



Rewarding Learning

eGUIDE // Geography

Unit AS 1: GIS Investigation: Rivers and Flooding

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Unit AS 1: GIS Investigation: Rivers and Flooding

Introduction

Specification link

This GIS investigation is related to AS Geography Unit 1: Physical Geography, Part 1(b) Human Interaction in Fluvial Environments.

Aim

The aim of this investigation is to enable you to:

- investigate areas which are susceptible to flooding in your local area; and
- decide the best methods of management; either to control the river or the planning of buildings along the floodplain of the river.

Before you start

In order to carry out this investigation successfully you must complete each of the tasks in order. Work your way through each task step by step. Do not move onto another task until you have completed all sections of each task.

Background to Flood Maps NI

Flood Maps (NI) is an interactive map-viewer that enables users to access the latest flood hazard information available from government. These maps indicate the areas throughout Northern Ireland that are prone to flooding allowing you to assess the potential impacts. This should help you to see the planning issues that need to be addressed in that particular area.

This task focuses on flooding within parts of Belfast but it can be adapted to any river in Northern Ireland. It might be best to look at the river closest to your school as it will be more meaningful. Just make sure you follow the steps one at a time. Do not skip anything. Refer back to the screenshots to help you.



Fig. 1: Flooding frequently impacts urban areas including infrastructure

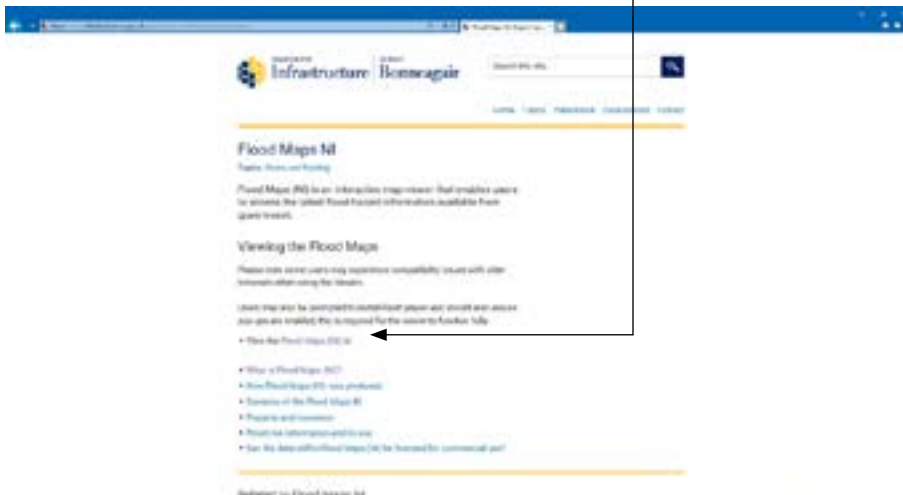


TASK 1: Getting started

1. To access the Flood Maps NI website log on to:

<https://www.infrastructure-ni.gov.uk/topics/rivers-and-flooding/flood-maps-ni>

Then click on **View the Flood Maps (NI)** link



Alternatively copy and paste this URL into your browser: <https://dfi-ni.maps.arcgis.com/apps/webappviewer/index.html?id=fd6c0a01b07840269a50a2f596b3daf6>

2. You will now be taken to the Flood Maps NI site. You need to accept the terms and conditions.

Click to **Agree** with the terms and conditions, then click **OK**.





3. The following screen will now be displayed.

Using the scroll button on your mouse, the touch pad on your computer or the +/- buttons shown here, zoom in to the area you wish to investigate.



Note: for the purpose of the rest of this investigation we will be looking at Belfast.

TASK 2: Investigating Flooding Hazard Extent in Belfast

4. You will see a **Layer List** on the left side of the screen. You can 'grab' and move the pop-up around the screen.

Click here to expand or collapse the layers

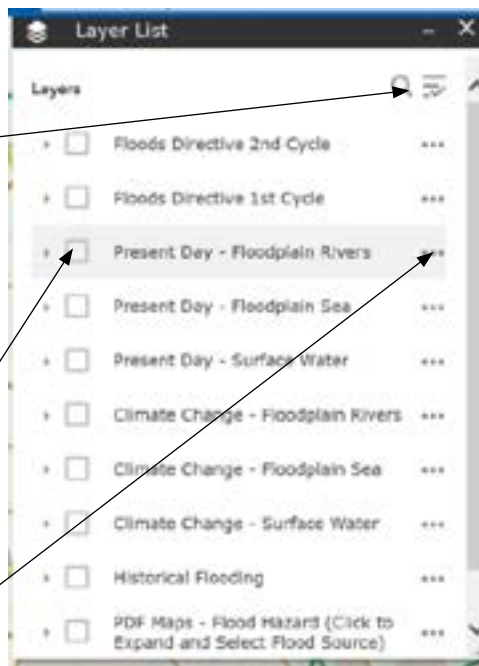
You can see that you have the opportunity to investigate river flooding, sea flooding and floods linked to surface water.

In addition you can look at present day or historical flooding.

Finally you will see that there is also the opportunity to consider the impact of climate change.

You simply click on the relevant box to select the layer/s you want to include.

Click on the **three dots** to access a drop down menu with further options (see next screen shot).





5. In the Layer List click on **Present Day – Floodplain Rivers**. Then click on the **three dots** symbol and choose **transparency**. In this example the transparency has been set to zero to allow the rivers to be seen easily. This will show the rivers around Belfast (or the town you have selected). You are now going to choose an area to study.

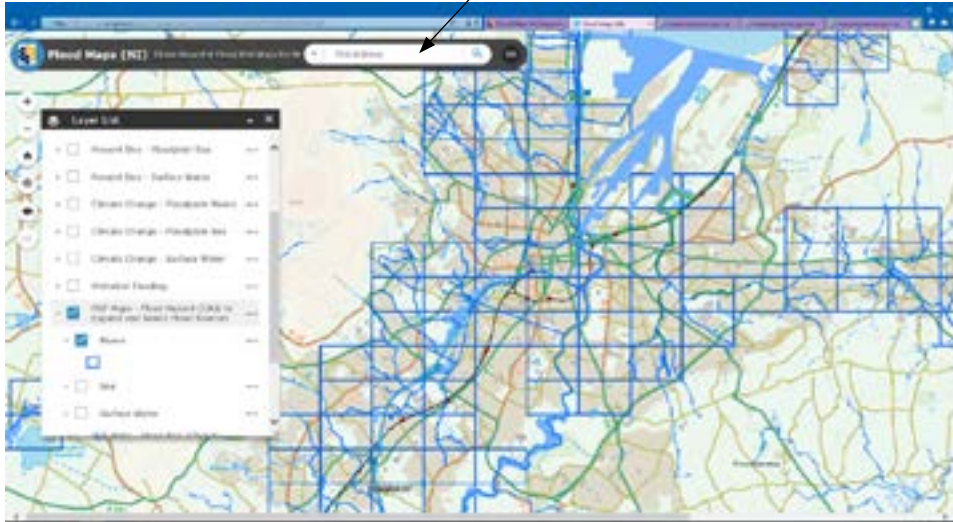


6. Now scroll down through the layer list and click on **PDF Maps – Flood Hazard** and **click to expand** and select **flood source** (rivers) as shown. This will then bring up a map with all the squares as shown below.





7. Choose a square which you would like to investigate. Your teacher may decide which one is best for you. You can also search here to find a location of your choice.



You can select a square from the map by simply clicking on it. When you select a square you will see a **pop-up**. Click on the **image** to open the PDF map.



As shown above, by clicking on '**Zoom to**' you can access a close-up of the area you have chosen.

You can also click on the arrow to the left/right of the image to **access other PDFs** in this map set.

You can access PDFs showing all probabilities, high probability, medium probability and low probability. You can add a marker to the map by clicking on the dots in the bottom right-hand corner and selecting **add a marker** from the drop down menu.



8. This will then generate a PDF file (see below) which you can save and print. In this case the PDF shows the flood hazard extent for all probabilities for the chosen area. Look carefully at the key to establish the extent of flooding in your area.



Note: use the **up/down** arrows and the **-/+** to navigate the PDF.

Follow up work with map

- Describe the extent of the flooding in the 1 in 10, 1 in 100 and 1 in 1000 events. Name places which will be affected by these flood incidents.
- What strategies need to be put in place **now** and in the **future** to minimise the impacts of these events?



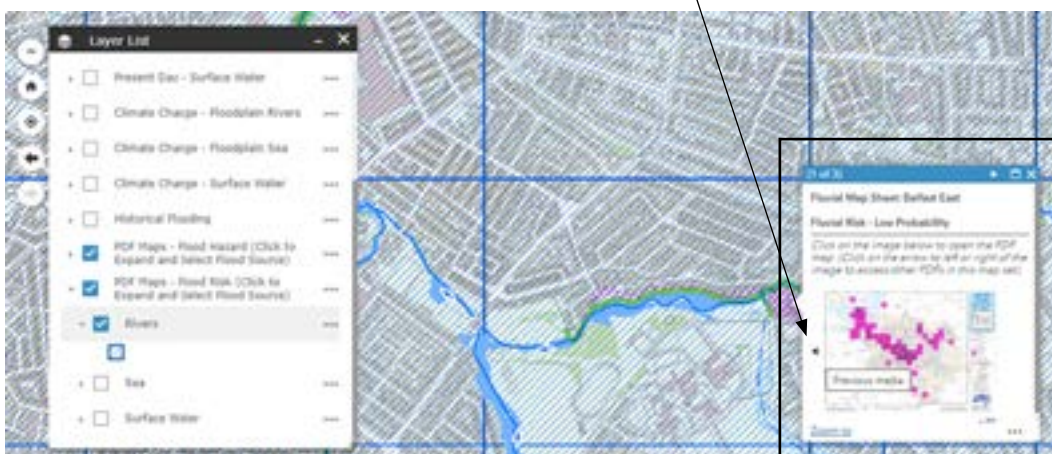
TASK 3: Investigating the flood risk in Belfast

So far you have been investigating the extent of the flood hazard in your chosen area. Flood Maps NI also allows you to investigate the flood risk for your chosen area.

9. Select **PDF Maps - Flood Risk** from the options given in the layer list. As instructed, click to **expand** and select **flood source**. In this example we have chosen rivers as the flood source. Your map will now show lots of striped lines.

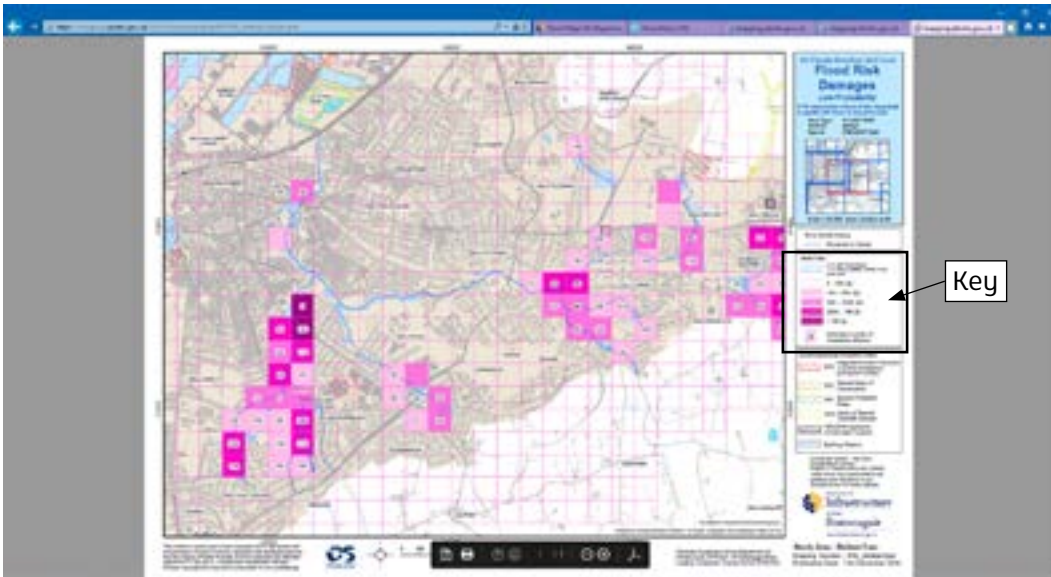


Go through the same procedure as before to select the square/area which you want to investigate. Depending on the area you have chosen, you might be able to access maps like the ones shown next, however, if when you zoom in on your map and you do not see any red stripes then your images may look different to what you will see here. Do not forget to click on the arrows to the **left/right** to see all the possible PDFs you can access and generate.





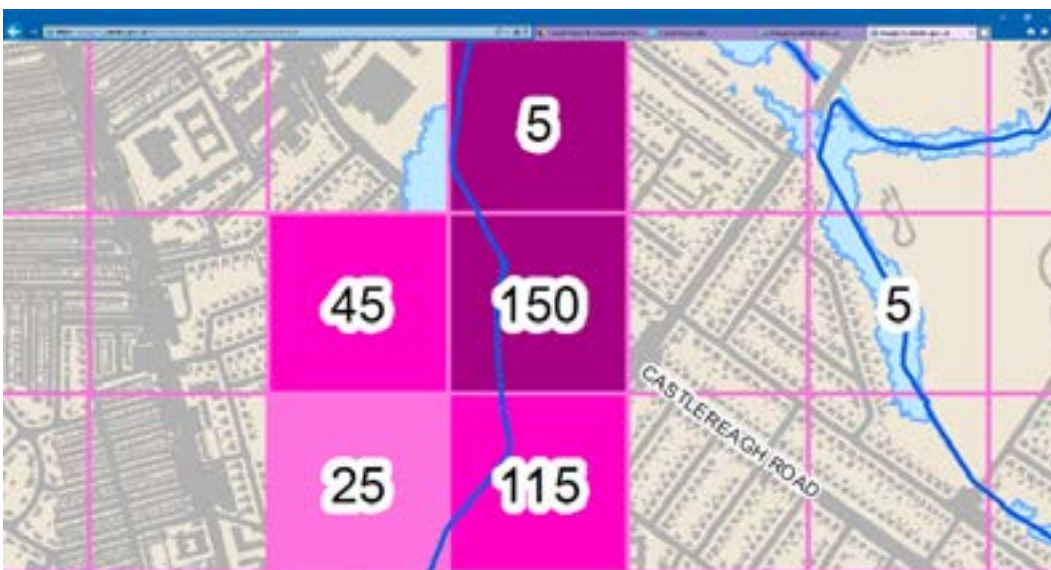
10. You should now have created a PDF of flood risk damage which may look like the one shown below.



Look closely at the key. The shading represents the likely cost of the flood damage; the number in the middle of a square represents the estimated number of inhabitants affected.

The PDF will cover a wider region than the map you used in Task 2. You can zoom in on any area of this map using the + and – arrows along the bottom of your screen. You can also take a screenshot of any part of the map.

The following screen shot shows the complexity of flooding in an urban area. You can see two areas considered likely to experience damage totalling in excess of £1million. In one area the total number of inhabitants affected is 150 people compared with just 5 inhabitants in the other area.





Follow up work with the map

- Which areas will have the greatest cost in terms of flood damage?
- Why will these areas be more prone to flooding?
- Why will the cost be greatest in this area?

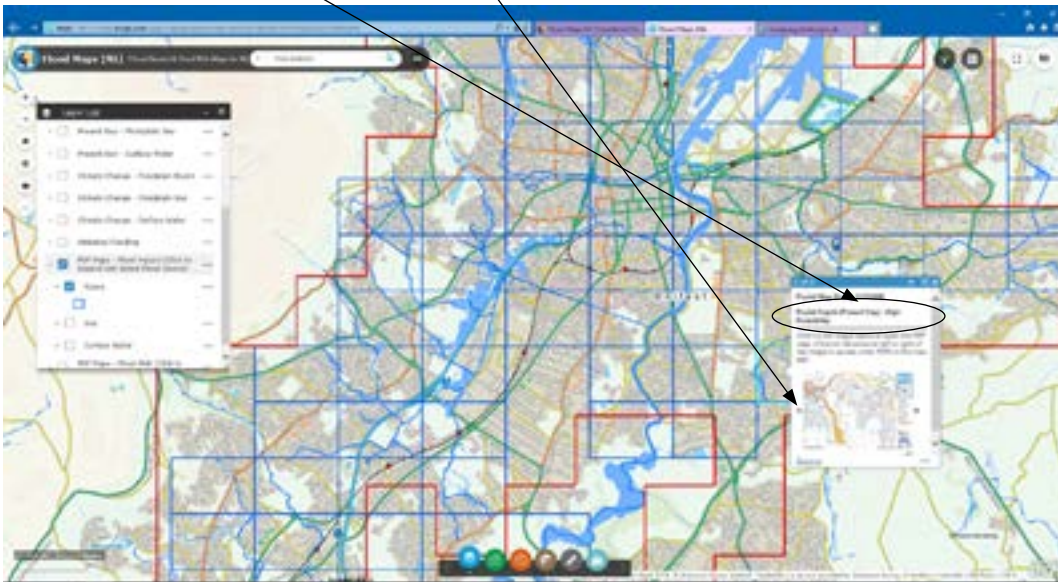


TASK 4: Investigating Flood Hazard Depth in Belfast

Flood Maps NI allows you to investigate specific aspects of the flood hazard in your chosen area including river level (m), velocity (m/s) and discharge (m³/s). In addition you will see any flood defence structures and their standard of protection (SoP) present in the chosen area.

- 11 From the Layer list de-select the PDF maps- Flood risk from the previous task and click on **Present day Floodplain** and **PDF Maps - Flood Hazard** then click on the text as before to access the flood source – select **Rivers**.

Use the **left/right arrows on the pop-up** to scroll to **Fluvial depth (Present day) – High probability**.



12. This will generate another Pdf file which you can save and print. Please note that the data for this map may not be as detailed in all other areas. River depth, velocity and discharge may be shown on this map. Look carefully at the key.





You may need to go back and select the adjacent square on the map to get the full overview of the river affecting your area. To do this go back to the map and simply click on the adjacent square. Don't forget to scroll through the map set to find **Fluvial depth (Present day) – High probability**.

Follow up work with the map

- Which areas show the greatest depth of floodwater hazard in the area you have been studying?
- Describe and explain the varying river levels along the course of the river.
- Describe and explain the varying velocity and discharge along the course of this river.

Group task

- In groups, look at all the information you have gleaned about the area you have been investigating.
- Write a short report about the flood risk in the area you have been investigating using information from all the maps.
- What river management strategies need to be put in place now to minimise the risk?
- What type of emergency strategies need to be planned for evacuation of this area- remember to plan suitable routes as the main route may be flooded!
- What long term strategies need to be developed now to protect the area from the most severe form of flooding predicted for the area?
- Present your findings to the rest of the class.

Extension Study

Further investigation can be based on climate change or historical flooding.

For example, you could consider the extent of coastal flooding in the context of climate change.

Investigating historical flooding requires a slightly different approach. Select your area and click on the map, the software will then search for historical flooding in that area. The following screen shot shows the extent of flooding in East Belfast on 12 June 2007.

