

SDG14 Future of the Ocean

MM3: Offshore Renewable Energy



Micro-Module 3: Offshore Renewable Energy

Research and Development

Lesson 10: Teamwork and Problem Solving

Subjects: Climate Action and Sustainable Development, Design, English, Engineering Science

7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



13 CLIMATE ACTION



Lesson Title and Summary: Teamwork and Problem Solving

In this lesson, learners engage in a practical activity to select suitable sites for a wind farm through online research. Divided into teams, they explore the Marine Atlas Tool on the Marine Institute's website to identify potential locations for a wind farm. They consider factors like water depth, wind speeds, fishing patterns, and challenges such as shipwrecks. Each team proposes three optimal sites, with individual team members analyzing specific aspects. The lesson promotes teamwork, critical thinking, and geographic analysis. To conclude, teams present their selections to the class, providing justifications for their choices. This activity encourages hands-on learning about renewable energy and marine environments.

Vocabulary: Desktop study, Teamwork, Problem Solving, Geographic Analysis, Site Selection

In this lesson, the learner will:

- Engage in a collaborative "desktop study" activity to identify potential locations for a wind farm using online maps and tools.
- Work in a team, analyzing factors such as water depth, wind speeds, fishing patterns, and challenges like shipwrecks to determine suitable sites.
- Take responsibility for assessing specific aspects of the proposed locations, promoting individual contribution and expertise sharing.
- Articulate and justify their team's decision through presentations to the class, honing their communication and critical thinking skills.

Materials

- Worksheet: Site Selection
- Internet access
- Large printout of map taken from the worksheet, plus thumb-tacks (only needed for extension activity)

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ACTIVITY INSTRUCTIONS

Activity 1: Introduction (5 min)

1. Explain to learners that they are going to complete a 'desktop study' in teams to identify where they are going to build a wind farm. This is going to be done using maps available online at the Marine Institutes website. We are going to use their [Marine Atlas Tool](#).
2. The class should be split into teams of 3-4 learners.

Activity 2: Teamwork Activity (30 mins)

1. Before exploring the website, have groups discuss the following questions based on their worksheet: Site Selection:
 - a. Why these 6 aspects would be important to consider when building offshore wind turbines? Which ones do you think are most important and least important? Can you think of any other aspect the government should consider when building offshore wind turbines?
2. Each team of learners will need to decide on three possible locations for their proposed wind farm, using the steps outlined in the worksheet: Site Selection and the Marine Atlas Tool. In working out the optimum locations for their wind farms, they will need to take account:
 - a. water depth
 - b. fishing patterns
 - c. wind speeds
 - d. Shipwrecks
 - e. several other challenges (all detailed in the worksheet)
3. Each learner should take responsibility for assessing their proposed location for 1-2 of these.

Activity 3: Presentation to the Class (15 mins)

1. Invite learners to present their top three locations to the rest of the class and include a justification for why they chose these locations.

REFLECTIVE EXERCISE: 3-2-1

- Three things they feel they have learnt from the exercise
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the site / exercises

Use Post-its or a Mentimeter survey - [mentimeter.com](https://www.mentimeter.com) to gather reflections

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EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class, reduce the number of criteria that learners need to consider (for example, leave out the map showing water depth or wind speeds). Furthermore, you could just ask learners to choose 1 optimum site, and not 3.

Extension: For a longer class, set up a map of the region and give some thumb-tacks to each team asking them to pin their proposed locations on the map. Once all thumb-tacks have been pinned, moderate a group-discussion on the overall advantages and disadvantages of the locations chosen. Highlight the variety in locations, indicating that different teams prioritized different things, and no one option is necessarily worse than another.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Marine Atlas Tool on the Marine Institutes Website <https://atlas.marine.ie/#?c=53.3899;-13.0518;6>

Article: Ireland makes history with its first offshore wind auction:

<https://windeurope.org/newsroom/news/ireland-makes-history-with-its-first-offshore-wind-auction/>

Events page of the Marine Institute: <https://www.marine.ie/site-area/news-events/events>

Local Trip / Expertise / Additional Work and Assessments

Check out the events page of the Marine Institute to see if there are any events of interest to you in your area?

Consider a visit to the coast to one of the areas designated as a protected site based on the Marine Institute's Atlas Tool.

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You will use the [Ireland's Marine Atlas tool](https://atlas.marine.ie/#?c=53.3899;-13.0518;6) on the Marine Institute's website to select a suitable site in Ireland for offshore wind turbines.

<https://atlas.marine.ie/#?c=53.3899;-13.0518;6>

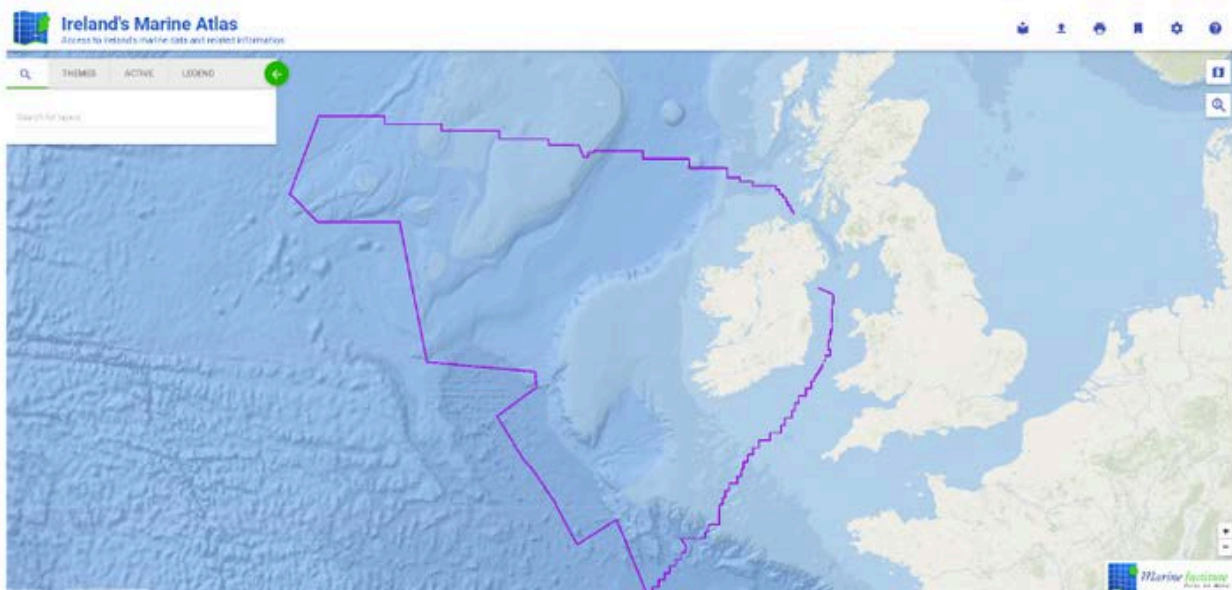
You will have to consider the following aspects when selecting a site:

1. Water depth
2. Fishing patterns
3. Wind speeds
4. Shipwrecks
5. Marine mammal species distribution
6. Protected areas

Before continuing, discuss as a group why these 6 aspects would be important to consider when building offshore wind turbines? Which ones do you think are most important and least important? Can you think of any other aspect the government should consider when building offshore wind turbines?

On the following pages, you will be guided through how to use the Ireland's Marine Atlas Tool to discover these six aspects.

The landing page will look something like the figure below. When you click on the 'themes' button, there are many opens for information that can be shown on map.

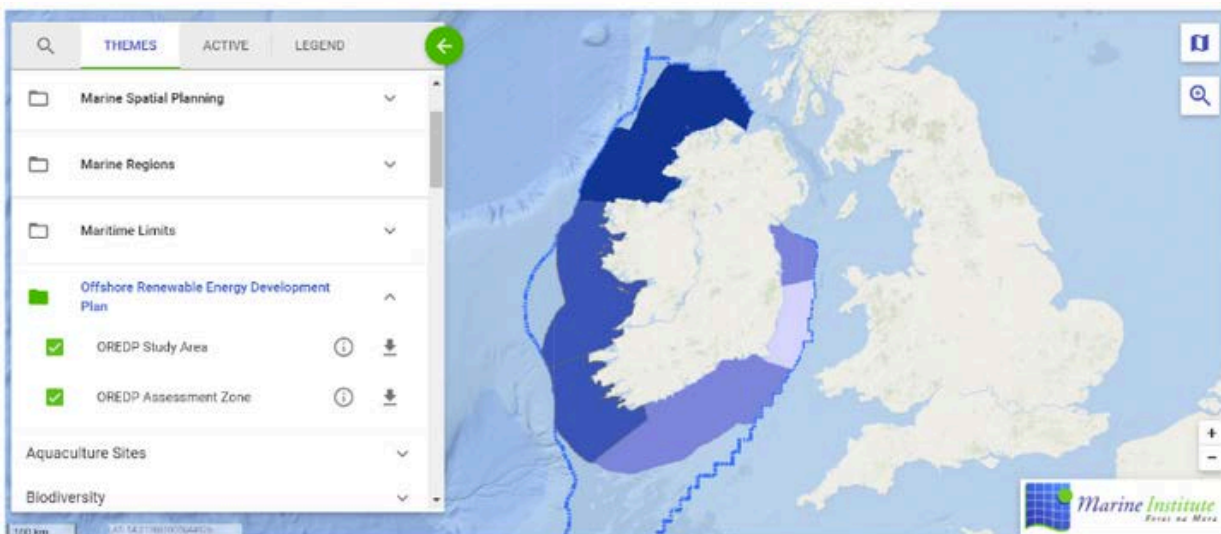


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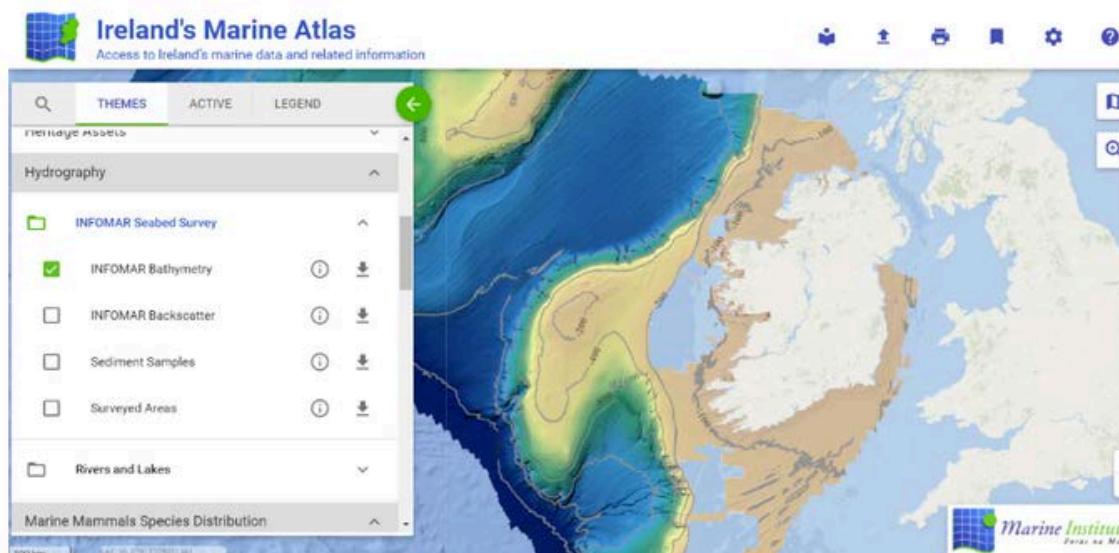
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For example, you can turn on the view that shows the regions allocated as part of the Offshore Renewable Energy Development Plan under the heading 'administrative boundaries'. The Department of Communications, Climate Action and Natural Resources commissioned the Offshore Renewable Energy Development Plan Strategic Environmental Assessment boundary of full assessment area for tidal, wave and wind assessments and definition of zones into specific strategic renewable sectors. These are the zones the government is potentially targeting for offshore wind farms.



Then, if you turn off this setting, and then turn on 'INFOMAR Bathymetry' under the 'Hydrography' tab, as per the image below, you will see a map showing how deep the water is in the areas surrounding Ireland. It's relatively shallow (100m) near land, and gets much deeper (up to 1000m) off the west coast. The depth of water is something that needs to be considered, as in shallow water we can use monopile turbines, but in deep water we may need to use floating turbines.

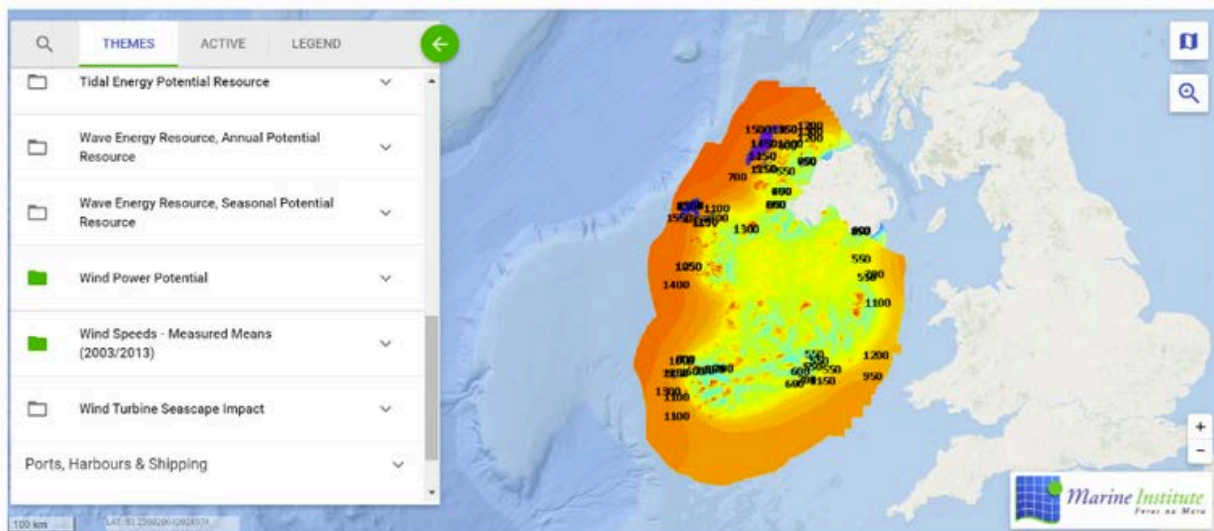


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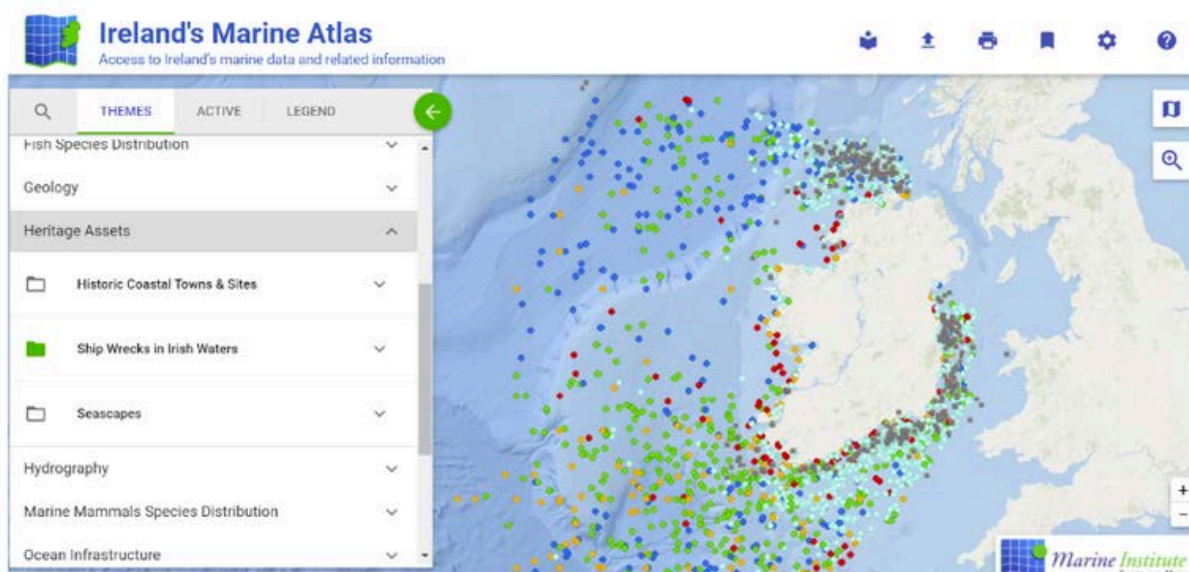
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If you turn off this setting, and instead turn on the view that shows 'wind power potential' and 'wind speeds' under the tab called 'Offshore Energy – Resource Potential'. This should give you a map that looks something like the figure below and gives an indication of how high the winds speeds are in the regions offshore around Ireland, and consequently, the potential energy that might be generated. Choosing a site that's going to be windy enough is important.

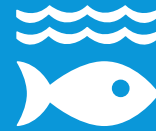


Now turn off this setting, and turn on the setting called 'Shipwrecks in Irish Waters' under the tab called 'Heritage Assets'. This should give you a map that looks like the figure below showing all the thousands of shipwrecks that lie on the bottom of the seabed in the waters around Ireland. When choosing a site for your wind farm, you'll need to make sure you avoid the locations of these shipwrecks.

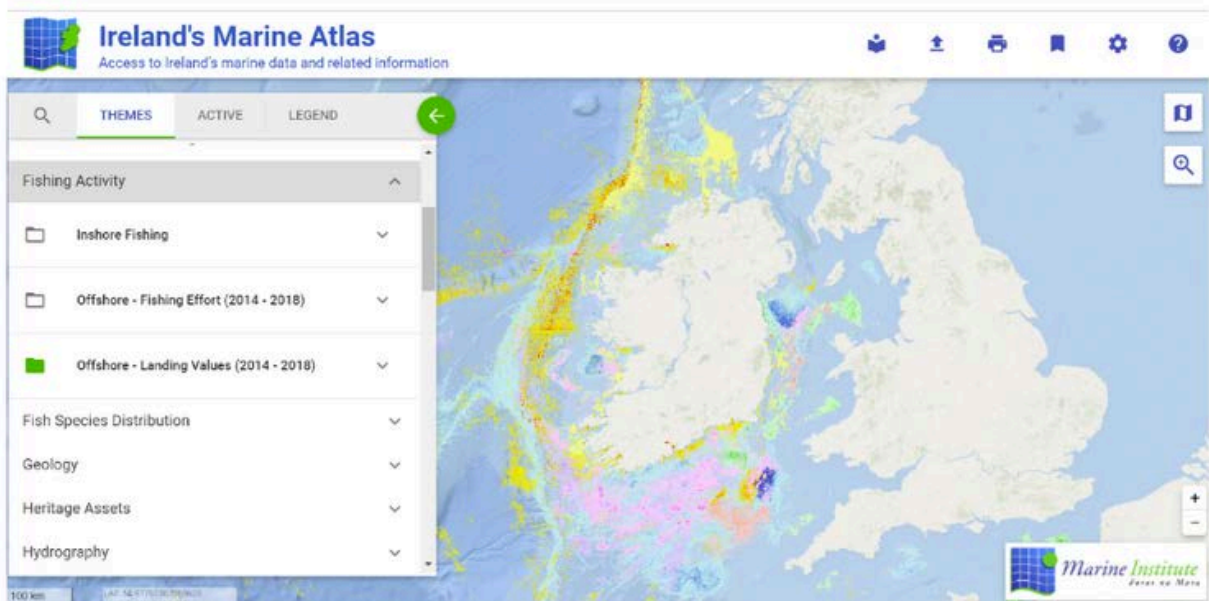


MM3: L10 WS SITE SELECTION

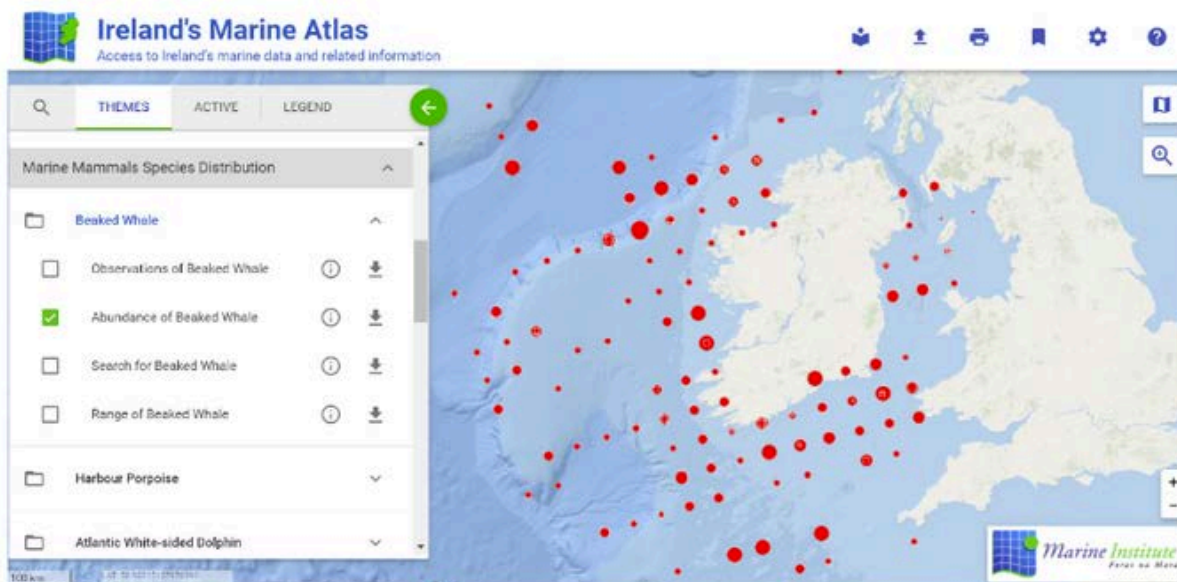
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Turn off the shipwreck setting, and instead turn on the setting for 'offshore landing values' under the tab 'fishing activity'. This gives an indication of the value of the fishing industry in the waters around Ireland, and this is something that can't be interrupted due to the construction of a wind farm. When choosing your site, consider the fishing patterns in the area.

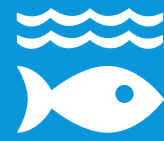


Linked to this, you'll also need to consider the regions of water where certain marine species tend to congregate. By turning off the previous settings, and instead turning on the settings for 'marine mammals species distribution', you'll get a map showing something like the figure below. It will be equally important to avoid these areas not just for the construction of the turbines, but also so as not to displace wildlife into the future due to the presence of the turbines.



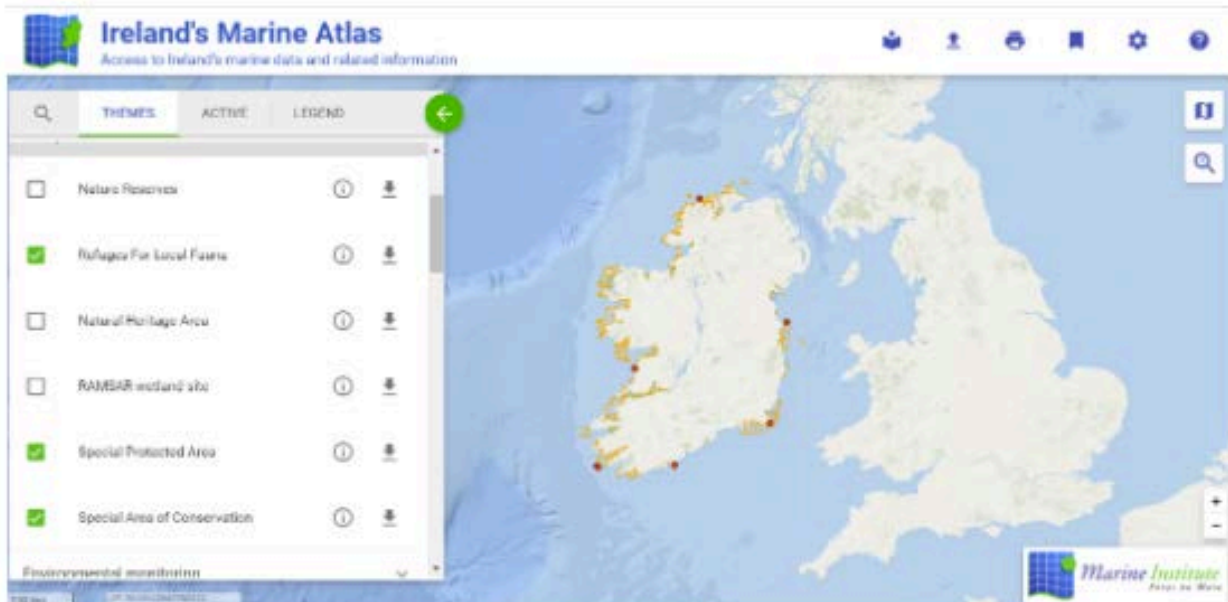
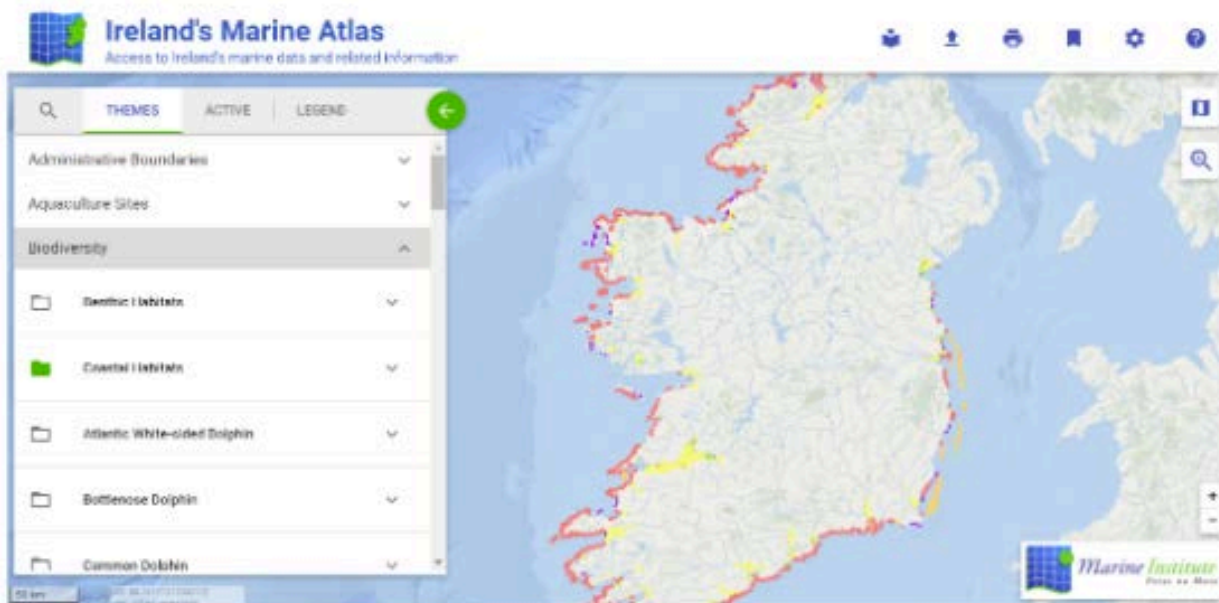
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In case you were tempted to put the turbines really near the shoreline, in shallow water to avoid all these challenges, you should also be aware that the coastlines around Ireland tend to be protected areas.

Take a look at the two images below – for ‘coastal habitats’ under the ‘biodiversity’ tab and the various options under the ‘Designated sites’ tab.



After considering these six aspects, what are your top three sites where you would build wind turbines (you may write the coordinates and / or show on a map):

1. _____
2. _____
3. _____