Introduction to proposed Morlais tidal array at the Holyhead Stacks

These notes are an overview of the proposal and of specific issues raised in the Morlaid EIA which may be of interest to sea kayakers. The Environmental statement follows a set format and comprises 27 chapters and runs to over 200 documents. These documents are available in several locations:

As submitted by Morlais from a dropbox link at http://www.morlaisenergy.com/useful-documents-links/ - this is the easiest if you want to download as they can be downloaded into zip files.

On the Planning Inspectorate TWA website https://dns.planninginspectorate.gov.uk/projects/wales/twa-morlais-demonstration-zone/?ipcsection=docs where you can filer files

On the on the NRW public register – put "ORML1983" into the search box. https://publicregister.naturalresources.wales/

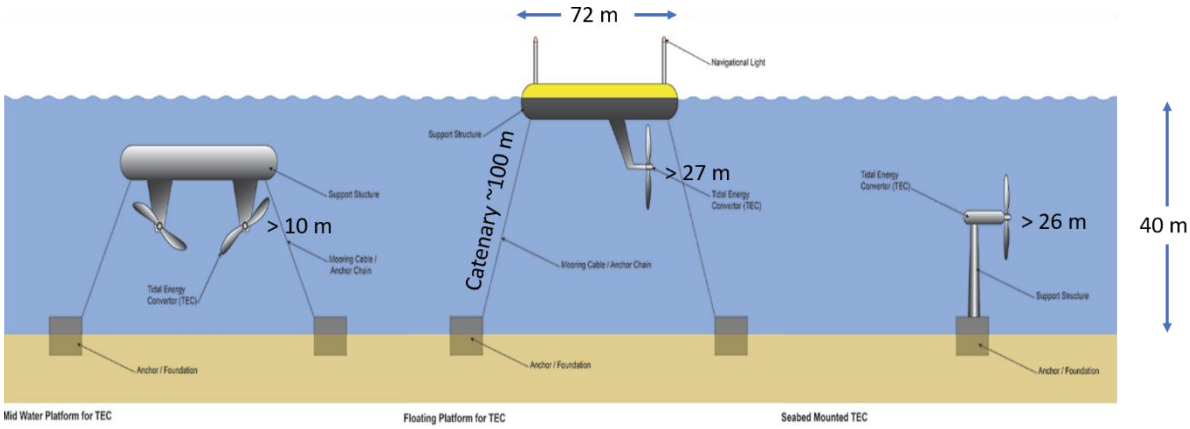
There is a non-technical summary of the EIA available at https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000007-017%20Non-Technical%20Summary.pdf

Not all of the 27 chapters are directly relevant to sea kayaking – what follows is an introduction to the most pertinent chapters.

Chapter 4 - Project description

Morlais took out a 45 year lease for the West Anglesey demonstration zone from the Crown Estate in 2014. The intention is to provide a consented tidal technology demonstration zone with communal infrastructure such as export cables and substations, for tidal technology developers to install arrays of tidal energy converters. The total area of the Morlais Demonstration Zone (MDZ) is 35 km² broken down into nine sub-zones each with its own support infrastructure in the form of an electrical cable hubs ech with an export cable connection (nine "tails") to Abraham's Bosom. "Berths" in the sub-zones will be let to different companies to test different tidal turbine devices. So far it appears that nine companies have expressed an interest in renting space from Morlais. These are: Aquantis, Big Moon Power, Instream Energy Systems, Magallanes Renovables, Nova Innovation, Orbital Marine Power, Sabella, TidalStream/Sustainable Marine Energy and Verdant Isles. The devices will be a mix of seabed mounted, suspended in the water or suspended from floating structures. Since these devices are different the final layout of the array will not be settled until after consent has been given and will not require further consent or consultation. The development of the array will be phased starting with 40 MW and increasing to maximum of 240 MW.

There are three basic classes of tidal devices being proposed: floating, mid-water and seabed mounted as shown in the diagram.



Surface floating devices come in various configurations – the largest are up to 72 m long while others are 22 x 30 m. Could have rotors up to 27 m diameter, pairs of 24 m rotors or several smaller rotors The devices will have catenary moorings with heavy chains which will drag across the seafloor every time the tide changes. The spacings of the floating devices would be in the range 50-200 ± 30 m between structures perpendicular to flow and 120-500 ± 40 m parallel to flow.

Buoyant mid-water devices are below the surface with moorings under tension so with les impact on the seabed than catenary moorings for the floating devices. Example device given has multiple, small (less than 10 m diameter) rotors. They will be installed at similar spacings to floating devices.

Seabed mounted devices are single rotors which can be relatively small with rotors less than 10 m diameter but also very large with rotors up to 26 m diameter. Spacing will depend on size and will range from spaced 50-100 m apart perpendicular to flow and 100 and 250 m parallel to flow.

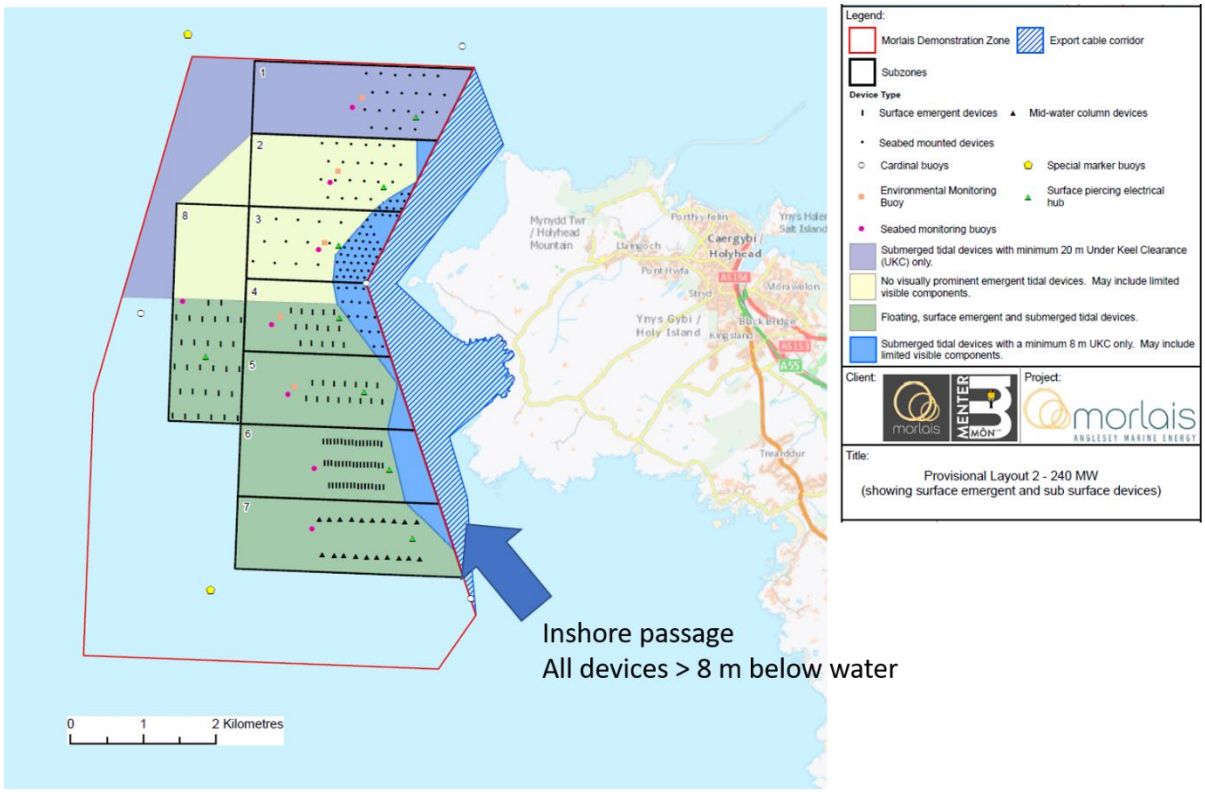
The *worst case* scenarios for the EIA supposes installation of up to:

- 620 devices
- 180 surface piercing devices (up to 130 floating)
- 120 **electrical hubs** to aggregate power from a cluster of devices – these will be either mounted on the seabed or floating and maybe emerge up to 18 m above the water.
- 8 submerged and floating **environmental monitoring platforms** up to 6.5 m above the water.

- 4 **cardinal buoys** with flashing white lights visible for 5 nm and a number of marker buoys with yellow flashing lights.

All surface emergent structures will be painted yellow and have navigation lights. All submerged devices and equipment will be marked with buoys also with navigation lights. All infrastructure in the water will be painted with potentially toxic anti-fouling preparations.

The map below gives an indicative layout of maximum occupancy of the array with various devices to give a total output of 240 MW which would make it the largest tidal array in the world.



The area between the MDZ and the coast is termed the ‘inshore passage’ and is intended to give a 1 km zone with no emergent devices for passage of small boats (indicated dark blue in layout map).

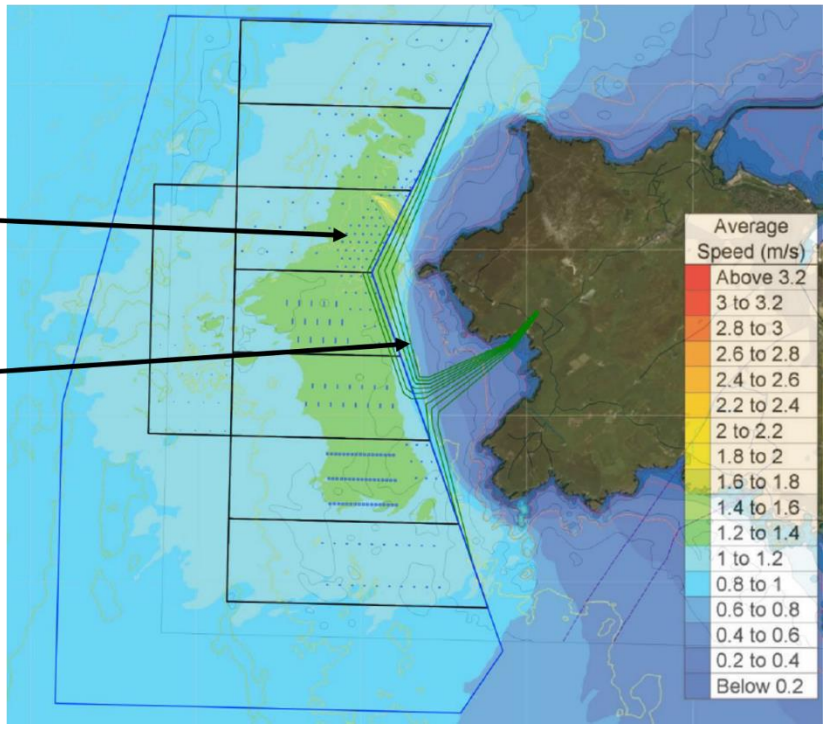
If consent is given in March 2021 as planned, the offshore **construction** phase would start in January 2023 for Morlais infrastructure together with the first of the daughter arrays installed by the companies renting berths. Construction is expected to “extend over a period of several years” during which there would be intermittent activity to expand the number of tidal devices to maximum capacity. Worst case for duration of construction are given in diagram to illustrate impact on passage around the Stacks.

Construction
500 m exclusion zone around construction vessels and sites

Duration of construction for full occupancy:
Hubs – 1.5 days x 120 = 1,800
Devices = 4,306 days
Interarray cables 1.5 days x 740 = 1,110 days

Export cables - 32 days per cable x 9 cables = 288 days

Operation
Up to 4 groups of service vessels in MDZ at any one time for 37 year life of project



Chapter 6 - Consultation

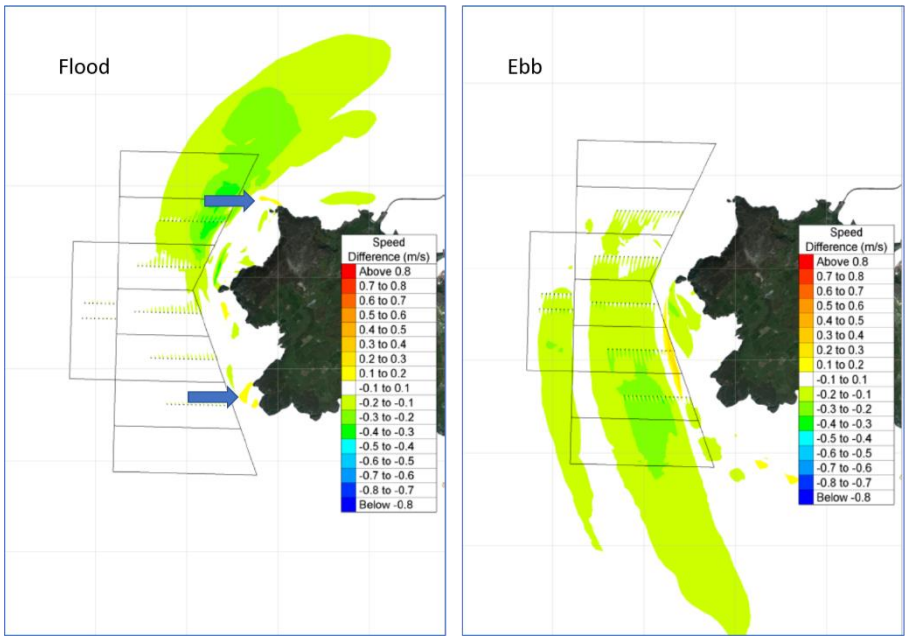
Trawling through these documents reveals that there has been no significant representation of sea kayaking interests in the consultation.

Chapter 7 - Metocean[1] conditions and coastal processes

Within this chapter is an evaluation of the impact of the array on nearby tidal streams. This is a 2-D model prepared by HR Wallingford primarily to assess impacts of flow rate changes within the array for the purposes of determing power output and are not intended for assessment of chages outside the array – what are termed near-field and far-field impacts. Neverthelss, the modelling indicates there are likely to be changes in flows within the inshore passage and through the MDZ which would be of concern to any in small boats and especially kayakers.

Outputs from the HR Wallingford 2-D tidal flow model have been provided for four energy production scenarios. Note, sea bed turbines are anticipated to reduce speed of water flowing through them by 0.8 m s^{-1}. The changes in flow rates for the 60 MW and 240 MW scenarios are shown below – greens and blue flows will be slower in this area than at present; yellows and oranges it will be faster.

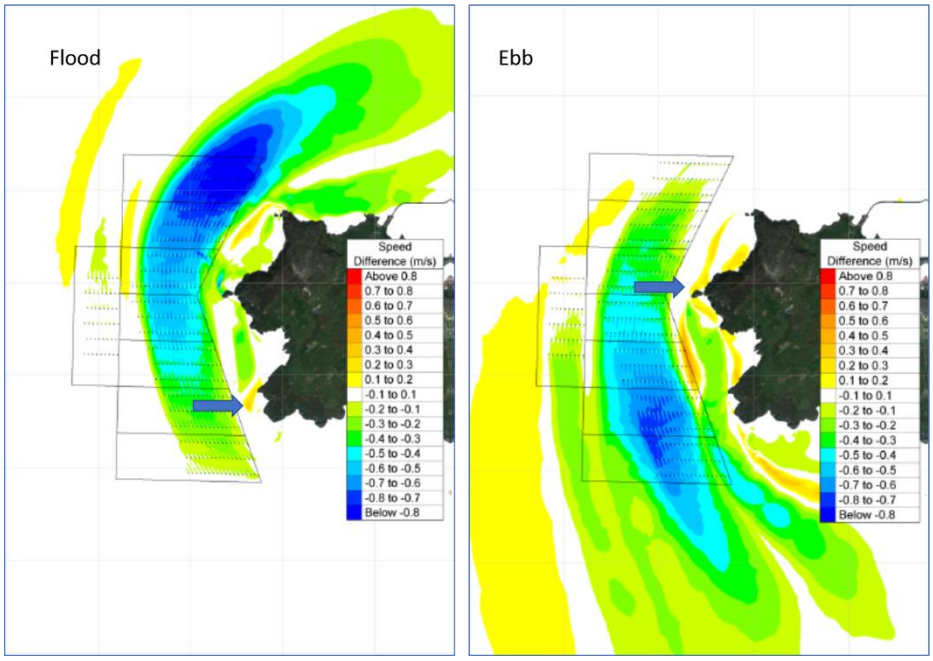
[1] Metocean = meterological + ocean processes



60 MW installation

Speed difference in peak depth averaged flow for mean spring tide

1 m s^{-1} = 1.94 knots = 3.6 km hr^{-1}



240 MW installation

Speed difference in peak depth averaged flow for mean spring tide

1 m s^{-1} = 1.94 knots = 3.6 km hr^{-1}

See https://www.youtube.com/watch?v=7FtMP-7ua_E&t=262s for a model running across a spring-neap cycle. It would be useful to know if changes in speed will affect all flow rates or be more or less intense in neaps or springs.

Further detail in:

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000067-ES%20Volume%2001%20-%20Ch07_F3.0_Metocean%20Conditions%20and%20Coastal%20Processes.pdf

Full resolution figures:

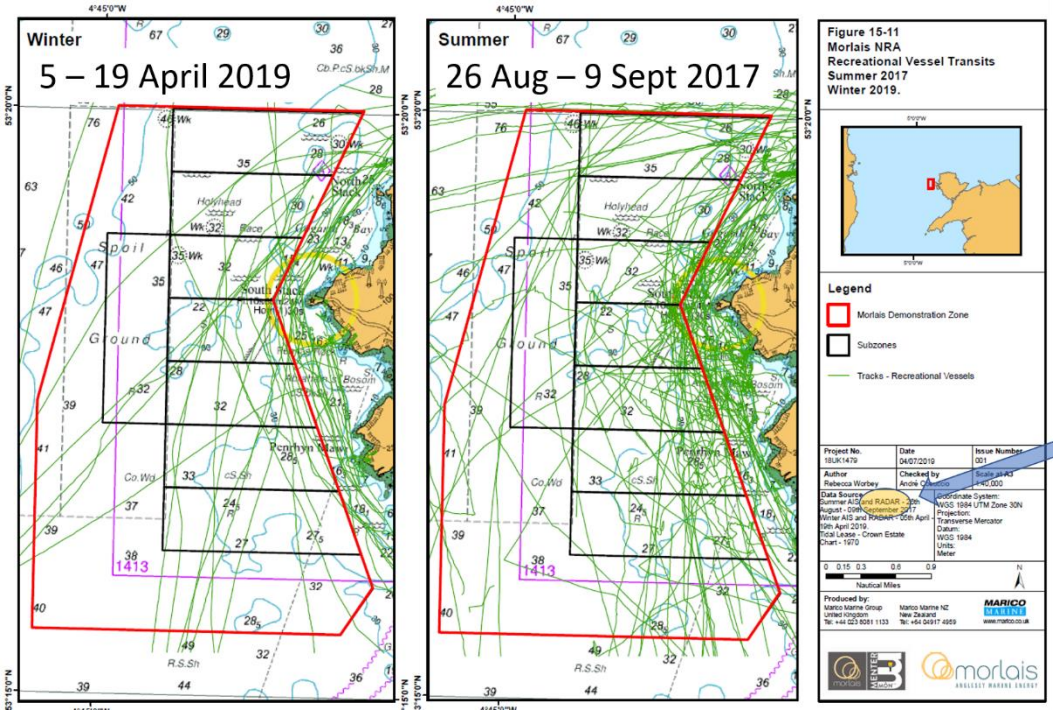
https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000091-ES%20Volume%2002%20-%20Chapter07_F3.0.pdf

Original report done by HR Wallingford – details of modelling and flow regimes

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000111-ES%20Volume%2003%20-%20Ch07.pdf

Chapter 15 – Shipping and navigation

Morlais contend that “kayaks and canoes” fall into the category of Recreational vessels < 3 m draught – and this is what they have as representation of this. Note this likely doesn’t include kayaks as they notoriously don’t show up on radar.



The report notes that 52% of transits through the MDZ is recreational vessels < 3m draught including yachts, powerboats, kayaks and canoes. This makes this class of vessel the most prolific receptor (of the MDZ impacts). Nevertheless, the only hazard to these vessels that is considered in the impact assessment is the risk of collision with MDZ infrastructure. Collision risk was deemed to be moderate due to the potential for loss of life with grouding as a significant risk. Embedded mitigation to reduce these risks weere gien as: limit devicesto greater than 8 m below surface on eastern edge and redesign of eastern boundary. Re-design of eastern boundary was “excluded as it was considered an unacceptable measure effecting the viability of the development”.

Proposed additional mitigation which could potentially restrict access by kayaks in the same manner as for offshore windfarms are;

- restrict navigation through the MDZ,
- use of guard vessel(s) to monitor passing traffic, and
- implementation of safety zones

If all of these are implemented then residual risk is deemed to be low. However, there is no mention of project impact on low powered craft (i.e. paddlers) arising from changes in tidal flow rates or alignment indicated in the hydrodynamic modelling. It seems very likely that the complex pattern of overfalls, races and eddies will be significantly disrupted.

The hazard represented by any infrastructure coming above the water in areas of fast tidal flows is underplayed for kayaks and other small vessels e.g. small sailing boats which have limited power and

steerage. For such boats in an emergency they are largely at the mercy of the tides and weather and risk of being swept into the arrays and colliding with barges, buoys and inspection platforms etc. is considerable. There has already been a collision between a yacht which was dismasted and the solitary Minesto buoy which is 8 km offshore in its first year of operation.

Further detail in:

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000075-ES%20Volume%2001%20-%20Ch15_F3.0_Shipping%20and%20Navigation.pdf

Full resolution figures in:

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000099-ES%20Volume%2002%20-%20Chapter15_F3.0.pdf

Consultants' navigation risk assessment

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000118-ES%20Volume%2003%20-%20Ch15.pdf

Chapter 24 - Seascape, landscape & visual impact assessment

This chapter deals with visual impact of the scheme – from land view points. The Morlais impact study considers that visual impacts of the project from the land are 'not predicted to be significant'.

Impacts on people on recreational vessels were assessed from a point 2.4 km south of the MDZ and considered to be a moderate impact. "It is acknowledged that the level of effect on these receptors, at a given location, would vary with distance and greater (and potentially significant) effects would occur at locations closer to the MDZ. However, such effects would be localised and associated with people travelling within approximately 2 km of the Project". However, kayaks as well as vessels passing through the inshore passage would be a lot closer than 2 km and visual impact would be adverse and significant.

Further detail in:

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000084-ES%20Volume%2001%20-%20Ch24_F3.0_Seascape,%20Landscape%20and%20Visual%20Impact%20Assessment.pdf

Chapter 25 - Socio-economics, tourism and recreation

Mostly concerned with regional tourism figures which shows water sports as being a very small component of total visitor's reasons for visiting North Wales / Anglesey. This is what they say about sea kayaking:

“Anglesey is a popular destination for sea kayaking for novices and experienced paddlers. Sea kayaking takes place all around the island’s coastal waters, but the north coast of Anglesey has a challenging combination of steep cliffs, strong tidal streams, offshore islands and sheltered bays. The area of sea around Holy Island including the MDZ is particularly challenging in nature and generally only recommended for experienced kayakers (Krawiecki and Biggs, 2013). The sea kayaking community, including local clubs and local kayaking training providers, will be kept informed of the development of the site particularly during construction period and the cable laying closer to shore. This will be backed up by the introduction of relevant signage.”

There is no mention of the sea kayak scene centred around Holyhead and the contribution this makes to visits to Anglesey e.g. the Anglesey Sea Kayak Symposium which draws people from across the world; two sea kayak manufacturers, specialist shops, accommodation and centres and ~10 sea kayak guide and training companies. There are also many repeat visits by canoe clubs from across the UK. Numbers on all of this would be useful to make the case to the Morlais developers that sea kayaking is a significant activity on Anglesey and should be represented in the consultations.

Further detail in:

https://dns.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/DNS/3234121/DNS-3234121-000085-ES%20Volume%2001%20-%20Ch25_F3.0_Socio-Economics,%20Tourism%20and%20Recreation.pdf

Biodiversity impacts

The impacts of the project are assessed for a wide range of marine wildife which are summarised here. There are many objections being made on behalf of wildlife and if you have a particular interest in any of these issues please seek out the specialist organisations such as RSPB North Wales, North Wales Wildlife trust, Whale and Dolphin Conservation etc..

Chapter	Worst case impact
9 – Benthic and intertidal ecology	Permanent loss of 2.23 km² (~ 6% of total area) of which 2.18 km² is the area swept by the catenary anchors. Temporary loss of 0.42 km² It is considered by some objectors that insufficient attention has been given to the determination of risk to seabed habitats of higher conservation value.
10 – Fish and shellfish	Much of the discussion is about the risk of noise and fish colliding with the rotors. Rotor tip speed is estimated to be 22 ms^{-1} and will kill fish. Fish have varying susceptibility to noise with some not hearing the turbines so less able to avoid them with others being startled or even damaged by excessive noise. Some fish are also better able to avoid collisions. Impacts are considered to be low as MDZ is small part of the Irish Sea used by fish. Some objectors consider further detail is required on migratory fish.
11 – Marine ornithology	Potential impacts on birds are difficult to determine as they could be very complex as: boats may disturb the birds; lights might attract them; there maybe changes to availability of food through changes in fish density or location; changes in water quality; noise both above and below water; diving birds may collide with fast moving rotors. There are models for each of these interactions based on observations elsewhere but there are rather few tidal turbines from which to gather data with some figures and methods used by Morlais are contested. The most susceptible species are judged to be puffin, red-throated diver,

	guillemot, razorbill and shags as they are deep divers so most likely to encounter the turbines. Worst case coud be loss of breeding colonies of guillimot and razorbills.
12 – Marine mammals	Impacts on porpoise, dolphins and seals are judged to arise mostly from underwater noise and risk of collision with turbine rotors. Few data are available for these risks and ar contested.