victorian campaigners and politicians such as Edwin Chadwick and Robert Peel campaigned for the creation of green spaces for the good of the people – before then public spaces did not exist as they do today.

Go to **this** link to consider the impact of public spaces on society.






Think about the area where you live or have visited as inspiration, make a list of as many different types of public spaces as you can on the worksheet. Try to think about why they were created, who owns them, what are they for, and who uses them.

Look at **this** document: Think about the overall benefits of public spaces, try to think about how you will apply this to your proposal for Smeaton Park.

Seek inspiration from **this** Public Space award.

public space

Worksheet 1
Public Spaces & Accessibility:

Task 1

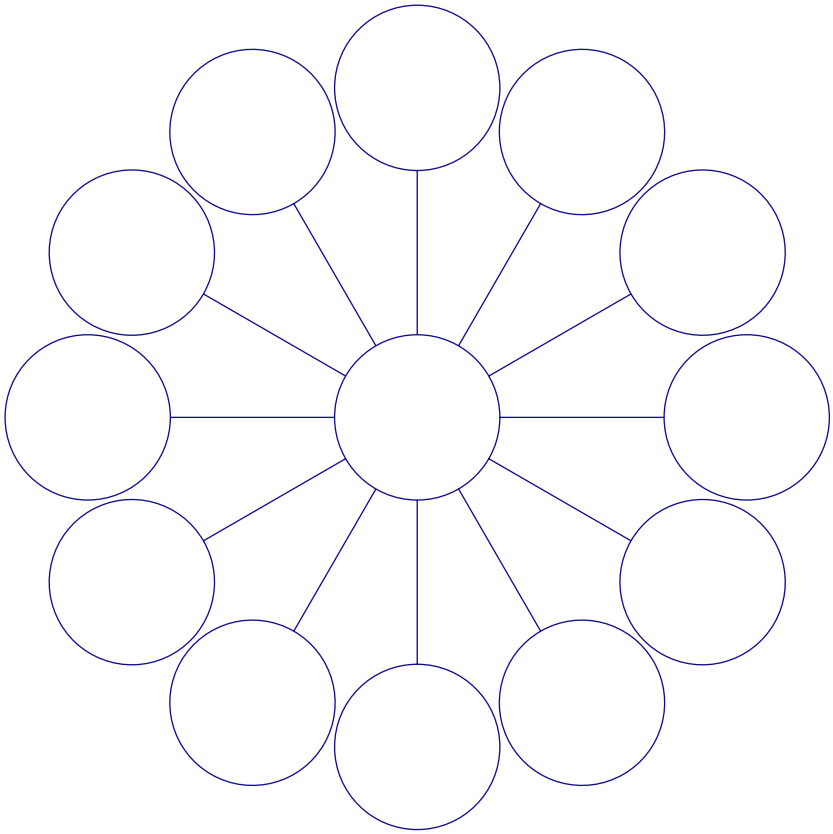
"public spaces are important in cities, towns and communities"
Before the 1840s there were no public parks in Britain.

- Why did this have to change?
- What types of public spaces exist today?
  List them below and suggest what role they have.

E.g., Skate Park – providing a safe place for this sport, protecting public spaces and other users from skateboard accidents.

Task 2

Accessibility: Inclusive design. Complete the mind map with different opportunities for inclusive design.



Student Information — Sheet 2

Accessibility:

Accessible design and inclusive design is more than how you simply get into a location, by car, or on foot etc. As a Civil Engineer you will need to consider a broad range of users and think about how they will use the venue. Smeaton Park is an island and therefore vehicle access is a problem (apart from service vehicles). However, there are many different aspects to consider when designing a public space.

How do people get there?

How can visitors of all ages and abilities access the whole space?

What safety requirements are necessary?

Who will maintain the space?

These are all questions that need to be considered.

The images below are examples of inclusive design, can you spot common features?

Who are they aimed at?







Who? - who will use, be affected by, come into contact with, benefit from, not use these?

What? - what are these for, what do they do, what else could be used?

Why? - why are they there?

Where? - where are they in use, where else might they be used?

When? - when might they be used?

Student Information — Sheet 2

Bridges:

Currently the site can only be accessed by walking over the lock gates – this is fine for able bodied pedestrians (although a little dangerous) but is not suitable for people with additional needs and abilities. These are examples of bridges (some from Leeds that you may recognise) that could be utilised. You will need to consider these designs later in the project when you show how visitors will access the island in the future.

This is an aerial photograph of the island showing the lock access (bottom left) the Knights Way bridge utilizes the island for central support but does not offer a way onto the island.

Access across the weir is not possible either.

The Island is between 5 and 20 metres away from the main Leeds doc area. (White Rose Point).

Look at the table below at the different sorts of bridges that exist, many of these types are featured around Leeds and all over the world in various forms.

Did you know the Humber Bridge near Hull was once the largest Suspension bridge in the world? Where is the largest today?

BRIDGE TYPES

The I-35W bridge that collapsed Wednesday in Minneapolis was designed as a "non-redundant" truss structure. Non-redundant bridges require less material and are cheaper to build but have no other pathways for loads to be disbursed in the event of a failure. That design has caused problems with some other bridges, including the Silver Bridge that collapsed into the Ohio River in 1967 at the height of rush hour, carrying 31 vehicles and 46 people with it. Experts says greater redundancy could prevent a progressive collapse of a bridge.

GIRDER BRIDGE
A girder or beam bridge is arguably the most basic bridge. A log across a creek is an example of a girder bridge in its simplest form. Modern steel girder bridges often use I-beams or box girders in their construction.
EXAMPLE: The 2,165 foot Poplar Streeet Bridge.

TRUSS BRIDGE
The truss is a simple skeletal structure. In theory, the individual parts of a simple truss are only subject to tension and compression forces but not bending forces. Trusses are made up of small beams that when put together can support large amounts of weight and also span great distances.
EXAMPLE: The Old Chain of Rocks Bridge is a one-mile-long truss bridge with a dramatic joint in the center.

ARCH BRIDGE
The second oldest bridge type, the arch doesn't require piers in the center. Arches use a curved structure. This provides high resistance to bending forces. Arches can only be used where the ground or foundation is solid and stable.
EXAMPLE: The Eads Bridge has a three-arch span that totals 1,647 feet.

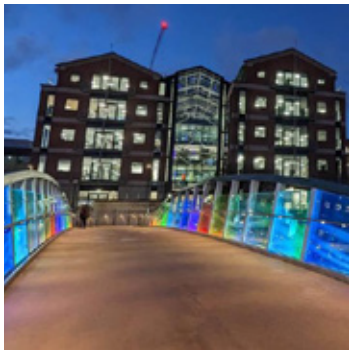
CANTILEVER BRIDGE
A cantilever bridge is a modified form of beam bridge. The support is in the middle of a span, not the end. The advantage to a cantilever bridge is its ability to span wide spaces without the need of extensive and expensive support while under constuction.
EXAMPLE: The Greater New Orleans Bridge over the Mississippi River.

CABLE-STAYED BRIDGE
A typical cable-stayed bridge is a continuous girder with one or more towers erected above piers in the middle of the span. Cables stretch down diagonally (usually to both sides) and support the girder from the towers.
EXAMPLE: The Clark Bridge crossing the Mississippi going to Alton.

SUSPENSION BRIDGE
The suspension bridge allows for the longest spans. A typical suspension bridge is a continuous girder with one or more towers erected above piers in the middle of the span.
EXAMPLE: The Golden Gate bridge in San Francisco.

The bridges in the photographs below are intended to be used by people on foot or bike, they have lots in common even though they look very different. Can you think of what the similarities are?

Bridges that are not designed for vehicles can be made much more cost effectively and can utilise unique design features and materials that larger bridges cannot. What materials are mainly used?



Do some of your own research to find bridges that would be suitable for access to Smeaton Park. Assign some members of your team to design and even model the bridge for your proposal. The bridge is a key element to think about as it is the main access to the park for visitors and services. Do not worry about strength or cost at this stage.

Make a difference

- Does the bridge have to be standard?
- What features could make the bridge unique?
- How could the bridge help the island/environment/users?
- Who will use the bridge?

Worksheet 2
SMEATON PARK: MAP

Use this map to identify where potential access to the island could be.

- Identify where and how visitors could access the island.
- Create your own Key to illustrate your access method.

KEY

Add notes to suggest ways you could address the issues.

- Where could you put a bridge?

Link to google maps location >

Worksheet 3
Generating electricity: Understanding renewable energy

Starter:

Thinking about the parks you know, and the park you are now designing, make a list of the things which may need power? This can be a simple list, or a spider diagram.

Are you going to have lighting? Will these be around paths (low level) or used to illuminate landmarks (higher power). Are you going to have toilets onsite? What sort of things might need power in the visitor's centre? Interactive displays etc.

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Practical session – refer to attached sheet from the Geothe Institut

Task 1 – Hydropower

What are the three types of hydropower?

What is the key idea behind hydropower?

Task 2 – Wind power

What are the limitations of using wind on its own?

Task 2 - Wind power

What are the limitations of using wind on its own?

Draw some different types of wind devices.

Task 3 - Hybrid Systems

Draw a diagram of a hybrid system that would handle at least 2 different sources of energy. What sort of storage could you include?

Worksheet 4
Session 4 – Research
Understanding renewable energy

Split the case studies up between your group.
Read them through and then discuss as a group.

One person can focus on each of the following areas

- Hydro solutions.
- Wind power solutions.
- Energy storage.
- Alternative methods of energy generation.
- What are the power demands of the site?

What are your observations?

What ideas do you like?

Are there any potential problems?

Make notes of any useful ideas.

Hydro power

River Don hydro scheme –
https://www.bbc.co.uk/news/uk-england-south-yorkshire-34553635 -

Reading hydroelectric scheme –
https://www.bbc.co.uk/news/uk-england-berkshire-58187804

Community-led hydroelectric plant in Caversham –
https://www.itv.com/news/meridian/2021-08-14/community-run-hydroelectric-plant-opens-on-thames-in-reading - video

Center for Alternative Technology –
https://cat.org.uk/info-resources/free-information-service/energy/micro-hydro/?gclid=CjwKCAjw1MajBhAcEiwAagW9MTLYVKmiVXThERg_aiKHfTQ4AYcestYVL4GWuZNH4DPgjP1fL_-LSxoCoU4QAvD_BwE

Hydropower 101 – https://youtu.be/q8HmRLCgDAI

Overview of renewable energy – https://studentenergy.org/map/

Energy Saving Trust – https://energysavingtrust.org.uk/advice/hydroelectricity/?gclid=CjwKCAjw1MajBhAcEiwAagW9MckLmQ-bLQQQRN9Uro5Ze1Xymhdmd1nk5FZwqQW41Q7qfw9bGSBJkBoCk64QAvD_BwE

Waterwheels – https://www.british-hydro.org/waterwheels/

Windpower

Dezeen articles on wind power – https://www.dezeen.com/tag/wind-power/

Manufacturer of wind turbines – https://www.quietrevolution.com/

Renewable enery specialists – https://www.renewablesfirst.co.uk/

Turbine designs

https://en.wikipedia.org/wiki/Vertical-axis_wind_turbine

Savonius https://en.wikipedia.org/wiki/Savonius_wind_turbine

Darrieus https://en.wikipedia.org/wiki/Darrieus_wind_turbine

Storage systems

https://studentenergy.org/distribution/energy-storage/

https://energysavingtrust.org.uk/advice/storing-energy/

https://www.arup.com/perspectives/publications/research/section/future-of-energy-storage

Worksheet 5
The Challenge

"Working in teams; you will design a layout for **Smeaton Park** that considers access, inclusivity, informative displays about **John Smeaton** and his work and you must also use your knowledge of **renewable** energy sources to identify a renewable energy source that will be used to generate the electricity for the park".

Specification

- The park must be contained in the area identified on the map.
- You should propose how and where visitors will access the island.
- You must consider accessibility to the site for visitors of all abilities and ages.
- The park must suggest what you would include in features and information displays about John Smeaton.
- Your renewable energy source(s) must be shown on the plan and be justified in your proposal.
- Your proposal must clearly show the location of all of your features on the map.
- Consider the environmental impact of the site from construction to use

Your presentation will last between 5 minutes.

You should aim to include:

- An overview of your proposal.
- An explanation as to why you have included the various elements.
- Information about how you came up with and decided upon your renewable energy source.
- Discussion of your idea in more detail including your sketches, drawings and models.
- Every team member must contribute to the presentation. If time is available the other teams should ask you questions.

Suggested mark allocation*	**MARK**
1. Quality of the plan/layout (10 marks)	
2. Accessibility – different users (10 marks)	
3. Renewable energy source. (10 marks)	
4. Features/information (reference to Smeaton and engineering) (10 marks)	
5. Environmental impact. (5 marks)	
6. Quality of presentation. (5 marks)	
Total (50 marks).	

*Teachers may wish to alter this mark allocation to suit the group and focus of their task.

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FOXGLOVE

Leeds City Council

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BURBERRY

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