

International Marine and Dredging Consultants S.A. (“IMDC”) was founded in Belgium in 1982. For 40 years IMDC provides, on a worldwide base, specialized, water-related engineering and consultancy services in the domain of inland waters, coasts, ports and estuaries as well as offshore, dredging and environment. Our highly qualified staff offers advice based on recent research results of leading universities and research institutes and hands-on experience acquired throughout the years.

One of IMDC’s core activities is to conduct marine environmental impact studies. A description of these services is presented in this product sheet.

More information can be found on our website: www.imdc.be

Environmental Impact Studies

As environmental awareness grows, careful consideration of environmental factors is becoming an intricate part of any marine or coastal construction project. Increasingly, emphasis is placed on reducing the ecological impact while also facilitating positive ecological effects by introducing nature-based solutions and monitoring the short and long-term effects of marine activities on sensitive habitats. IMDC has developed substantial in-house experience and expertise in preparing marine environmental impact studies for projects related to dredging, coastal development, mariculture, blue energy, and marine infrastructures in the Belgian and Dutch North Sea and internationally.

Services

Our services span various project phases:

- Writing the environmental impact assessment (EIA);
- Writing the appropriate assessment (AA) for projects influencing Natura 2000 areas and species;
- Preparing all documents for the environmental permit application, including for TEN-E and PCI/PMI projects;
- Supporting EIA services such as life cycle analysis and numerical modelling (turbidity, water quality, sediment transport, etc.);
- Supporting the stakeholder management process through regular meetings with various authorities.

Our environmental expertise combined with the technical knowledge of offshore and coastal works and activities allows us to effectively assist clients throughout the whole project life cycle.

Blue Energy projects

Wind, wave, and tidal energy projects are becoming more popular in supporting the increasing global demand for sustainable energy. From the very start, IMDC has been one of the pioneers for the development of offshore wind farms along the Belgian coast, active in several projects for the feasibility and resource assessment, Owner’s Engineer, detailed design, environmental impact analysis, permits & procedures, and project supervision for both the installation of the windmills as of the infield and export cables and landfalls.



Marine organisms on a gravity-based foundation (Source: MUMM)

Marine aquaculture

Marine aquaculture is gaining increasing popularity worldwide due to its capacity to produce sustainable sea foods such as shellfish and seaweeds. The EU also supports research and innovation on aquaculture through its Horizon Europe framework programme and has developed strategic guidelines for a more sustainable aquaculture in a way that contributes to the European Green Deal and the Farm to Fork strategy. Sustainable aquaculture can, for example, increase water quality and provide habitats for other species. However, as aquaculture can also have a negative environmental impact, IMDC can provide the environmental impact assessments and prepare all permit applications for aquaculture projects.



Kelp farming (Source: Seaweed Solutions AS)

Dredging Operations

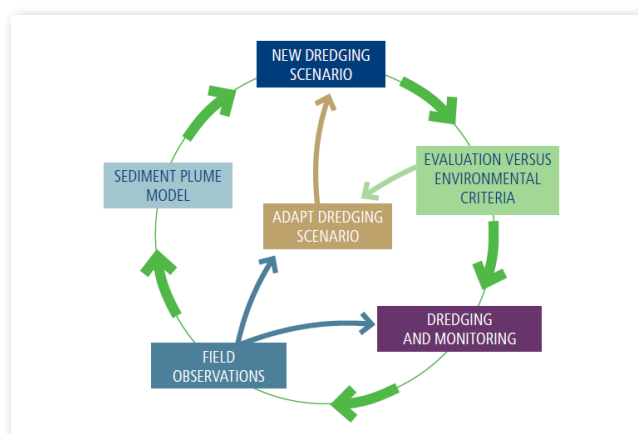
There are several important environmental aspects that need to be considered in dredging projects. Not only can the final destination of the dredged material - whether contaminated or not – raise concerns, but also the turbidity created during the dredging and disposal operations is a major point of attention. The multidisciplinary team of IMDC, consisting of technical experts, ecologists, and modellers with a broad knowledge of the dredging processes, has extensive experience in the assessment of the environmental impact of turbidity-generating activities and can give advice on possible mitigation measures.



Sediment plume during dredging activities

IMDC can assist both clients and contractors in minimising these environmental impacts, by providing them with a set of tools to help them anticipate these potential effects. For example, IMDC can prepare an Environmental Monitoring and/or Management Plan (EMP) for any specific marine project. In such a plan, it is clearly described how potential impacts will be monitored and what actions should be taken in case certain (pre-defined) thresholds are surpassed. IMDC can set-up an EMP for contractors who are requested to submit one already in the tender phase or can assist the clients in reviewing EMPs provided by bidders.

One of the measures that could be proposed in such an EMP, is pro-active adaptive dredging management.



IMDC has set up a real-time system for adaptive management of dredging-induced turbidity. The system is called the Ecological Proactive Adaptive Management system, or ECOPAM. An online tool, specifically set up for each project site, offering a big-data, modelling-based approach to both forecast and hindcast the actual turbidity generated by dredging activities on site in order to minimise the threat of excessive turbidity near sensitive habitats whilst maintaining overall efficiency of the works.

Supporting EIA services

IMDC can deliver a broad range of services that might be required for an EIA or in the process of acquiring a specific marine works permit. They range from safety-related studies like ship collision or navigation risk assessments and/or simulations to environment-related studies like underwater noise modelling or monitoring (for baseline studies) and modelling of certain environmental parameters. The latter service is briefly presented hereafter but for more detail on this and other permit supporting studies is referred to other more specific product sheets.

Permit application

IMDC has extensive knowledge on the environmental legislation and permitting procedures in Belgium and the Netherlands. In both countries we have also built up a good working relation with the different authorities related to the North Sea. Our experience for permit applications covers following aspects:

- Belgium:
 - Environmental permit (including the EIA);
 - Natura 2000 permission (including the AA);
 - Cable permit;
 - Pipeline permit;
 - Disposal permit.
- The Netherlands:
 - The Environment and Planning Act 2024 (Omgevingswet);
 - Water permit (including the EIA);
 - Preliminary assessment (Voortoets) and Appropriate Assessment (Passende Beoordeling) for activities with influence on Natura 200 areas;
 - Flora and fauna activities, for activities with influence on protected species;
 - Mining Act (Mijnbouwwet) permits for extraction activities;
 - Project Procedure for PCI/PMI projects.
- IMDC has also developed expertise with Trans-European Networks for Energy (TEN-E) Regulation to ensure that Projects of Common Interest (PCIs) and Projects of Mutual Interest (PMIs) status follow a dedicated process.
- For Belgian onshore water-related projects, IMDC can also provide the Flemish environmental permits such as the Appropriate Assessment for the Natura 2000 permit, and together with our parent company Tractebel-Engie the integrated environmental permit (Omgevingsvergunning), including the EIA.

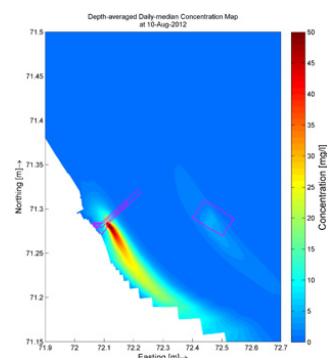
Life cycle analysis

During a life cycle analysis (LCA), the main emissions (CO₂, CH₄, and N₂O) during the whole lifetime of a project and through all the project phases (production, construction, operation and decommissioning) are calculated and evaluated. Primarily, the aim is to quantify the CO₂, CH₄, and N₂O emissions generated, produced directly and/or indirectly by an activity, or by the set of activities during the life cycle of a project. The LCA is effective in determining the levels of emissions generated and therefore in measuring the carbon footprint and can be adapted to any project. IMDC can perform an LCA on basically any infrastructure construction project in an estuarine or marine environment, going from off-shore wind farms and platforms, including infield and export cables and landfall, construction of artificial islands (caissons and revetements), flood protection structures, breakwaters, etc. allowing investors or project sponsors to choose between more or less sustainable projects and project execution methods and contractors to optimize their material selection, work methodologies and equipment.



Environmental modelling

IMDC's modelling team can simulate reference situations and impact scenarios using the numerical models developed in-house to address critical environmental issues such as water quality.



To assess the autonomous evolution of the seabed and the impact of the envisaged intervention or operation, IMDC will set up a numerical model that can simulate the natural tidal currents, wave action and sediment transport at the project location. IMDC also

performs plume model studies, to assess the impact of dredging, disposal or cable-laying activities on the background turbidity and suspended sediment levels. IMDC's water quality model can focus on several biogeochemical parameters along coastal waters, including estuaries and ports. Our biogeochemical models integrate various parameters such as suspended sediment, nutrients, phytoplankton, zooplankton, detritus, and oxygen.

Underwater noise can have a significant impact on marine life, affecting fish as well as whales and dolphins. IMDC uses the well-known proven technology of the Underwater Acoustic Toolbox to calculate the propagation of underwater noise in the nearfield as well as in the far field region of a source of underwater noise, considering the effects of stratification of the water column, as well as changes in the water depth and the seabed material.

Key references

IMDC has been successful in obtaining all the required environmental permits for every EIA that has been submitted with the authorities. A few examples of EIA projects are listed below.



EIA CO₂ Highway Europe Project (2024-2026)

Belgium • Client: Equinor

Project description: Equinor ASA, an international energy company, headquartered in Norway, was investigating the possibility for transporting liquid CO₂ by use of trunklines, going from Belgium (Zeebrugge) and France (Dunkirk) to the Norwegian continental shelf for final storage in depleted reservoirs. IMDC was responsible for writing the required permit applications and complementary reports and studies like appropriate assessments and environmental impact assessments for the Belgian section.

Sustainable Development Goals

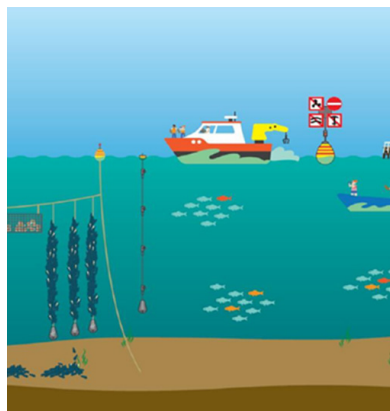


EIA Modular Offshore Grid 2 (The Princess Elisabeth Island) (2021-2022)

Belgium • Client: Elia

Project description: The artificial Princess Elisabeth Island (PEI) stretches across an area of 6 hectares and is located 45 km off the Belgian coast in the middle of the Princess Elisabeth Zone (Belgium's second offshore wind zone). The artificial island is constructed with concrete caissons and filled with sand, and hosts both high-voltage direct current (HVDC) and alternating current (HVAC) infrastructure. The PEI project extends the Belgian offshore transmission grid by connecting new wind farms in the Belgian part of the North Sea (3.15 to 3.5 GW) with the onshore transmission grid. The PEI is connected to the land by six 220 kV three-phase AC export cables and one HVDC cable system.

Sustainable Development Goals

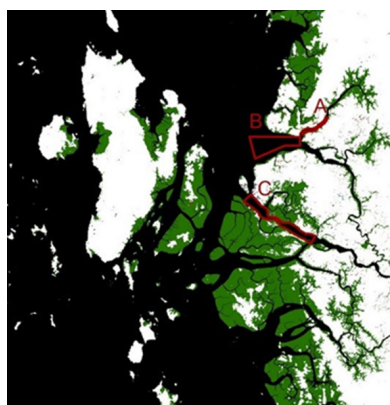


EIA Sea farm Westdiep (2019-2020)

Belgium • Client: Colruyt Group NV

Project description: Colruyt Group planned to operate a commercial-scale aquaculture sea farm on the Belgian part of the North Sea. For this, Zone C – Westdiep was chosen, a part of the commercial and industrial zones in accordance with the Marine Spatial Plan 2020-2026 in the Belgian sea areas. The applicant opted for shellfish farming, namely the blue mussel and flat oyster, and native seaweeds. IMDC was responsible for drawing up the application for the user permit file, coordinating with the competent authorities, writing the EIA and an Appropriate Assessment and submitting the environmental permit application.

Sustainable Development Goals



ESI maintenance dredging (2014-2015)

Myanmar

Client: DIAP-SHAP JV

Project description: In three estuaries in Myanmar, maintenance dredging works took place in the navigational channels. For this project IMDC wrote the EIA which was set to comply with national and international legislative standards, describing the expected environmental and social impacts, and proposing possible mitigating measures. IMDC also performed a historical analysis of the coastline evolution and mangrove area dynamics based on satellite imagery.

Sustainable Development Goals



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