Marine GIS. Its central role in delivering to the Blue Economy

The North Sea Checkpoint Project and its contribution to understanding

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Growth & Innovation in the Ocean Economy

Checkpoint projects are funded by EU DG MARE, alongside EMODnet portal projects

Two current sea areas being undertaken, Mediterranean and North Sea. More to be commissioned.

The checkpoint projects are providing an assessment of EC services such as EMODNET and Copernicus to solve real problems faced with managing the marine environment and developing blue economy.

Rationale

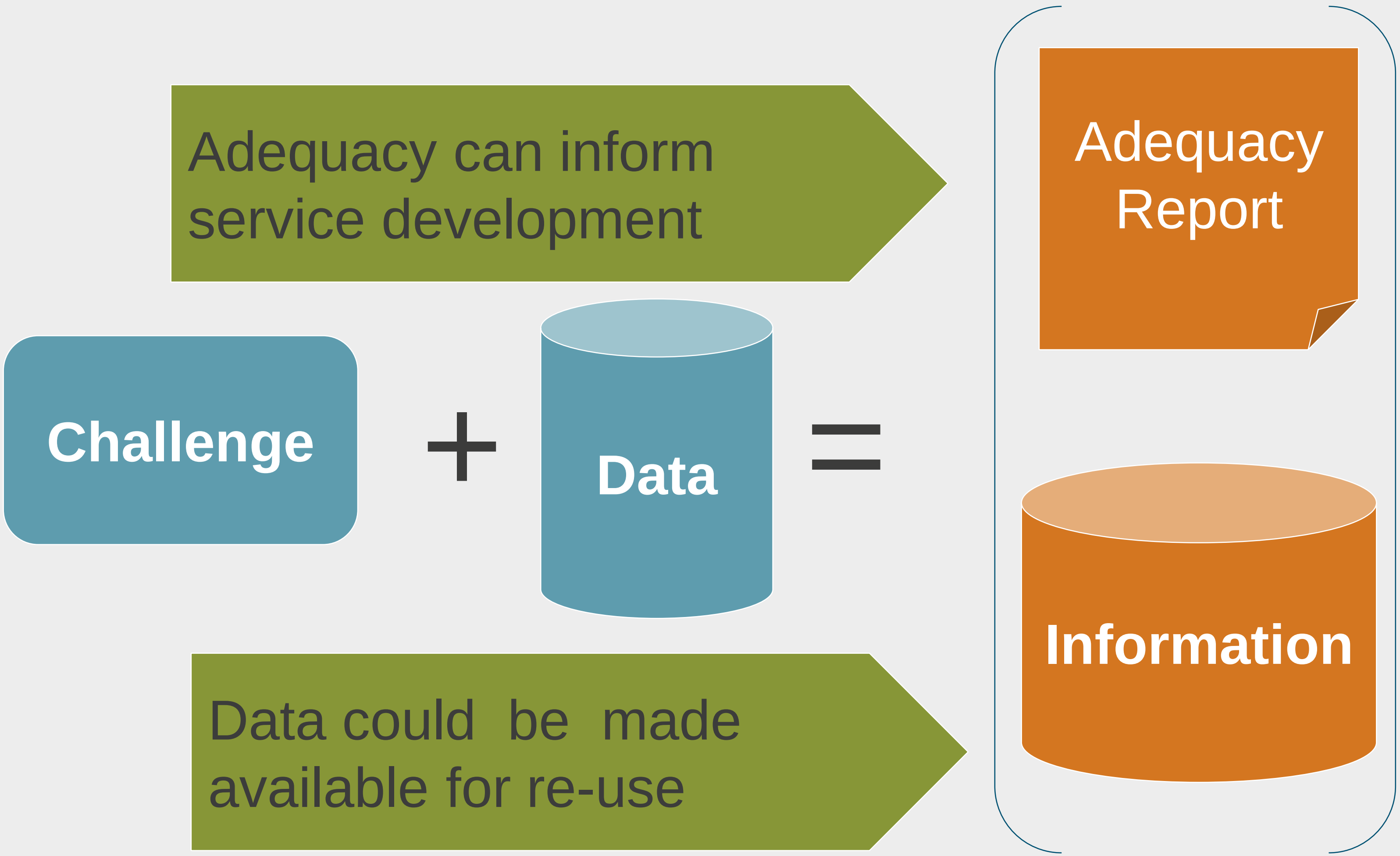
Growth in marine and maritime sector is reliant on innovation. Innovation needs a robust and accessible knowledge base. Private industry and public sector require access to marine data.

Despite investment in ISO-19139 metadata catalogues and web services the key ‘blue economy’ actors aren’t being serviced

Standard catalogue and portals are great, but don’t convey data value. Current initiatives are targeted at the science community. There are multiple portals and initiatives

The blue economy uses standard web tools to search for the data they need to solve the problem they have.

Methodology



Feedback on the value of the data to solve the challenge

The data outputs from solving the challenge

Wind farm siting challenge

EU "2030 framework for climate and energy policies"

EU Renewable Energy Directive (2009/28/EC).

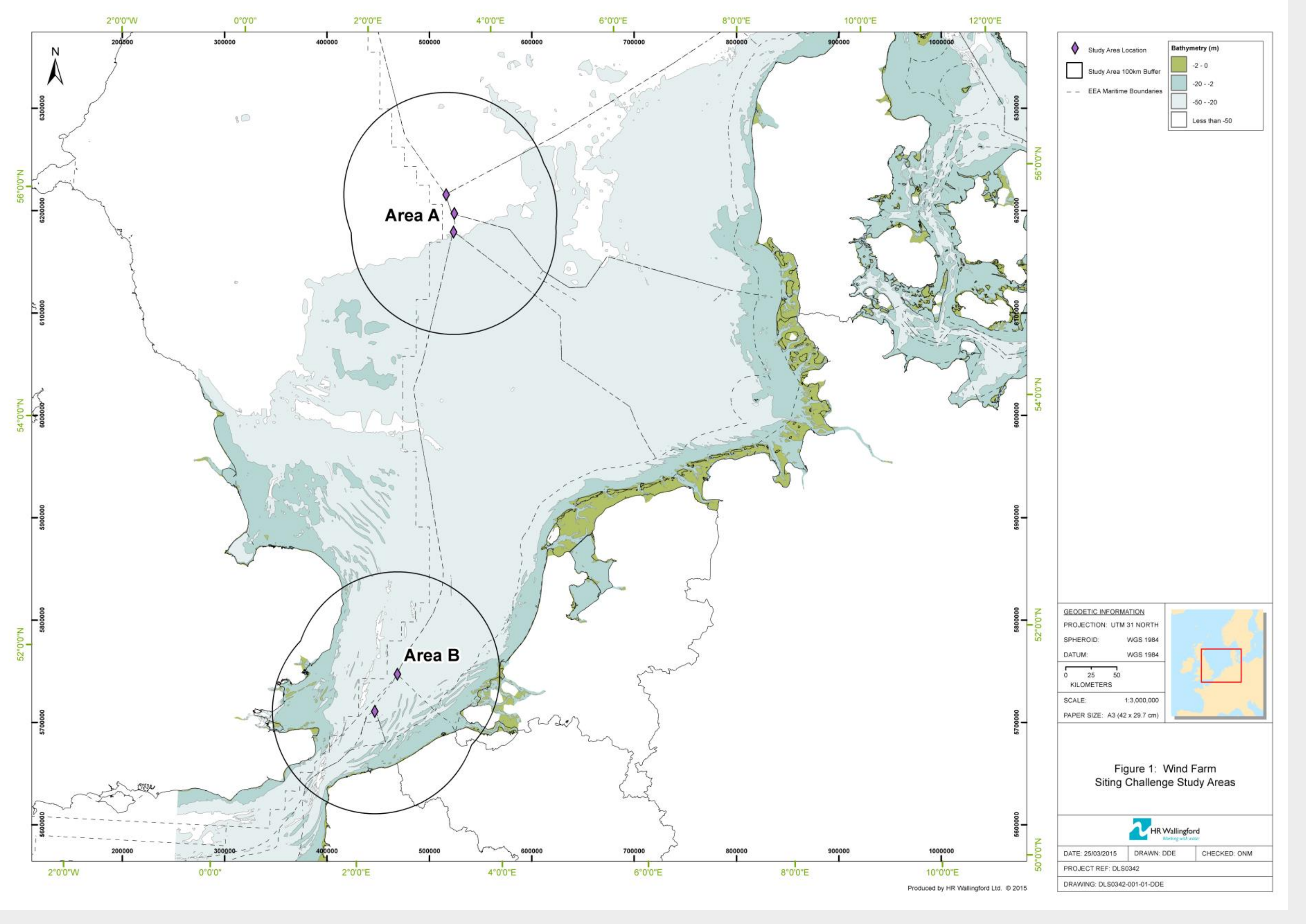
Offshore wind farms are expected to provide a significant contribution toward both of these aims. Investment decisions by renewable energy developers require a minimisation of risks that can be achieved if adequate data is available to inform any such risk assessment.

Aims

The main aim of the challenge as specified in the project brief was to:

- Determine the suitability of sites for wind farm development along national marine boundaries in the North Sea Basin, where:
  - Norwegian, UK, Danish, German and Dutch waters meet
  - UK, Dutch and Belgian waters meet
  - UK, Belgian and French waters meet
- Consider all factors used for wind farm siting, even if one of those factors makes the site unsuitable for development.

Locations



Area A
Area B
N
Study Area Location
Study Area 100km Buffer
EEA Maritime Boundaries
Bathymetry (m)
-2 - 0
-20 - -2
-50 - -20
Less than -50
GEODETIC INFORMATION
PROJECTION: UTM 31 NORTH
SPHEROID: WGS 1984
DATUM: WGS 1984
0 25 50
KILOMETERS
SCALE: 1:3,000,000
PAPER SIZE: A3 (42 x 29.7 cm)
Figure 1: Wind Farm
Siting Challenge Study Areas
HR Wallingford
DATE: 25/03/2015
DRAWN: DDE
CHECKED: ONM
PROJECT REF: DLS0342
DRAWING: DLS0342-001-01-DDE
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Working with water

Methodology

Grade	Level	Symbol	Description
5	Very High		The presence of a variable makes the area unsuitable for wind farm development
4	High		The proximity to a suitability receptor or marine activity is adversely affected by the new wind farm or may put the wind farm at risk
3	Medium		The marine activity or sensitive receptor may be adversely affected by the installation and presence of a wind farm although the site may be suitable for development
2	Low		The site is suitable for development and there are only minor adverse impacts anticipated on the sensitive receptor or marine activity
1	Very Low		The site is suitable for development and there are no adverse impacts anticipated on the sensitive receptor or marine activity

Site suitability scoring index

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Working with water

Methodology

Mapping of current sea-use

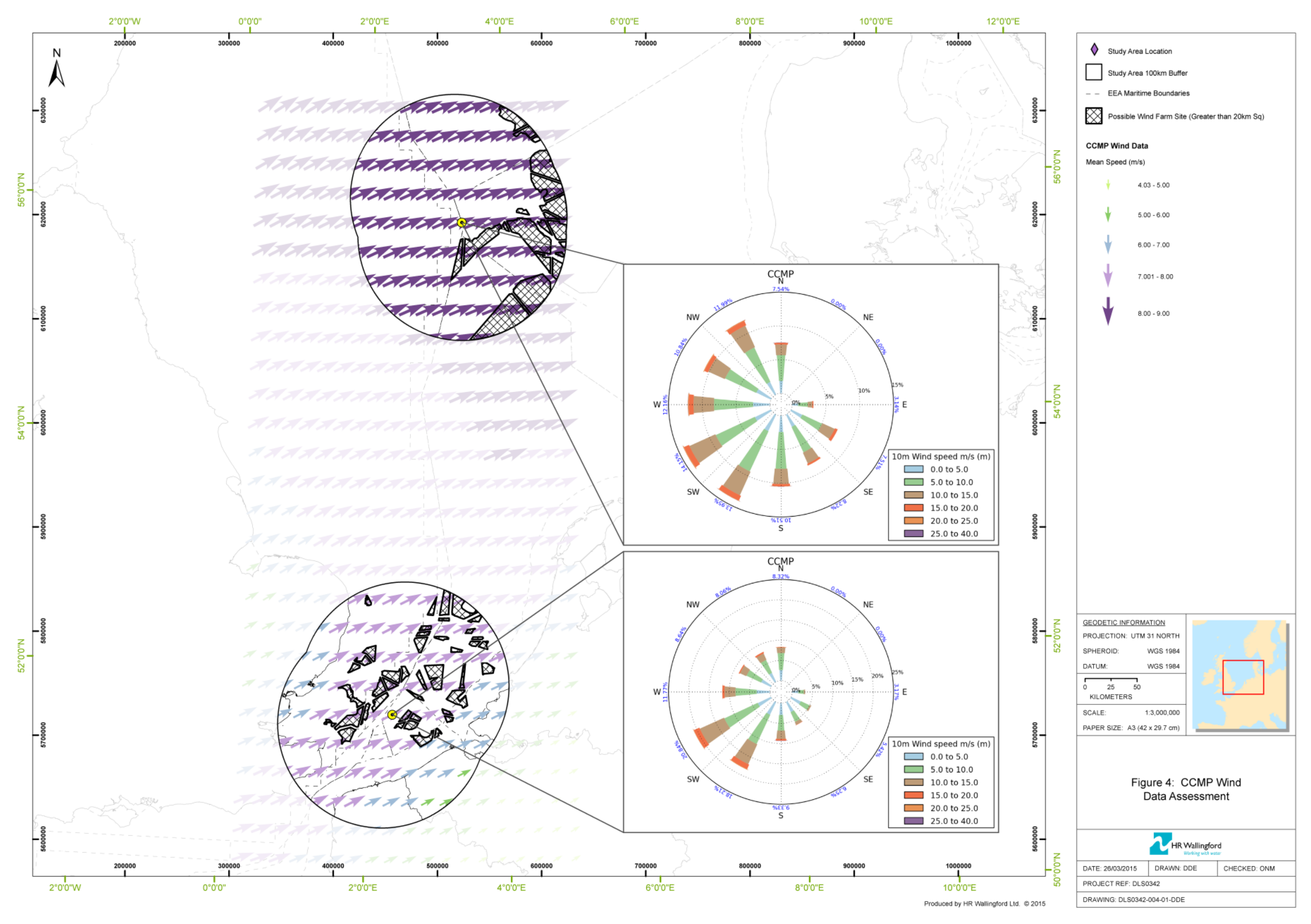
- Existing sea-use, including:
  - Administrative/legislative boundaries
  - Cables and pipelines
  - Other wind farms and renewable energy devices
  - Oil and gas installations
  - Marine aggregate dredging grounds
  - Offshore disposal sites
  - Military training and disposal grounds
- Seabed obstructions, e.g. wrecks
- Shipping lanes
- Environmental sensitivities:
  - Marine Protected Areas.

Methodology

Mapping of Environmental parameters

- Bathymetry
- Seafloor geology
- Wind strength, including:
  - Maxima
  - Averages
  - Gusting
  - Long-term data
  - Direction where available
- Distance from grid/supply chain
- Tidal data
- Topography.
- Environmental sensitivities:
  - Bird migration routes
- Commercial fishing grounds
- Distance from shore (visibility).

Wind assessment



Wave assessment

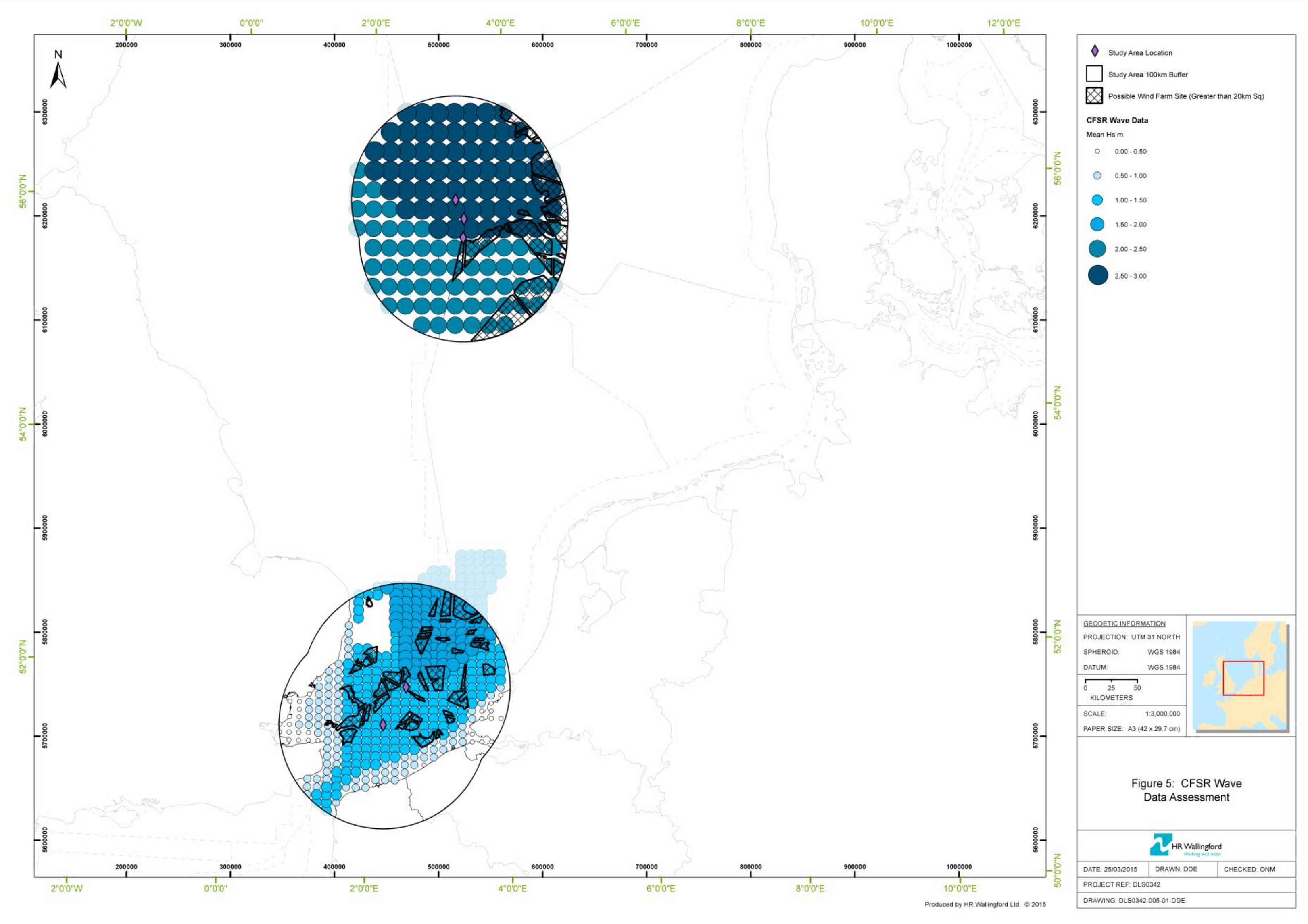


Figure 5: CFSR Wave Data Assessment

Protected Areas and Fishery Assessment

Figure 6: Assessment Of Protected Areas And Fishing Data

Area A Site Suitability Scoring Assessment

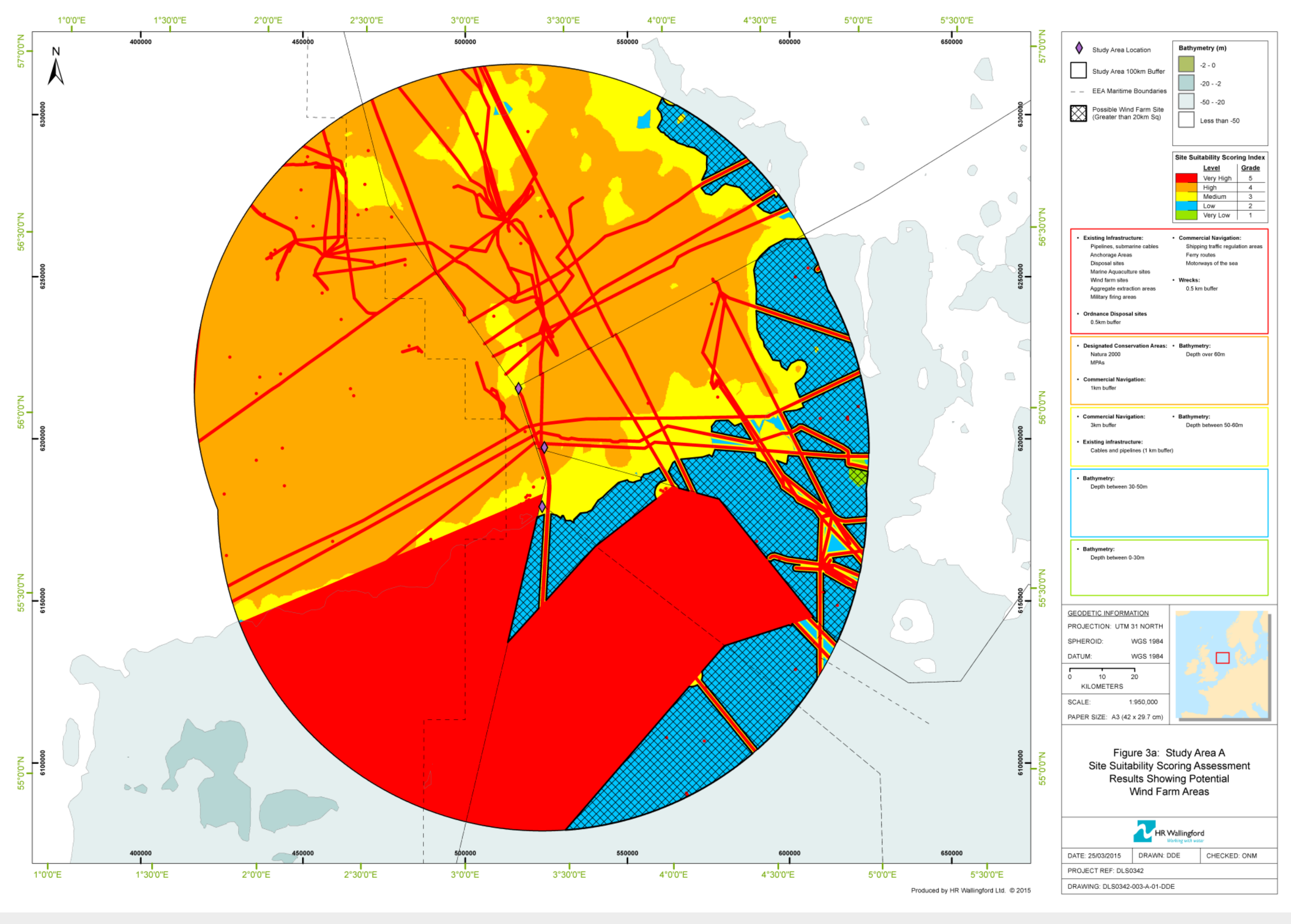


Figure 3a: Study Area A Site Suitability Scoring Assessment Results Showing Potential Wind Farm Areas

Area B Site Suitability Scoring Assessment

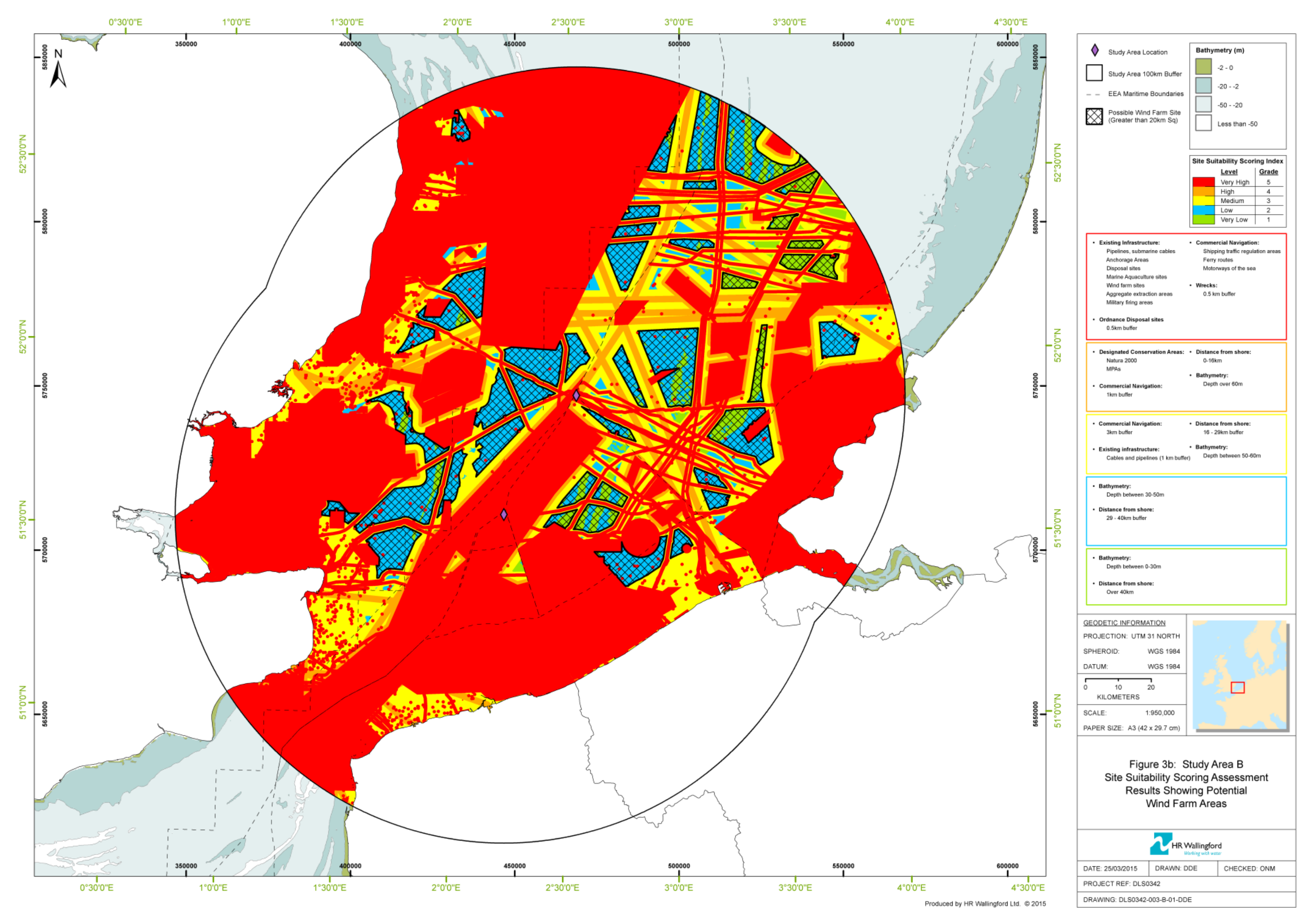


Figure 3b: Study Area B
Site Suitability Scoring Assessment
Results Showing Potential
Wind Farm Areas

Data Adequacy

- Superficially, a large amount of data available to potentially provide a contribution.
- The range of data considered, downloaded and reviewed was much broader than the data used.
- Data providers sourced their data from different locations.
- Fishing data difficult to source.
- Data on migration routes of birds and cetaceans not found.

Data Adequacy

Large proportion accessible through EU-funded sites.

Contrasts in the coverage of data provided from different sources.

Not all national data providers have forwarded their information to EMODnet thematic portals.

Some source paths to access datasets were broken.

Some resources were only available as a pdf, kml or as a static image.

Data Adequacy

- **Considerable overlaps between data providers and types of data, often offering data from different sources.**
- **Same data from more than one source had to be appraised to discover which was most up-to-date.**
- **Some data was too coarse, usually as a result of being compiled into a single dataset alongside data from multiple sources provided at different resolutions.**

Data gaps

- Spatial datasets for:
  - migration routes,
  - marine cetaceans,
  - ecology,
  - and fishing activity.
- Loss of data resolution in favour of providing a data product
- Ability to search metadata from portals
- Integration between marine data resources

Outcomes

The challenge showed that it would be possible to use GIS and public data for such an exercise and this approach is being taken elsewhere for commercial siting of projects or to understand overlapping uses of their areas of interest.

There are limitations being exposed by the project

- Finding existing information and understanding its attributes
- Commercially funded information not always made discoverable or public
- How the information is held – not always adequately spatially referenced
- Overlapping information, which is more current or pertinent?
- Data gaps
- Resource implications (not just cost, also time!)

Marine GIS in the Blue Economy

Particularly good at portraying overlapping interests in the marine environment, where there are few visual clues for people to observe

Exposes opportunities as well as constraints

Reduces risk and uncertainties

Enables a much deeper understanding of a commercially interesting area, which can be interrogated for different purposes

Powerful tool for communicating to non-specialists, regulators, stakeholders and shareholders