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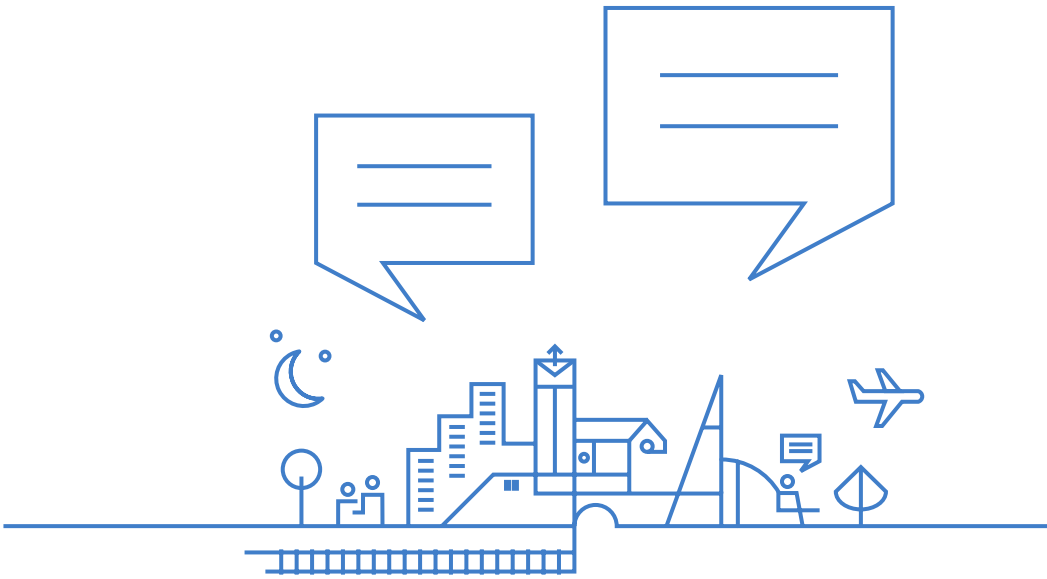
Marine and Coastal Impact Assessment

Thought pieces from UK practice



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GUEST EDITORIAL

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Marine and Coastal Impact Assessment

Welcome to Volume 10 of the Outlook Journal, which brings together a selection of articles about the assessment and consenting of marine development. As we embark on the UN's Ocean Decade, and with the expansion of the offshore wind sector, this edition is both timely and important. We draw on lessons learned and wider reflections on marine impact assessment and related consenting frameworks, to work towards a firmer understanding of EIA within this fluid space.

Through its very nature the marine environment is one that is challenging to develop projects within. Design and assessment must contend not only with what is on the seabed, but also with the sea itself. In this environment, site boundaries are hard to define and receptors have a habit of paying little attention to national or regional boundaries. At the coast, the complexities of the terrestrial planning system overlap with offshore consenting regimes. Projects developed here have both 'wet' and 'dry' elements to them.

Looking out to sea it is tempting to think of it as a blank, blue expanse. Looks can be deceiving. Below the surface the marine environment is every bit as complex and 'busy' as its terrestrial counterpart. Offshore wind farms contend for space with aggregates extraction and submarine cables. Closer to shore fish farms, sea defences and other coastal development vie for space. This infrastructure co-locates (or doesn't) with protected habitats, designated areas, disposal sites and wrecks. Among and through it all pass vessels of all sizes and a rich and diverse tapestry of marine life, from target fish species to marine mammals and everything in-between.

How do we, as members of the planning and impact assessment community, make sense of all this complexity within EIA and its related consenting and assessment processes? The contributions included in this journal act as an entry point into the diverse and exciting world of marine impact assessment.

The first trio of articles frame the challenge. **Ed Walker** kicks us off with an overview of the diversity of marine industries, framing the spatial planning challenge within the history of marine uses and their linkages with cultural identity. Ed uses navigational risk assessment to further explore this theme. Building on this introduction, **Miriam Parish's** article focuses on the complexities of consenting at the water's edge, the various permissions coastal development requires, and the assessments needed in order to gain consent. We then delve into the EIA Quality Mark article archive with **Jamie Oaten**

who discusses how, in aiming to leave the environment in a better state following development than before, marine net gain can complement EIA processes with regard to avoiding environmental deterioration.

The second trio of articles give sector-based reflections on marine EIA and consenting. **Laura Gatdula** explores the offshore wind consenting landscape in the UK and Ireland and discusses how the UK and Irish Governments can reach their targets for offshore wind this decade. **Caroline Purcell** reflects on decommissioning offshore wind structures – an emerging issue within marine EIA – and uses lessons learned from the oil and gas sector to explore challenges and opportunities for this section. Moving away from offshore wind, **Ben Johnson** brings us closer to shore with his reflections on EIA processes related to Scottish salmon farming. These articles allow reflection on the similarities and differences inherent in operating the EIA process across sectors.

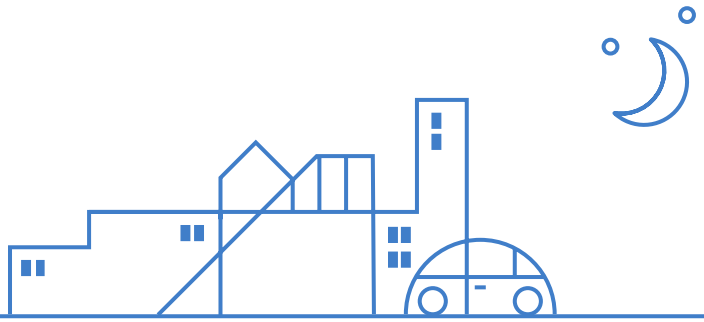
Applying a different lens, the next trio of articles relate to receptor-specific challenges. **Miriam Parish** and **Georgina Roberts** explain what *Sabellaria* reef is and why it is important. They further explore the implications of what happens if you find it during the assessment of a marine development project. **Graeme Cook's** EIA Quality Mark article, in which he discusses apportioning impacts upon *Larus* gulls, uses the Caithness wind farm as a case study for reflection. Likewise, **Gayle Boyle's** article, also from the EIA Quality Mark archive, explores how EIA methods can be utilised to minimise marine licence conditions and restrictions in relation to spawning fish.

EIA does not end at the consent stage. Reminding us of this, **Fraser Malcolm's** EIA Quality Mark article discusses post-consent compliance in Scotland. This article, like Gayle's, stresses the importance of including post-consent considerations within EIA processes.

The articles in this edition respond to the challenge of assessing development within this fluid marine space. Our final article introduces cross-jurisdictional complexity. In her article, **Laura Gatdula** provides her thoughts on applying for consents for cross-jurisdictional marine projects. In this article the experience gained through working on a project straddling three maritime jurisdictions provides insight into another challenging area for marine EIA.

At first glance it may appear that the deep waters of marine EIA are treacherous to navigate. But as our contributors make clear, this is an area in which professionals are gaining an ever broader and deeper understanding of what is needed to manage and assess the development of our seas.

I would like to give my sincere thanks to all of our contributors, both new and those who previously submitted articles under the EIA Quality Mark. I hope that this edition of the Outlook Journal provides you with the opportunity to think about the complexity of marine EIA whilst considering the wider marine environment in which the marine planning and consenting processes operate.



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Setting a clearer course: marine spatial planning and UK coastal development

Marine heritage

As an island nation, use of the marine environment to support our social and economic development is unsurprisingly nothing new. Taking London as an example ('Londinium', as it was in 50AD). The city became what we now know through its strategic position along the tidal river Thames. Exploring historical records, a multitude of users operated alongside one another with passenger transport, sewage and waste disposal, shipbuilding and the movement of goods and commodities being notable examples[1].

As activity increased throughout the 17th, 18th and 19th centuries, the Thames became a hotbed of marine activity. And with that came risk. The dangers at this point are highlighted poignantly by the tragic sinking of the Princess Alice in September 1878 after she was struck by a coal barge[2]. Shortly after this point, in March 1909, a new central body – the Port of London Authority – was created to help further the regulation of this intensively busy waterway[3].

UK development

Fast forward to the present day. Centres of economic and industrial power have emerged throughout the UK, dotted around our waterways and coastlines. Whilst rooted in industries such as shipbuilding, coal and steel, marine development is now a more diverse world. In north east Scotland, Aberdeen Harbour (the oldest business in Britain, emerging in 1136) is now host to the European Offshore Wind Deployment Centre (EOWDC[4]), a 93.2MW 11-turbine offshore wind scheme trialling large 8.4MW turbines with next generation 'suction bucket' foundation technology.

Elsewhere, Teesside, once internationally renowned for its steel, is now set to be developed as the UK's first zero-carbon industrial cluster ('Net Zero Teesside' [5]). In Scotland and England, multiple applications have been submitted to use seawater to cool datacentres which are facing greater use due to our increasing use of the internet and "big data" across all walks of life.

1 Stone, Peter (2017) The History of the Port of London: A Vast Emporium of Nations
2 Thames Police Museum (2021), Thames Police History: Princess Alice Disaster 'Officials Examine the Scene'. Accessed Online; Available at: http://www.thamespolicemuseum.org.uk/h_alice_11.html
3 PLA (2019), Port of London Authority: A Brief History. Accessed Online; Available at: http://www.pla.co.uk/A-Brief-History-of-the-PLA
4 EOWDC (also referred to as the "Aberdeen Bay Wind Farm") is an OWF test and deployment / demo facility located just off the coast of the city of Aberdeen. Further information about EOWDC can be found here: https://group.vattenfall.com/uk/what-we-do/our-projects/european-offshore-wind-deployment-centre
5 NZT is set to be the UK's first decarbonised industrial cluster; it features a CO2 gathering network linking a range of industrial emitters around Teesside, a highly efficiency CCGT generation station (with its own carbon capture plant) and a portion of offshore CO2 export pipeline. Works taking place offshore will include a 140km long pipeline for transport of the dense-phase CO2 and a permanent geological storage facility. More information about NZT is available here: https://www.netzeroteesside.co.uk/

Regulation

The principal method of regulating coastal development is the Marine and Coastal Access Act (2009) – 'MCAA'. As well as setting out the process for how regulatory bodies may determine a request for a consent, the MCAA sets how, in considering such an application, several factors must be considered including 'the need to prevent interference with legitimate uses of the sea'. There is much policy and legislation concerned with marine development but, for me, there is something wonderfully concise about the message from the MCAA here.

Challenges

The rich heritage of UK coasts means that our seas and coastal waterways are home to a multitude of different users. Whether this be a longstanding local fishing community or a popular recreational coastal resort, existing users are crucial to consider in terms of interfaces with future marine development. As the pace of different marine industries continues to grow, there is also the challenge of co-development; by way of example, one of several reasons cited for the refusal of Thanet Extension Offshore Wind Farm last year was the impact of the windfarm on other neighbouring marine development and potential future ports growth[6].

Solutions

As highlighted above, the activities for which consent may be sought around our coasts are extremely diverse; this ultimately means that there is no 'one size fits all' approach for the assessment and regulation of activities. As opposed to a single solution to challenges of marine development, a site-specific approach is needed whereby the individual merits and issues of a particular technology, whatever that may be, are appraised.

As a professional community, we should always look to refine and improve where we can. Looking back to the topic of interference with 'legitimate uses of the sea', one salient consideration is navigational risk. In the case of offshore wind, the scale of the industry growth over recent years has led to the development of technology-specific guidance which has been produced and published by industry. For the multitude of other coastal activity, there is far less guidance.

Forward look

Whilst the concept of marine development is nothing new, as our coasts become home to an increasing range and frequency of activity, we must recognise and confront the challenges associated with multiple activities and users operating alongside one another.

As the pace of marine development builds, it will be beneficial to build upon the lessons learned from industries such as offshore wind and marine aggregates and develop practical guidance and advice to help inform assessment and decision making.

For the topic of navigational risk specifically, I look forward to working with the IEMA community to further the development of best practice and practical guidance which can help support marine growth.

6 Planning Inspectorate (2020), Decision Documents associated with the Thanet Extension Offshore Wind Farm.Accessed Online;Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010084/EN010084-003114-TEOW%20%E2%80%93%20PINS%20Notification%20Letter%20of%20Decision.pdf

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Consenting at the water's edge in the UK

At the water's edge, consenting development can be extremely complex. In the coastal zone, terrestrial legislation and marine legislation meet and overlap, and the statutory authorities on planning permission and marine licensing must follow the Coastal Concordat to agree how development will be assessed and consented.

The Coastal Concordat

The Coastal Concordat[1] applies to the consenting of coastal developments in England where several bodies have a regulatory function, and it is designed to form the basis of agreements between the main regulatory bodies and coastal local planning authorities. The Coastal Concordat provides a framework within which the separate processes for the consenting of coastal developments in England can be better coordinated. One of the principles of the Coastal Concordat is that regulators in the coastal zone should agree a single lead authority for coordinating the requirements of Environmental Impact Assessments (EIAs) and Habitats Regulations Assessments (HRAs).

Infrastructure development at the water's edge varies hugely and can include nuclear power stations, coastal defences, residential developments, ports, marinas, landfall for offshore cables and pipelines, industrial sites, urban development and land reclamation. Our coastlines are so important to the way we live and work, especially as an island nation in the UK where we rely on our coast to provide us with a variety of services.

Coastal consents

Coastal and marine consenting legislation, regulations and processes vary between England, Scotland, Wales and Northern Ireland. This article will focus on coastal consents in England. When looking to apply for consent for a coastal infrastructure project, it is important to note that more than one consent may be required.

Development and associated activities in and around the marine environment at the coast in England may require a number of consents, such as:

- marine licence
- planning permission
- Crown Estate permit
- wildlife licence
- European Protected Species licence
- Seabed Survey Licence
- environmental permit or water abstraction licence
- SSSI consent
- flood risk activity permit
- River Works Licence
- Harbour Order

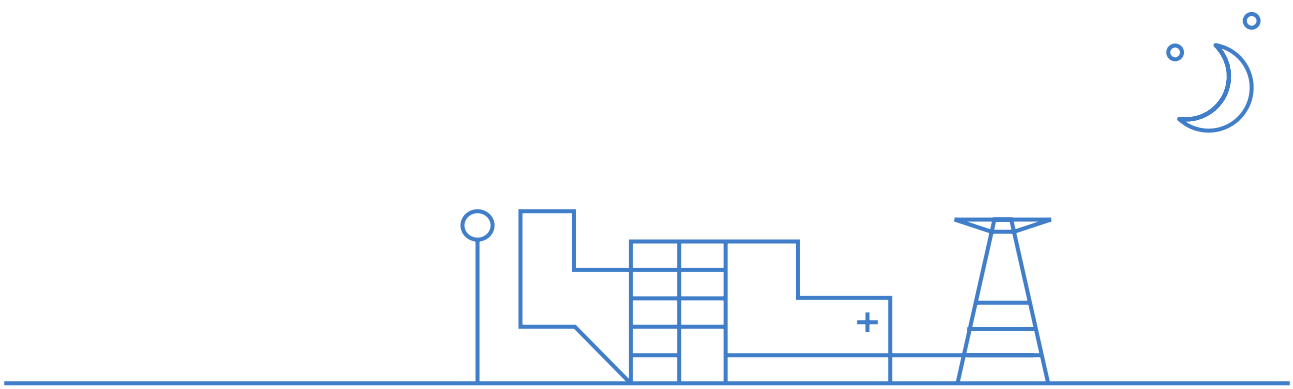
1 UK Government (2020) A Coastal Concordat for England (updated 30 October 2020). Accessed via URL: https://www.gov.uk/government/publications/a-coastal-concordat-for-england.

On a coastal project in England, the main regulatory bodies such as the local authority and the Marine Management Organisation (MMO) agree via the Coastal Concordat which organisation will take the lead for coordinating assessment requirements for the marine licence and/or the planning permission. However, it is important to note that this does not mean that further consents from other regulatory bodies will not be needed. It is more often the case that a coastal scheme may need a number of the consents listed above, if not all. Doing your research and engagement with the main regulatory bodies and stakeholders is key to determining which consents are required for a coastal project.

Nationally Significant Infrastructure Projects (NSIPs), which are major infrastructure developments in England and Wales, fall under a separate consenting regime which is managed by the Planning Inspectorate. NSIPs require a Development Consent Order (DCO) application to be submitted, which will ultimately require the Secretary of State to grant consent. NSIPs in the coastal and marine environment in England require a deemed marine licence from the MMO, which would be applied for in parallel with the DCO.

When applying for consent for a coastal scheme, there are a number of assessments that may need to be undertaken to support a consent application, such as:

- Environmental Statement to inform an EIA for projects that are sufficient in size and impacts to fall under the EIA Regulations or the DCO process
- Environmental Assessments to inform the marine licence/planning permission
- HRA (following the Habitats Directive)
- Water Framework Directive Assessment (following the Water Framework Directive)
- Marine Conservation Zone Assessment (following the Marine and Coastal Access Act 2009)
- Flood Risk Assessment (following the National Planning Policy Framework (NPPF) and Environment Agency requirements)
- Marine Plan Assessment



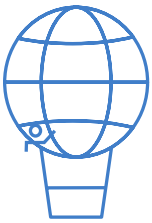
Lessons learnt from working at the water's edge

When looking to apply for consent for a development project at the coast, it is vital to commence research at an early stage to determine which consents are required. Early regulator engagement is critical to de-risking the licence application phase. Agreement with key regulators such as the MMO and local authorities regarding consents required, how assessments will be undertaken, and identifying and discussing development constraints to be assessed are important tasks.

Key statutory consultees for coastal marine licences can include Natural England, the Environment Agency, the Centre for Environment, Fisheries and Aquaculture Science, English Heritage and Historic England, local authorities, the Crown Estate, harbour authorities, the Maritime and Coastguard Agency and Trinity House. Anticipated delays from regulator engagement should be built into your project programme, as regulator response times vary and can often take long periods of time.

Furthermore, be aware that separate consents such as a marine licence may be required for preliminary works such as surveys, prior to a full marine licence application for development.

Ultimately, consenting development at the water's edge is complex; there are a number of coastal consents that may need to be sought, a number of coastal assessments that will need to be undertaken to inform those consent applications, and a number of regulators that will need to be consulted throughout the development consent application process.



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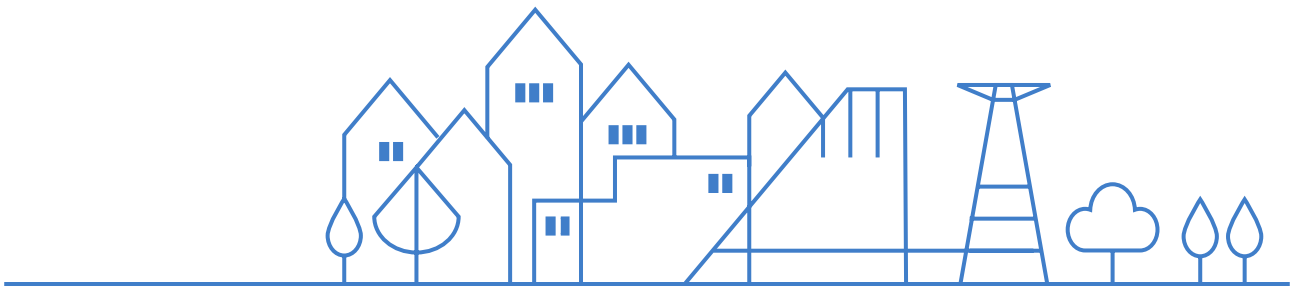

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Marine Net Gain: moving towards a practical framework and metric for the marine environment

Net gain has been proposed as a mechanism for contributing to the restoration of natural habitats by aiming to leave the environment in a better state following development. This is pertinent to Environmental Impact Assessment (EIA), given that likely significant effects on biodiversity caused by 'EIA development' need to be assessed, and the EIA process should contribute to avoiding any deterioration in the quality of the environment.

The Environment Bill, which will officially mandate the use of biodiversity net gain for developments in England, is still undergoing parliamentary scrutiny following its re-introduction in January 2020. The current expectation is that it will become law by autumn 2021. If enacted this will mean terrestrial and intertidal habitats will have to be considered, down to the mean low water mark, to account for the whole regime of the Town and Country Planning Act.

At the present time, the intention is to apply net gain to intertidal areas covered by the planning system. However, ABPmer has been advocating for a 'marine net gain' approach which would apply more broadly in coastal and offshore waters. This article discusses a simple and practical approach to marine net gain through the development of a 'Marine Net Gain Metric'. The aim of the metric is to provide a simple method to calculate net gain on all developments requiring a marine licence. A more detailed White Paper on the topic has been produced by ABPmer and can be found here.

The first key net gain principle is the application of the mitigation hierarchy. The priority is to restore and maintain over creation and offsetting, therefore all steps of the mitigation hierarchy should be followed prior to any net gain actions: avoid, mitigate, restore, offset (no net loss), net gain.

A key element of the net gain approach is the development of a metric: a tool that allows biodiversity losses and creation of offsetting habitat to be measured. Progress with the development of a marine net gain metric has lagged behind its terrestrial counterpart[1]. However , Natural England is currently developing an intertidal-only net gain metric. Many of the concepts developed for the terrestrial metric can be translated across to the marine environment for application to activities for which a development licence is required.

The aim of a marine metric would be to provide a tool that can be used to calculate net gain for licensable development in the marine and coastal environment, providing a simple and objective method for informing net gain decisions. Similar to the terrestrial metric, the marine metric would be based on an interpretation of

1 Natural England (2020). The Defra Biodiversity Metric 2.0. https://bit.ly/3elfKZU [14/04/2020]

'Area X Quality' to quantity the biodiversity value of a habitat area. The relative quality is defined by two key habitat attributes, distinctiveness and condition. Condition is assessed against a generic set of criteria linked to habitat attributes in a recognised habitat classification.

The process converts a given area to Habitat Units to determine how much compensation habitat is required. It can be used to calculate the losses and gains in biodiversity from actions such as development or from positive conservation management. The initial calculation determines the pre-intervention value in biodiversity units. The process is then repeated using a post-intervention scenario to account for the impact of a development or intervention (including any measures to retain, enhance or create additional biodiversity within the development site).

At this point additional factors to account for the risk associated with creating, restoring or enhancing habitats are considered. A risk factor is used to account for the likelihood of failure of offset actions. The risks are:

- Delivery risk – that associated with the implementation of the offset due to uncertainty in the effectiveness of restoration or habitat creation/management techniques.
- Temporal risk - in delivering offsets, there may be a mismatch in the timing of impact and offset, i.e. a delay in the offset reaching the required quality or level of maturity, which results in a temporary loss of biodiversity.
- Spatial risk – this reflects the ecological risk of undermining aspects of connectivity and function if the created habitat is at a distance from the place of impact.

Based on the above, a suggested metric for marine habitat net gain is as follows:

pre-intervention units = (area x distinctiveness x condition)

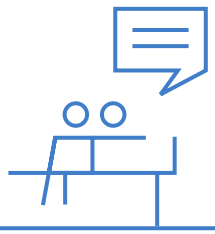
post-intervention units = (area x distinctiveness x condition) x (difficulty of creation x time to condition x spatial risk)

post-units - pre-units = net gain

In the marine environment, many subtidal habitats, and some intertidal ones, are difficult to recreate. It is likely that the concept of irreplaceability applied in the terrestrial metric will need to be modified to reflect marine circumstances. There is also likely to be a greater need to achieve net gain using different habitats, including offsetting subtidal impacts with intertidal gains.

To maximise the ecological and environmental benefit of interventions, an element of experimentation will be required. This will mean that an important element of learning about how to recreate more difficult features such as native oyster reef and seagrass beds will be required, and this will need a shared risk approach between developers and public bodies.

Additionally, there are various challenges associated with interventions in coastal/marine environments both due to the multi-use nature of the marine environment and the need to work with existing marine processes. Both of these issues demand that a strategic approach to identifying the location and nature of interventions is required.

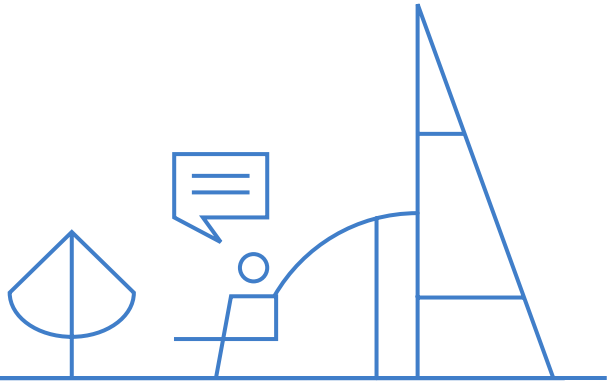


Existing requirements for development affecting Marine Protected Areas (MPAs), e.g. Wild Birds and Habitats Directives and the Marine and Coastal Access Act, will need to be complied with. Currently, this will significantly limit application of the metric as around 80% of UK estuaries and 50% of coastline are subject to such designations. However, consideration could be given to requiring net gain to be applied to residual impacts of developments within MPAs even where these are not judged to constitute an adverse effect on the site. Additionally, there are a number of impact pathways assessed within EIAs in relation to disturbance of species which are of a minor nature. There needs to be some agreement on minimum thresholds of disturbance and agreement of when these fall within net gain assessment.

Furthermore, applying the marine metric only to licensable development activities will make only a minor contribution to halting or reversing marine biodiversity decline. Consideration needs to be given to applying net gain to other activities affecting the marine environment, outside of licensable development activities.

In addition to developing intertidal and marine net gain metrics to enhance coastal and offshore habitats, there may be some scope to include species impacts and temporary impacts as part of a marine metric. However, addressing aspects such as habitat disturbance and species impacts in the marine environment in a robust and equitable way remains problematic at this time.

"A key element of the net gain approach is the development of a metric: a tool that allows biodiversity losses and creation of offsetting habitat to be measured."



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Challenges for offshore wind consenting in a growth seascape

Introduction

This article explores the consenting landscape in the UK and Ireland and discusses how the UK and Irish Governments can reach their targets for offshore wind this decade. It includes reflections on lessons learnt from previous and current offshore wind projects in the UK and Ireland from a consultant's perspective and suggests future trends for the industry.

The growth of offshore wind

The UK Government's target for offshore wind capacity has recently increased from 30GW to 40GW by 2030, which is a significant increase from the currently operational capacity of 11.8GW. It is to be achieved partly through the seabed leasing rights secured in The Crown Estate's (TCE) Round 4 bidding process that concluded in February 2021, as well as through a new leasing opportunity announced by TCE for commercial-scale floating wind projects in the Celtic Sea. The Scottish Government aims to secure 11GW of offshore wind capacity by 2030 through its ScotWind leasing round, and the Government of Ireland has plans in motion to auction over 3.5GW of capacity in the same period.

The volume of projects planned around the UK and Ireland will keep EIA and consenting professionals busy for some time and while many lessons have been learnt through the leasing rounds to date, the scale of the proposed developments, the complexity of the increasingly busy marine environment, and the scale of the transmission requirements will pose new challenges.

Consenting and EIA

The consenting regimes that individual offshore wind projects in UK waters must navigate[1] are well understood, while a new regime is being established in Ireland under the new Marine Planning and Development Bill. In March 2019, the UK Government and the Offshore Wind Industry Council signed a Sector Deal[2] with a broad reach that includes workstreams designed to develop a capable workforce and identify feasible solutions to regulatory barriers to the sector's anticipated fast-paced growth.

Strategic outputs for streamlining the EIA, consenting and marine licensing process have not been announced but it is clear that synergies could and should be sought in the approaches taken to the assessment of regional concerns such as ornithology, marine mammals, underwater noise, shipping, and commercial fishing.

The cumulative effect challenge

An industry-wide approach to cumulative concerns including the disturbance of European Protected Species and the influence of the industry relative to commitments made under the Marine Strategy Framework Directive[3] should also be considered at a strategic scale.

1 In England and Wales, including but not limited to the Planning Act 2008, the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, and the Marine Works (Environmental Impact Assessment) Regulations 2007. In Scotland, including but not limited to the Electricity Act 1989, the Marine and Coastal Access Act 2009, the Marine (Scotland) Act 2010, and the Planning (Scotland) Act 2019.
2 https://www.owic.org.uk/osw-sector-deal.
3 Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

Regulators and stakeholders in all jurisdictions can be expected to focus on the rigour of cumulative effect assessments and some guidance on this issue in the face of so much proposed development would be welcomed by the industry. However, the commercial sensitivity of project parameters could stifle the ability of EIA practitioners to base their assessments on reliable data. A streamlined approach to stakeholder engagement could also be valuable as multiple projects will need to seek the views of the same stakeholder groups, which could quickly result in consultation fatigue.

Learning lessons from past experiences

Developers in the UK and Ireland offshore wind markets include companies that have been involved since the industry's inception over 20 years ago, and also those that are transitioning into offshore wind from other sectors and geographies. EIA advisors will need a good awareness of the decisions made on past projects and the evolving views of regulators on key consenting issues if they are to build lessons learnt into the design and planning of future projects and efficiently steer these developers through to successful consent.

For example, recent Round 2 extension projects have been refused or delayed on the grounds of the adequacy of navigational safety mitigation (Thanet extension) and the potential for adverse effects on the integrity of European designated sites (Race Bank extension).

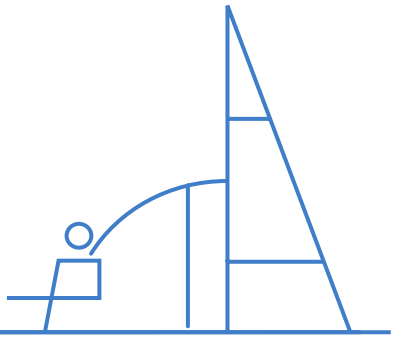
Other projects have achieved consent but subject to licence conditions that have significantly limited their design parameters. For example, East Anglia THREE had to modify its rotor tip heights to reduce impacts to seabird species, and Dogger Bank Creyke Beck had limitations imposed on the volume of cable protection that could be installed to reduce impacts to coastal processes. Other projects have had limitations imposed upon the dates within which licensable activities may occur, such as Humber Gateway, which had seasonal piling restrictions to protect peak spawning periods for certain commercial fish species. It is also common for monitoring regimes to be required at all phases of the build. Consequential programme delays cause rising costs, both for the project developer and ultimately for us all as the consumers of renewable power.

Final thoughts

The issues that carry the highest consenting risk are regionally variable, so these tend to differ from project to project. While past outcomes can be informative, they cannot be assumed to directly apply again under new circumstances, particularly where projects are progressing in devolved jurisdictions as the various regulators may not necessarily align on any single issue.

The Sector Deal and wider ongoing industry-wide collaboration has the potential to facilitate meaningful solutions to some of these challenges, but the developers and their EIA teams will have to stay on the ball to keep up.

" Regulators and stakeholders in all jurisdictions can be expected to focus on the rigour of cumulative effect assessments..."



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Decommissioning of offshore structures: the burdens and opportunities

Introduction

The offshore wind industry has experienced a tremendous growth over the past few decades and the first generation of offshore wind farms is now reaching the end of their operational lifetime and will soon need decommissioning. The expected lifetime for offshore wind structures typically is about 20 to 25 years, with more recent developments being associated with a lifespan of around 35 years (e.g. Hornsea Four, Dogger Bank).

The term 'decommissioning' refers to the necessary procedures to end the use of an industrial structure. Structures need decommissioning when they are found to have irreparable damage, have become obsolete or have reached the end of their designed lifetime. Sooner or later decommissioning is necessary. Therefore, attention to it should be paid already during the planning stage.

To date, very few decommissioning operations for offshore wind farms have been carried out globally (less than 10). Examples include the Danish Vindeby Offshore Wind Farm, the Swedish Yttre Stengrund offshore wind farm, and UK's Blyth Offshore Wind Farm.

Learning from oil and gas

Currently, the offshore wind industry is developing its know-how on decommissioning operations. In this context, the offshore oil and gas industry provides a natural source of experiences. Both operations include digging, cutting and lifting of heavy structures from the seabed into specialized vessels, as well as transport and disposal of them on land.

Decommissioning of oil and gas offshore structures has also resulted in important lessons with regards to costs and risks for companies' reputations when done poorly. Learning from the experiences of the oil and gas sector can help avoid compromising the green credentials the wind farm industry currently has[1].

Regulatory considerations

International regulations and agreements aiming to prevent dumping, or the abandonment of disused offshore structures, demand that they be removed from the seabed (see the London Dumping Convention, UNCLOS, OSPAR). However, the derogation clauses allow for exceptions in the case of heavy steel structures (above ten thousand tonnes) and gravity-based concrete. Thus, there is a lack of clarity about what can an cannot be left on the seabed.[2,3]

1 Wright, A. J. et al. (2020). How "Blue" Is "Green" Energy? Trends in Ecology and Evolution, 35(3): 235–244. doi: 10.1016/j.tree.2019.11.002.
2 Fam, M. L. et al. (2018). A review of offshore decommissioning regulations in five countries -Strengths and weaknesses. Ocean Engineering, 160: 244–263. doi: 10.1016/j.oceaneng.2018.04.001.
3 Hall, R., João, E. and Knapp, C. W. (2020). Environmental impacts of decommissioning: Onshore versus offshore wind farms. Environmental Impact Assessment Review, 83:106404. doi: 10.1016/j.eiar.2020.106404.

What do we mean when we talk about decommissioning?

Possible decommissioning options vary between total removal and abandonment in situ of the whole structure. The choice of the most appropriate option should be informed by an assessment of environmental, and in particular ecological, impacts through strategic environmental assessment (SEA) and environmental impact assessment (EIA).[4] [5]

An important issue to be considered is the risk of liability disputes associated with structures left in situ. This can potentially generate extra costs for third parties intending to develop future activities at the same site. Also, it can lead to taxpayers ending up paying for neglected abandoned structures or inadequate site clearances. The statutory requirement to present a Decommissioning Programme under the UK Energy Act aims to address this issue. Ultimately, the Decommissioning Programme will establish how decommissioning will be carried out.

In practice, due to the high level of uncertainty, while planning for development consent, there is often an assumption that the decommissioning phase is a simple reverse sequence of the construction phase. Further details are then to be presented closer to structures' end of lifetime, through the Decommissioning Programme. This was confirmed by Purcell (2020)[6] when reviewing publicly available documents of eight UK offshore wind projects.

Although this practice allows for the adoption of technological innovations developed during the project's lifetime, it risks weakening early design discussions that could promote other alternatives such as lifetime extension, reuse and repurposing of the structures.[7] [8]

Ways forward: applying lessons learned

Going back to the lessons learned by the oil and gas industry, although the decommissioning of offshore structures represents a challenge, case studies such as the Maureen oil platform, decommissioned and deconstructed for partial reuse and recycling twenty years ago, have proven that this operation can be economically and environmentally feasible.[9]

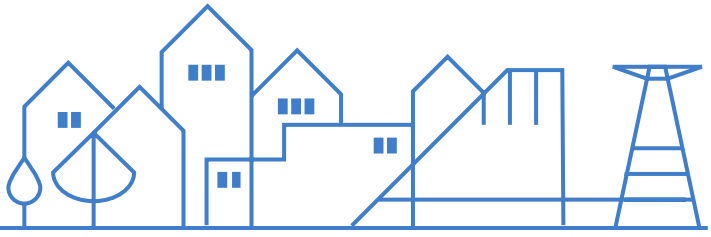
Good early planning is key to raising the opportunity to encompass concepts such as the circular economy, the strengthening of sustainable development goals and a move towards more cost-efficient and sustainable decommissioning alternatives for offshore structures.

4 Phylip-Jones, J. & Fischer, T. B. 2013. EIA for Wind Farms in the United Kingdom and Germany. Journal of Environmental Assessment Policy and Management, 15(2): 1340008.
5 Phylip-Jones, J. & Fischer, T. B. 2015. Strategic Environmental Assessment (SEA) for Wind Energy Planning: Lessons from the United Kingdom and Germany. Environmental Impact Assessment Review 50: 202-212.
6 Purcell, C. A. (2020). Planning for decommissioning: UK's offshore wind perception, practice and process. Masters' dissertation. Environmental Assessment and Management, Department of Geography and Planning. University of Liverpool.
7 Topham, E. & McMillan, D. (2017). Sustainable decommissioning of an offshore wind farm. Renewable Energy. 102: 470–480. doi: 10.1016/j.renene.2016.10.066.
8 Topham, E. et al. (2019). Challenges of decommissioning offshore wind farms: Overview of the European experience. Journal of Physics: Conference Series, 1222(1):1–9. doi: 10.1088/1742-6596/1222/1/012035.
9 Broughton, P. et al (2004). Dismantling the Maureen platform - An overview. Proceedings of the Institution of Civil Engineers, 157(2): 79–85. doi: 10.1680/cien.2004.157.2.79

Improving good environmental outcomes of the decommissioning phase of offshore wind developments can be supported by:

- An early and broad discussion of decommissioning alternatives.
- Good translation of measures proposed by EIAs and SEAs into the decommissioning programme.
- Refinement and updating of impacts and environmental measures over the project's lifetime.
- Optimization of logistic operations and waste management.
- Monitoring of ecological indicators to assess site recovery.

"Learning from the experiences of the oil and gas sector can help avoid compromising the green credentials the wind farm industry currently has. "



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When a marine development isn't a marine development

Introduction

From very humble beginnings in the late 1960s, the Scottish salmon farming industry has developed into a technologically advanced sector which is now the UK's largest food export by value. In 2018 the aquaculture sector supported 11,700 jobs in the Scottish economy and generated £885 million Gross Value Added[1]. The industry consists of over 200 farms which are located on the West Coast of Scotland, the Outer Hebrides and the Northern Isles of Orkney and Shetland.

Planning framework

It is these humble beginnings which have contributed to the unusual consenting and impact assessment process which the industry has historically faced. Marine finfish developments (out to 12 nautical miles) came under the jurisdiction of the terrestrial planning system in Scotland on 1st April 2007, when the Town and Country Planning (Marine Fish Farming) (Scotland) Order 2007 came into force. Prior to this date, development consents for marine fish farms were under the jurisdiction of the Crown Estate, or in Shetland and parts of Orkney, the Shetland and Orkney Islands Councils respectively.

EIA

Marine finfish farms are listed in schedule two of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. An EIA is required if the proposed farm is designed to: produce >10t fish per year, hold >100t of biomass or greater, if the surface area will extend to 0.1ha or more, or if the site is in a sensitive area. Modern salmon farms are generally significantly larger than these thresholds and so EIA is always required in practice for new developments.

Issues

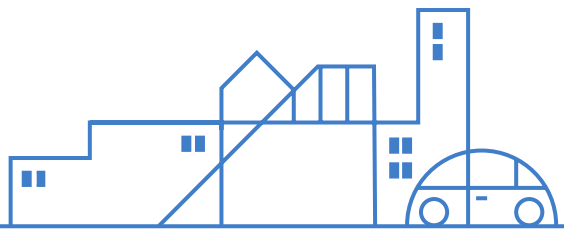
With reference to impact assessment, marine finfish sites are arguably more complex than other marine infrastructure developments. This is because of potential interactions between farmed fish and other environmental receptors, such as wild fish, predators and cetaceans. Marine finfish sites also discharge organic waste and occasionally medicinal residues, both of which require advanced predictive modelling and post-consent monitoring against measured baseline conditions.

1 Marine Scotland, 2018. Estimation of the Wider Economic Impacts of the Aquaculture Sector in Scotland. ISBN: 978-1-80004-031-1 (web only).

The industry is highly technologically developed and the current direction of travel is towards the development of larger offshore sites which have higher capacity to disperse organic wastes as well as reduced potential for adverse effects on sensitive receptors (e.g. visual impact). Under the current framework, such developments would still be considered under terrestrial planning regulations even out to 12 nautical miles. For context the largest existing offshore windfarm in Scotland (Beatrice Offshore – 588 MW) is only located approximately 7 nautical miles offshore.

With specific regard to impact assessment in the context of EIA, this raises a series of significant challenges for developers and EIA consultants:

- The planning system is designed to consent physical infrastructure, however for aquaculture proposals planners also have to consider highly complex scientific/technical aspects such as biomass, carrying capacity, wild fish, predatory interactions and fish health issues.
- There are six local authorities (LAs) in Scotland which account for the overwhelming majority of finfish sites: Shetland, Orkney, Western Isles, Highland, Argyll + Bute, and North Ayrshire. There is a lack of consistency between LAs in terms of planning resources, expertise and schemes of delegation for EIA applications.
- Scoping opinions are typically overburdensome (perhaps due to a lack of confidence on the LA part), and potential issues are rarely scoped out of EIAs even if proven repeatedly not to be significant in the past.
- Applications which are subject to EIA are typically determined by local councillor planning committees across most local authorities. Such committee members are typically even less familiar with the scientific/technical aspects of marine aquaculture developments than planning officers.
- Duplication of the Habitats Regulations Appraisal (HRA) process for the same development for each statutory application process. For example, HRA can be required for planning applications, marine licence applications to Marine Scotland Licencing Operations Team (MS-LOT), and for Controlled Activities Regulations (CAR) discharge licence applications to the Scottish Environment Protection Agency (SEPA).
- Marine licences are required from MS-LOT only for navigational safety for aquaculture developments. This is a duplication as LAs are also responsible for potential impacts on navigation during planning process.



Solution?

A review of Scottish aquaculture consenting which was jointly funded by Marine Scotland and the Crown Estate was undertaken during 2016. The review had a number of recommendations to improve the consenting process. The proposed alternative consenting options included:

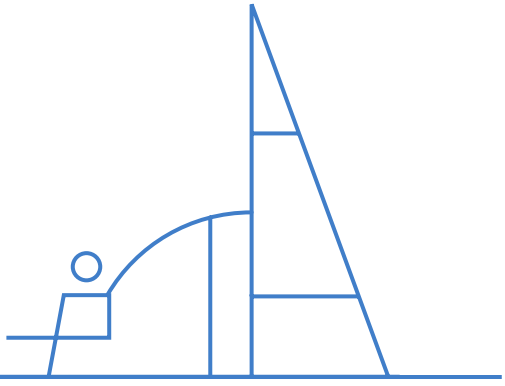
1. Consolidation of MS-LOT marine licences into planning permission.
2. Removal of aquaculture from the Town and Country Planning Act and introduction of a specific Aquaculture Act.
3. Alignment of CAR and planning permission consents.
4. Creation of a single consenting body (similar to Norwegian system) which replaces existing 5 x separate consent/licence applications to separate statutory bodies (including LAs) with a single responsible body.
5. Movement of potential wild/farmed fish interactions out of planning permission remit.

The consolidation of marine licences into planning permission and the alignment of CAR licencing with the planning process both have the potential to prevent duplication of consultation and HRA assessments for the same development. The transfer of farmed/wild fish interactions from the remit of the planning process would also remove one of the most technical and complex considerations from local planning officers. All of these options have been recommended for implementation in the near to mid-term future (though none as yet are actually implemented).

None of these recommended options will, however, address the unusual current situation whereby marine aquaculture development falls under the terrestrial planning remit. The creation of a specific aquaculture act to replace the Town and Country Planning Act, or the creation of a single regulatory agency to replace all existing separate consenting processes would address the issue. Neither option has been recommended for implementation in the near to mid-term primarily due to resource implications.

It seems therefore that for the foreseeable future, marine aquaculture developments will continue to fall under the remit of terrestrial planning, and many of the challenges highlighted earlier in this article will remain.

"With reference to impact assessment, marine finfish sites are arguably more complex than other marine infrastructure developments. This is because of potential interactions between farmed fish and other environmental receptors, such as: wild fish, predators and cetaceans."



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Sabellaria reef: why is it important and what are the implications on coastal and marine development if you find it?

In this article we explore what is *Sabellaria* reef, why it is an important marine habitat in the UK and how we can monitor it.

Sabellaria reefs

Sabellaria spp. are tube building, marine polychaete worms[1]. Under favourable conditions *Sabellaria* spp. aggregate, forming extensive reef structures.

The two *Sabellaria* species found in UK marine waters are *Sabellaria spinulosa,* commonly known as the ross worm, and *Sabellaria alveolata*, commonly known as the honeycomb worm. *S. spinulosa* reefs are predominately sub-tidal, while *S. alveolata* are predominantly intertidal. They are found in exposed areas where currents provide a sediment supply for constructing the tubes which make up the reef structure.

Sabellaria spinulosa

S. spinulosa reefs act as habitat engineers, stabilising the surrounding sediment. *S. spinulosa* reefs provide a hard attachment surface and structural complexity in environments that are dominated by sediments. *S. spinulosa* reefs are therefore associated with increased biodiversity[2] - for example, *S. spinulosa* reef in The Wash was found to have twice the number of associated species than non-reef sites[3].

1 Hayward, P.J., and Ryland, J.S.1990. The marine Fauna of the British Isles and Western Europe. Vol.2.Oxford University Press: New York.JENKINS, C., EGGLETON, J., BARRY, J. and O'Connor, J. 2018. Advances in assessing Sabellaria spinulosa reefs for ongoing monitoring. Ecology and Evolution 8: 7673 – 768
2 Pearce, B., Hill, J.M., Wilson, C., Griffin, R., Earnshaw, S. and Pitts, J. 2011. Sabellaria spinulosa Reef Ecology and Ecosystem Services. The Crown Estate. [online] URL: www.thecrownestate.co.uk.
3 Fletcher, S., Saunders, J., Herbert, R., Roberts, C. and Dawson, K. 2012. Description of the ecosystem services provided by broad-scale habitats and features of conservation importance that are likely to be protected by Marine Protected Areas in the Marine Conservation Zone Project area. Natural England Commissioned Reports, Number 088.

S. spinulosa reefs are protected in Special Areas of Conservation (SACs) as Annex I reef[4], and in Marine Conservation Zones (MCZs) as Habitats of Conservation Importance in the UK[5] due to their high biodiversity value. Conditions that allow reef formation and persistence must be maintained within these sites. *S. spinulosa* reefs are listed as a priority habitat under the UK Post 2010 Biodiversity Framework[6] meaning that reefs have widespread protection both within and outside of SACs and MCZs.

Reefiness

It is the reef habitat that is of conservation importance, rather than the individual worm. In 2007, a workshop was held to establish a definition of *S. spinulosa* reef for conservation purposes. The workshop produced 'reefiness' criteria (elevation, extent and patchiness) against which *S. spinulosa* aggregations should be assessed to determine whether they qualify as reef[7]. These criteria can be used to categorise reef into low, medium or high reefiness. Whilst these are sometimes erroneously referred to as a measure of quality, medium reef is likely to have higher biodiversity value than high reef due to the bell curve relationship between reef age and associated species diversity reported by Pearce et al[8].

Surveying *Sabellaria spinulosa*

There are inherent difficulties in accurately delineating *S. spinulosa* reef, as it occurs in areas with high suspended sediment levels meaning that it can be challenging to obtain high-quality drop-down video footage, and it is difficult to differentiate the side scan sonar signature of low reef from surrounding sediment. Limpenny et al.[9] and Jenkins et al.[10] made recommendations for survey and mapping techniques, including acoustic data acquisition, ground truthing, and reefiness assessments. Survey techniques must include appropriate measures of reefiness.

S. spinulosa reefs exhibit variable temporal stability. Whilst some reefs have persisted for over ten years[11], reefs have also been reported to aggregate and disaggregate on an interannual basis[12]. A method of identifying areas that most consistently support reef has therefore been developed to inform conservation management measures[13].

4 EEC. 1992. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora [Online] URL: http://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:31992L0043.

5 UK government. 2009. Marine and Coastal Access Act [Online] URL: https://www.legislation.gov.uk/ukpga/2009/23/contents.

6 JNCC and Defra (on behalf of the Four Countries' Biodiversity Group). 2012. UK Post-2010 Biodiversity Framework. July 2012. [Online] URL: http://jncc.defra.gov.uk/pdf/UK_Post2010_BioFwork.pdf.

7 Gubbay, S. 2007. Defining and managing Sabellaria spinulosa reefs: Report of an inter-agency workshop 1-2 May 2007. JNCC Report No. 405 [online] URL: http://www.jncc.gov.uk/page-4097.

8 Pearce, B., Taylor, J., Seiderer, L.J. 2007. Recoverability of Sabellaria spinulosa Following Aggregate Extraction. Aggregate Levy Sustainability Fund MAL0027. Marine Ecological Surveys Limited, 24a Monmouth Place, BATH, BA1 2AY. 87pp. ISBN 978-0-9506920-1-2.

9 Limpenny, D.S., Foster-Smith, R.L., Edwards, T.M., Hendrick, V.J., Diesing, M., Eggleton, J.D., Meadows, W.J., Crutchfield, Z., Pferifer, S., Reach, I.S. 2010. Best methods for identifying and evaluating Sabellaria spinulosa and cobble reef. Aggregate Levy Sustainability Fund Project MAL008. Joint Nature Conservation Committee, Peterborough1-134.

10 Jenkins, C. Eggleton, J., Barry, J., O'Connor, J. 2018. Advances in assessing Sabellaria spinulosa reefs for ongoing monitoring. Ecology and Evolution. 8:15. 7673-7687.

11 Jessop, R.W. and Stoutt, J. 2006. Broadscale Sabellaria spinulosa distribution in the central Wash as predicted with the AGDS RoxAnn. ESFJC.

12 Limpenny, D.S., Foster-Smith, R.L., Edwars,T.M., Hendrick,V.J., Diesing,M., Eggleton,J.D., Meadows,W.J., Crutchfield,Z.,Pferifer,S., Reach, I.S. 2010. Best methods for identifying and evaluating Sabellaria spinulosa and cobble reef. Aggregate Levy Sustainability Fund Project MAL008. Joint Nature Conservation Committee, Peterborough1-134.

13 Roberts, G., Edwards, N., Neachtain, A., Richardson, H. & Watt, C. 2016. Core reef approach to Sabellaria spinulosa reef management in The Wash and North Norfolk Coast SAC and The Wash approaches. Natural England Research Reports, Number 065.

What are the implications for development if you find *Sabellaria* reef?

Sabellaria reef has often been found within areas identified for development in the marine environment around the UK. When *Sabellaria* reef is identified in a development area, an assessment must be done of the proposed development in line with the Habitats Directive, the Marine and Coastal Access Act, and the NERC Act. If *Sabellaria* reef is found in a potential development area it is recommended that early engagement with statutory nature conservation bodies (SNCBs) is undertaken to discuss surveying methods, potential impacts to the habitat, and potential mitigation and compensation strategies if required, to reduce the consenting risk.

Recommendations for progressing development in areas where *Sabellaria* reef is found

The following recommendations can facilitate the progress of developments in areas where *Sabellaria* reef is identified:

- The distribution of *S. spinulosa* is variable in space and time, which means that if the habitat is identified in a specific location its distribution may change over time. It is important to ensure up to date survey methods are followed, which includes a reefiness assessment for *S. spinulosa*, as advised by Gubbay[14].
- As it is a filter feeding organism, *Sabellaria* spp. thrives in environments with relatively high sedimentation levels and has a high tolerance and recoverability to light smothering[15], so any development that leads to a reduction in sedimentation levels in the water column may negatively impact *Sabellaria* reef. The ecology and distribution of the habitat should be taken into account in impact assessments. Conservation advice packages for protected sites produced by SNCBs include advice on operations, which can be used as a tool for developers to understand the sensitivity of features such as *Sabellaria* reef to different pressures and activities.
- It is important that surveys of *Sabellaria* reef are carried out both in the early planning stage of development projects and within a year of construction if possible, to ensure that the best available data on habitat distribution can be collected to inform habitat management planning and to feed into the design evolution of the development.
- Early engagement with SNCBs is strongly advised to discuss surveying methods, potential impacts to the habitat, and potential mitigation and compensation strategies if required. Effective consultation and agreed management plans with SNCBs can help to minimise and mitigate impacts on *Sabellaria* reef, and in turn on development.

14 Gubbay, S. 2007. Defining and managing Sabellaria spinulosa reefs: Report of an inter-agency workshop 1-2 May 2007. JNCC Report No. 405 [online] URL: http://www.jncc.gov.uk/page-4097.

15 Marlin (2021) Sabellaria spinulosa with a bryozoan turf and barnacles on silty turbid circalittoral rock [Online]. URL: https://www.marlin.ac.uk/habitats/detail/1171/sabellar-

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Natural Power

Apportioning impacts upon *Larus* gulls for Caithness wind farm developments: a review

This review summarises elements of a presentation to inform a NatureScot (then Scottish Natural Heritage - SNH) workshop in January 2019 aimed at developing an approach for combining onshore and offshore wind farm impact assessments for gulls[1]. This review was produced in March 2019 and updated in May 2021.

Apportioning predicted impacts to contextualise potential effects on gull species in relation to relevant biogeographic populations, or their designated populations at protected sites, may be necessary to determine impact significance. For Scottish developments a NatureScot interim guidance document[2] recommends approaches for undertaking apportioning for marine developments to assess breeding season effects. We are unaware of published guidance for apportioning the impacts of terrestrial developments, or for non-breeding season effects.

The aim of this paper is to summarise how consultants have conducted apportioning of predicted collision impacts for herring gull for three recent proposed wind farm developments in Caithness.

Moray West Offshore Wind Farm: EIA Report submitted 2018 – consent awarded (Ornithological Consultant: NIRAS)

For this offshore development east of Caithness, spatial apportioning for breeding season collision impact to surrounding Special Protection Areas (SPAs) was undertaken as per the 2016 iteration of SNH interim apportioning guidance[3]. This followed a two-stage approach:

- Breeding season collision impacts to herring gull were split into SPA and non-SPA components by using mean maximum foraging distances[4] to determine a species-specific area of connectivity around the proposed development. Population estimates[5] were then considered for all colonies within this area to determine proportions of the population within and outwith SPAs. Breeding season collision mortalities were then multiplied by these proportions to attribute total SPA and non-SPA impacts.

1 Quinn, L.R. 2019. Workshop Report on Gull foraging offshore and onshore: developing apportioning approaches to casework. Scottish Natural Heritage, Workshop 31st January 2019.
2 Scottish Natural Heritage. 2018. Interim guidance on apportioning impacts from marine renewables to breeding seabird populations in Special Protection Areas. SNH, Battleby
3 Scottish Natural Heritage. 2016. Interim guidance on apportioning impacts from marine renewables to breeding seabird populations in Special Protection Areas. SNH, Battleby
4 Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. & Burton, N.H.K. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate marine protected areas. Biological Conservation 156: 53-61. [Now superseded by Woodward, I., Thaxter, C. B., Owen, E. and Cook, A. S. C. P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724. The British Trust for Ornithology, The Nunnery, Thetford, Norfolk, IP24 2PU]
5 Mitchell, I.P., Newton, S.F., Ratcliffe, N. & Dunn, T.E (eds.) 2004. Seabird populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002). T & A.D. Poyser, London [These population estimates will be superseded by the results of the fourth Breeding Seabird Census]

- Total SPA breeding season impacts were apportioned to each of the SPAs within the area of connectivity. Impacts were assigned to each SPA using a three-parameter model which incorporated SPA colony size, SPA distance from the proposed development, and a sea area weighting factor to account for available marine habitat (as opposed to land) around each SPA. Larger proportional impacts were attributed to larger SPA colonies and those closer to the proposed development.

Further correction factors to apportion impacts to key demographic groups (specifically adult breeding birds) were also applied for each SPA population.

Spatial apportioning of non-breeding season collision impact was also undertaken. Impacts upon each SPA were considered in terms of each SPA's estimated contribution to the relevant regional non-breeding population. This regional population utilised the concept of Biologically Defined Minimum Population Scales[6].

Golticlay Wind Farm: EIA Report submitted 2016 – consent awarded (Ornithological Consultant: Natural Power)

This 19-turbine onshore development lies within 5km of the East Caithness and Sutherland Cliffs SPA and observed herring gull flight activity indicates connectivity with that SPA. For onshore developments, for *Larus* gulls, the potential for connectivity is generally determined by applying a 25km radius around the development area. The application of this apparently arbitrary radius is a noticeable departure from the approach taken for offshore sites (where species-specific foraging ranges are applied)[7]. No other SPAs with herring gull as a designated feature occur within the 25km radius area of connectivity for the development, therefore, all collision impact was apportioned to the East Caithness Cliffs SPA.

As for Moray West, additional correction factors were used to apportion impacts to key demographic groups for the East Caithness Cliffs SPA. Proportions of adults and breeding birds were once again accounted for, but a correction factor to account for migrant overwintering birds was also incorporated.

Lower Seater Wind Farm: EIA Report submitted 2014 – planning consent denied on landscape and visual grounds (Ornithological Consultant: Natural Power)

Due to the presence of a nearby landfill site, herring gull flight activity levels at this onshore three-turbine development were very high, and potential connectivity with surrounding breeding colonies (some of which were designated features of the East Caithness Cliffs SPA) was less clearly apparent. As such, a spatial impact apportioning approach analogous to that advocated in stage 1 of the interim guidance for offshore developments (i.e. splitting impacts into SPA and non-SPA components, for sites within 25km of the development area) was applied following consultation with NatureScot, in addition to the demographic correction factors outlined above for Golticlay Wind Farm.

"The aim of this paper is to summarise how consultants have conducted apportioning of predicted collision impacts for herring gull for three recent proposed wind farm developments in Caithness."

6 Furness, R.W. 2015. Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, Number 164.

7 Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. & Burton, N.H.K. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate marine protected areas. Biological Conservation 156: 53-61. [Now superseded by Woodward, I., Thaxter, C. B., Owen, E. and Cook, A. S. C. P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724. The British Trust for Ornithology, The Nunnery, Thetford, Norfolk, IP24 2PU]

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Exploring EIA methods to minimise future marine licence conditions and restriction in relation to spawning fish populations and offshore wind farms

During the EIA process for offshore wind farms, understanding and identifying the key sensitive fish species that may be affected by construction activities is important, especially in relation to the effects of underwater noise from pile driving upon fish spawning activity. Fish are susceptible to two types of impact from underwater noise: sound pressure and particle motion. The way in which fish react or can be impacted upon depends on the sensitivity of their hearing (e.g. herring) as well as the presence or absence of a swim bladder. The stage of the lifecycle is also important, with spawning adults being considered to be more sensitive than eggs or larvae.

Identification of sensitive fish species/areas usually includes baseline characterisation through desk-based study, along with completion and interpretation of site-specific survey programmes. One of the main sources of information used to identify important fish spawning areas are the fish sensitivity maps produced by Coull et al., 1998 (with further updates by Ellis et al., 2012). Once identified, noise propagation modelling outputs are created, based upon the design envelope, which are then overlain on these fish sensitivities, allowing potential effects to be identified.

A review of the consent conditions attached to issued marine licences within the UK, for offshore wind farms, shows that seasonal, temporal and technical restrictions are often applied to noise emitting activities (mainly pile driving but sometimes cable laying) to address spawning fish, including herring (*Clupea harangus*), cod (*Gadus morhua*), sandeel spp., black bream (*Acanthopagrus butcheri*), sole (*Solea vulgaris*) and other flatfish. Offshore consenting decisions are often precautionary due to the wide-ranging design envelopes and uncertainty at the EIA stage, as well as ever progressing construction techniques.

Consenting decisions for spawning fish are underpinned by the fish sensitivity maps[1] and site-specific data. The problem with this approach is that the fish sensitivity maps are very general in nature and site-specific data that has

1 Coull, K.A., Johnstone, R., and S.I. Rogers. (1998). Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd.
Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Science Series Technical Report no. 147.

been collected does not reflect spawning activity unless it is specifically targeted at egg/larval stages.

A refinement technique using a series of existing historical larvae or mature adult data to produce heat maps can be used during the EIA process to further inform the early decision-making process and can potentially be used to ensure consent restrictions are only applied where absolutely necessary or where there is certainty of an effect that needs managing. Data sources such as the International Council for the Exploration of the Seas (ICES) International Herring Larvae Survey (IHLS) or the Northern Ireland Ground Fish Surveys (NIGFS) can be used, with records of larvae/mature/spent adults being extracted out.

To provide an updated analysis of the distribution of areas of high importance for herring larvae using the most up-to-date data rather than relying on historical maps, IHLS data for the 10 year period 2007/08 – 2016/17 were downloaded from the ICES Eggs and Larvae data pages (http://www.ices.dk/marine-data/data- portals/Pages/Eggs-and-larvae.aspx). The data was sorted by date, categorised by the spawning season and then data was extracted for each season for the 10-year dataset. Separate datasets for each year (i.e. 2007/08, 2008/09, etc.) were produced along with a dataset for the full 10-year period (2007/08 – 2016/17) containing the total larvae per m^2 caught per trawl[2].

The datasets were then used to create point data shapefiles of the larval counts for each data point. Heat maps were created, for the total larvae per m^2. Further categorisation of the data then allowed easy visualisation of the location of the 'hot spots' within each dataset but also allowed comparison of the relative abundance between years. For the 10-year dataset for the whole of the North Sea, the categorisation method for each single year also allows determination of any variation in the relative importance of each spawning area in any one year.

This approach has recently been used post-consent to reduce (and even remove) restrictions on piling activity due to the presence of fish spawning areas. At Triton Knoll Offshore Wind Farm, GoBe used the most recent 10-year dataset from ICES IHLS to show that while there was correlation between the fish sensitivity maps, some areas within the historically identified spawning areas were less favoured (or not currently used) for spawning and therefore allowed removal of seasonal piling restrictions.

"Offshore consenting decisions are often precautionary due to the wide-ranging design envelopes and uncertainty at the EIA stage, as well as ever progressing construction techniques."

2 Boyle, G., New, P. (2018). ORJIP Impacts from Piling on Fish at Offshore Wind Sites: Collating Population Information, Gap Analysis and Appraisal of Mitigation Options. Final Report. June 2018. The Carbon Trust. United Kingdom. 247 pp.

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Post-consent compliance in Scotland in the era of multi-stage consenting

Following successful determination of applications for offshore wind farms in Scotland, developers are issued with a consent granted by Scottish Ministers under Section 36 of the Electricity Act 1989 (Section 36 consent), and two marine licences which cover the wind farm and the offshore transmission works. Conditions attached to the offshore consents require developers to make a number of notifications and returns to the licensing authority at key stages in a project's development.

S36 and marine licence consent plan requirements

The consent conditions require that developers prepare a suite of consent plans that must be submitted for approval to the licensing authority to confirm that construction and operation is conducted in accordance with the application and demonstrate implementation of mitigation commitments. Offshore consents can require production of up to 18 named consent plans which are subject to a 4-week consultation to key stakeholders named on the relevant consent conditions.

Multi-stage consents

The updated EIA Regulations 2017 put in place provisions for multi-stage consents. Marine Scotland Consenting and Licensing Guidance confirms that the Section 36 consents and marine licences for offshore wind farm projects fall under the definition of a multi- stage consent. Multi-stage consenting places challenges at the pre-application stage where developers must carefully identify a project design envelope that captures all potential aspects of project construction and operation. The multi-stage consent process then provides opportunities for the EIA to be revisited in the lead up to construction. The challenge arises in trying to ensure that the detailed methods of construction and design that will be provided by construction contractors following award of consent are captured within the consented design envelope. Consent plan submissions must satisfy the Scottish Ministers that the final project design parameters do not invalidate the determinations of the EIA for the project. Once satisfied a decision notice will then be provided by Scottish Ministers to discharge the relevant condition.

Challenges

This has implications for managing post-consent compliance risk as it has the potential to result in delays.

Where it is judged that the refined parameters and methods presented in a consent plan are beyond the consented design envelope and/or insufficiently addressed in the original EIA a developer would be required to provide additional information. The additional

information would be subject to the same requirements as set out in the EIA Regulations. Therefore, time must be allowed to place public notices, invite public participation and undertake consultation in accordance with the EIA regulations.

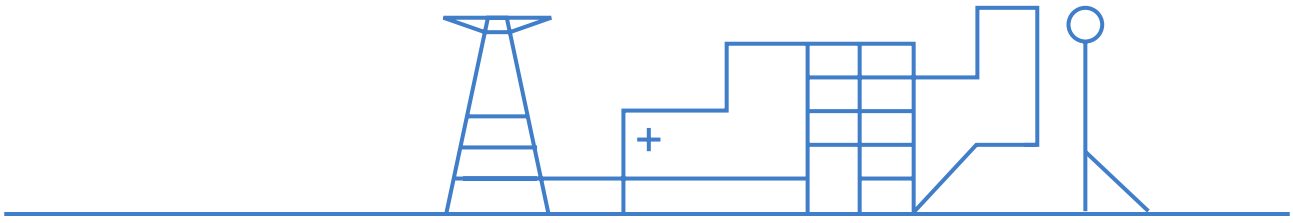
This highlights the importance in ensuring a sufficiently wide realistic worst-case scenario is identified for assessment within a project EIA and that baseline information is adequately robust that it cannot be challenged during the pre-construction phase of a project.

Whilst it is useful to engage early with the licensing authority and establish a protocol agreement for submission, consultation, and resubmission of updated consent plans, the process relies on the developer, stakeholders and the licensing authority ensuring adequate resource is available to contribute to the process. Realistically, it can be expected that a consent plan will take at least 3 months from the point of first submission, until the point of condition discharge. Add to this a request to provide additional information under the EIA regulations to support multi-stage consenting requirements and there is potential for significant and costly delays to construction programmes.

To ensure delivery and discharge of conditions in a timely manner and minimise the risk of project delays it is imperative that post-consent compliance requirements are considered early in the development process. It is recommended that the following considerations are taken into account in order to facilitate the process:

- Ensure that the worst-case design scenario for a project covers all potential design parameters and construction methods.
- Consider contractor method statements carefully in the context of the EIA and ensure these are sufficiently covered by the project EIA.
- Take into account the consent plan approval process to ensure sufficient time is scheduled to discharge conditions.
- Consent plans should be drafted to clearly illustrate compliance with the application and validation of the supporting EIA.

"Multi-stage consenting places challenges at the pre-application stage where developers must carefully identify a project design envelope that captures all potential aspects of project construction and operation."



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Complexities of cross-jurisdictional marine consenting in Europe

Introduction

In this article we explore the complexities of applying for consents for cross-jurisdictional marine projects. The EIA Directive states that EIAs must address impacts in all affected jurisdictions, but the national marine consenting requirements of each affected country must simultaneously be satisfied. We discuss the challenges faced by a linear marine project in Wood that crossed three maritime jurisdictions, how the various consent applications were carried out, and recommendations for progressing consenting on future marine cross-jurisdictional projects.

European versus national requirements

In countries across Europe, the Environmental Impact Assessment (EIA) requirements for achieving development consent share similarities as the national consenting regimes have been developed to satisfy the Espoo Convention[1] and a suite of European Directives. However, the intricacies of how the EIA Directive[2] and others (e.g. the Habitats Directive[3], Marine Strategy Framework Directive[4], and Water Framework Directive[5]) have been transposed into national legislation are diverse, as are the processes followed by the regulatory bodies that ultimately provide consent.

EIA across maritime borders

Large-scale infrastructure developments that cross jurisdictional boundaries in the marine environment face a particular set of challenges where differences exist between the national requirements of each country involved. These projects are commonly high value, high-profile, and of national and international importance, with marine examples including subsea cables and pipelines. The EIA Directive is designed to regulate the development of whole projects and there have been judicial reviews[6] that have challenged the avoidance of EIA through the practice of splitting or "salami-slicing" a project into smaller component parts that individually do not exceed the EIA screening threshold. It follows therefore, that transboundary project developers are nervous of any risk that their project is perceived to be incompletely assessed.

1 1991 UNECE Convention on Environmental Impact Assessment in a Transboundary Context.
2 Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
3 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
4 Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy.
5 Council Directive 2000/60/EC of 23 October 2000 establishing a framework for community action in the field of water policy.
6 Richard Buxton Solicitors, 2013. (Sandra and John Hockley) v Essex County Council [2014] EWCA Civ 1121. https://www.richardbuxton.co.uk/transcripts/r-sandra-and-john-hockley-v-essex-county-council

Article 7 of the EIA Directive provides for transboundary projects and includes a clear requirement for EIAs to address likely significant effects in other member states. The European Commission has published guidance on EIA for large-scale transboundary projects[7]. EIAs must therefore address impacts in all affected jurisdictions, but the national marine consenting requirements of each affected country must simultaneously be satisfied. Furthermore, projects with landfall in multiple countries must also interface with the relevant terrestrial planning regimes. Disparity between national requirements can begin at the EIA screening stage, where the classification of what constitutes EIA development is not identically transposed in all European states.

An example of different strokes for EIA

At Wood, we have seen a linear marine project face conflicting approaches to its screening decision in three maritime jurisdictions. The first nation classified the project as EIA development. The second screened it as non-EIA development but accepted the submission of a voluntary EIA with the consent application. The third also screened it as non-EIA development but refused to accept a voluntary EIA to avoid setting a precedence, requiring only a marine licence application for certain works. The reporting to support the consent applications in each jurisdiction therefore had to vary in line with the respective screening decisions and could not be coherently presented as one EIA for a single whole project.

Learning from others

Within the power sector, the TEN-E Regulation[8] provides guidelines intended to streamline the permitting processes for major energy infrastructure projects that contribute to European energy networks. It sets out requirements relating to programming and consultation, which can be helpful when designing the programme for a project that must achieve consent in multiple countries. However, regulations such as these can add another tranche of compliance requirements for the project to navigate and can be too rigid to accommodate the multiple moving cogs they are intended to lubricate. Not all sectors have similar guidance however, and most are left to devise their own strategy for negotiating the relevant consenting regimes.

Final thoughts

Supporting transboundary project developers through the provision of marine EIA services and effective consenting risk management requires an appreciation of the varying modus operandi between countries, as well as a programme that can accommodate the simultaneous motion of multiple delivery styles. It takes time to devise an EIA report structure that speaks to the expectations of all countries involved and additional time must be factored in where translation is required.

Programming consultation with multi-national sets of stakeholders and ensuring that each understands the needs and approaches of the others can be challenging. The communications required to reconcile disparities takes time, and language barriers and differing cultures of communication can take patience and diplomacy to resolve. Communication styles intended for transparency or efficiency in one language, for example, can translate as being too blunt for communications with regulators in other cultures.

Cross-jurisdictional projects therefore require early and well considered consents planning, so that the complexities described do not hinder the successful consent of crucial international infrastructure.

7 European Union, 2013. Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects. https://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf.
8 The Regulation on guidelines for trans-European energy infrastructure EU 347/2013.

Do you make effective use of ALL of IEMA's IA member resources?

IEMA's website contains a treasure trove of IA related content, as well as information about IEMA's volunteer network groups, blogs, webinars and policy. But not everyone makes the most of this free member content, including:

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- Recordings of past webinars, with over 24 hours' worth of IA content.
- IA Guidance & advice: such as recent EIA guides on climate change adaptation and major accidents & disasters.
- The Proportionate EIA Strategy.
- Over 400 EIA articles and 200 case studies related to EIA, developed by Q Mark registrants in recent years.
- Individual and organisational recognition specific to EIA, through the EIA Register and EIA Quality Mark schemes respectively.
- Contact details to engage with the steering group members for the:
  - Impact Assessment Network.
  - GESA Group (Global Environmental & Social Assessment).
  - Geographic/Regional Groups.

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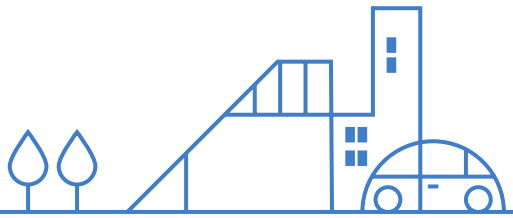
Summary

Kathryn Collins - Guest Editor

The articles included in this edition of Outlook showcase not only the complexities and challenges of marine development assessment, but also the opportunities to use 'marine' thinking to inform all areas of impact assessment work. Fluidity is key here. Fluidity applies not only in the environment in which we work, but also in our approaches to emerging technologies and challenges, policies and opportunities. We've evolved in the face of new technologies and applied existing assessment tools to new environments, with unique receptors and stakeholders. For me, marine EIA offers us the chance to consider how we can do EIA differently, how we can build on the work of our terrestrial friends and help to inform further evolution of impact assessment tools. And if you take just one thing from this IA edition, it should be that early regulator and stakeholder engagement is key to successful marine EIA development.

A final thought for those for whom this edition has served as an introduction to all things offshore: whilst there are complexities and challenges aplenty with offshore development, the community of marine EIA professionals can help guide you through. The more this community grows, the more insights we can gather for developing in marine space. So, if this edition has ignited, or renewed, your interest in getting involved in marine EIA, there's no better place to start than the Marine Impact Assessment working group. Details can be found on the IEMA website: So, come on in, the water is lovely.



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IEMA's EIA Quality Mark - a scheme operated by the Institute allowing organisations (both developers and consultancies) that lead the co-ordination of statutory EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed. The EIA Quality Mark is a voluntary scheme, with organisations free to choose whether they are ready to operate to its seven EIA Commitments: EIA Management; EIA Team Capabilities; EIA Regulatory Compliance; EIA Context & Influence; EIA Content; EIA Presentation; and Improving EIA practice. In April 2021, IEMA celebrated the 10-year anniversary of the EIA Quality Mark.

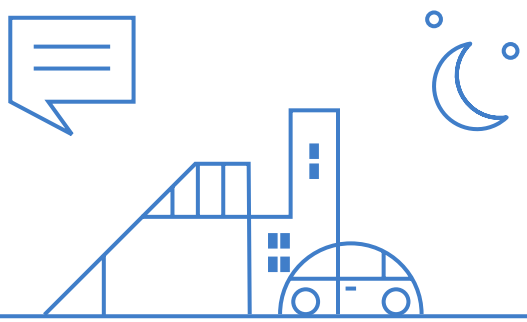
Marine and Coastal Impact Assessment

This tenth edition of the Impact Assessment Outlook Journal provides a series of thought pieces on the consideration of Impact Assessment in the marine and coastal environment. In this edition, the Guest Editor (Dr Kathryn Collins) has selected eleven articles produced by IEMA professionals and EIA experts. The result is a valuable yet quick read across some of the different aspects of UK practice exploring marine and coastal impact assessment and consenting.

About the Guest Editor: Dr Kathryn Collins (AIEMA, MIEnvSc)

Principal Consultant at Howell Marine Consulting

Kathryn has been working in environmental and marine planning systems for over 10 years. After gaining her Town and Country Planning MSc from Newcastle University, Kathryn took her terrestrial planning and assessment skills into the marine environment through her work in the marine licensing team at the Marine Management Organisation. Working for England's marine development regulator Kathryn developed an in-depth appreciation of the challenges of assessing the impact of marine development and ensuring that consents include adequate mitigation to avoid unacceptable environmental harm. Following the completion of her PhD in 2020 Kathryn worked in marine EIA consultancy before joining HMC in 2021. In her current role Kathryn is working at a more strategic level, helping researchers and policy makers work together to improve marine planning and regulation processes.



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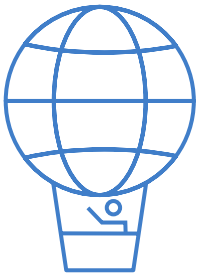

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