



**UK Marine Noise Registry:
Information Document**

JNCC on behalf of the Marine Noise Registry Steering group

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Executive summary

The UK Marine Noise Registry (MNR) is a database that records the spatial and temporal distribution of impulsive noise generating activities in UK seas in order that they can be analysed to determine whether they may potentially compromise the achievement of Good Environmental Status (GES). The approach is consistent with the [UK Marine Strategy Part One](#).

In UK seas, impulsive noise is generated by a range of activities including impact pile driving, explosions and geophysical surveys. Many of these activities may only be carried out under licences granted by a regulatory authority. Other activities, such as those undertaken by the Ministry of Defence, are not licensed. In both cases, data will be submitted to the MNR.

In accordance with the Open Government Licence, data are publicly available in the form of noise distribution maps, published regularly on www.data.gov.uk. Raw data are available on request.

The MNR was developed, and is maintained, by the Joint Nature Conservation Committee (JNCC) on behalf of Defra and the Devolved Administrations (DAs). It will contain impulsive noise data for activities taking place from January 2014 and onwards (dependent on activity type and industry).

This document is a summary of the development of the MNR and has been produced in consultation with the MNR steering group (MNR SG). A list of the organisations involved in this group is found in Appendix II.

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Glossary and acronyms

AAN	Activity Application Number - allocated to a noise event by the Marine Noise Registry
Cefas	Centre for Environment, Fisheries and Aquaculture Science
Close-out report	A form that collects impulsive noise activity data detailing when and where the activity has taken place.
DAs	Devolved Administrations
Data Host	The organisation responsible for managing the Marine Noise Registry; the Joint Nature Conservation Committee (JNCC).
Data Provider	Any organisation or individual providing data on proposed or actual noise events to the MNR. This may be a developer or regulatory body.
Data User	Any organisation or individual making use of data or data products from the MNR, whether obtained via openly available means (data.gov.uk) or other means such as through the Freedom of Information Act.
DECC-OGED	Department of Energy and Climate Change – Oil and Gas, Environment and Decommissioning
Defra	Department for environment, food and rural affairs
DfT	Department for Transport
DoE NI	Department of Environment, Northern Ireland
EEMS	Environmental and Emissions Monitoring System
EIR	Environmental information request
FOI	Freedom of information
GDS	Governmental Digital Service
GES	Good Environmental Status
Hz	Hertz
ICG - Noise	Intersessional Correspondence Group on Underwater Noise
Impulsive noise	A sound for which the effective time duration of individual sound pulses is less than ten seconds and whose repetition time exceeds four times this effective time duration. All sounds of duration less than 10 s that are not repeated are also impulsive (after Dekeling, R.P.A. <i>et al</i> 2014a)
JNCC	Joint Nature Conservation Committee
MCMS	Marine Case Management System, used by the Marine Management Organisation

MMO	Marine Management Organisation
MNR	Marine Noise Registry
MNR SG	Marine Noise Registry Steering Group
MoD	Ministry of Defence
MS	Marine Scotland
MSFD	Marine Strategy Framework Directive
National Project	Major infrastructure developments in Scotland for example large renewable energy projects
Noise event	A period of impulsive noise generation by an activity such as a seismic survey or impact pile driving.
NRW	Natural Resources Wales
NSIP	Nationally significant infrastructure project: Major infrastructure developments in England and Wales for example large renewable energy projects
Organisation	A developer/contractor/operator that proposes to carry out a noise generating activity
OSPAR	OSPAR Convention: The Convention for the Protection of the Marine Environment of the North-East Atlantic
Proposed activity form	A form that collects impulsive noise activity data detailing when and where an activity is planned to be carried out.
PINS	Planning Inspectorate
SEL	Sound exposure level, dB re $1\mu\text{Pa}^2 \text{ s}$ @1m (per pulse) measured over the frequency band 10Hz – 10kHz
Source property	Actual or estimated information that describes the noise source such as source volume or maximum hammer energy
SNCB	Statutory Nature Conservation Body
SPL	Sound pressure level, dB re $1\mu\text{Pa}$ (peak) @1m measured over the frequency band 10Hz – 10kHz
TG Noise	MSFD Common Implementation Strategy Technical Group on Underwater Noise.
Transitional Water	Transitional waters are those waters between land and sea including fjords, estuaries, lagoons, deltas and rias. They often encompass river mouths and so show the transition from freshwater to marine conditions.

1. Introduction

1.1. UK Marine Strategy

The [Marine Strategy Part One](#) sets out the UK's approach on the implementation of the Marine Strategy Framework Directive (MSFD) [2008/56/EC](#). For impulsive noise, the UK target for Good Environmental Status (GES) requires the establishment and maintenance of a 'noise registry' which will record in space and time activities generating noise in order that they can be analysed to determine whether they may potentially compromise the achievement of GES. The Marine Noise Registry (MNR) is managed by Joint Nature Conservation Committee (JNCC) and has been developed in discussion with Government Departments and the Devolved Administrations (DAs), UK regulators and stakeholders. The MNR will form part of the UK's programme of measures which will be set out in the [Marine Strategy Part Three](#).

The MSFD, transposed to UK legislation ([the Marine Strategy Regulations 2010](#)) in July 2010, requires all Member States to work towards achieving GES in their marine environment by 2020. The MSFD outlines 11 high level descriptors of GES. Descriptor 11 relates to underwater noise: "Introduction of energy, including underwater noise¹, is at levels that do not adversely affect the marine environment". Underwater noise generated by human activities has the potential to affect marine organisms in a variety of ways, from masking sounds used to communicate with each other and find food, to physiological injury and even death. Descriptor 11 covers both impulsive noise (seismic airguns, impact pile drivers and explosives) and anthropogenic ambient noise, dominated by shipping sound. Only data related to activities generating impulsive noise is collected within the MNR².

Little is currently known of the levels, distribution and impacts of impulsive noise in UK seas. As such it has not been possible to determine suitable quantitative targets for GES. Where feasible and appropriate, mitigation is already in place to reduce physical impacts of impulsive noise, for example the JNCC Guidelines (JNCC, 2010a-c), but the behavioural, cumulative and population effects of noise on marine animals are largely unknown.

1.2. UK Marine Noise Registry

The MNR will form a temporal and spatial record of activities producing low to mid-frequency (10Hz to 10kHz³) impulsive noise. The MNR will be used to analyse impulsive noise in UK seas and inform research on impacts to the marine environment by impulsive noise generated by human activities.

The MNR was developed, and is maintained, by the JNCC on behalf of Defra and DAs. It was developed to be a simple and user-friendly online data input system. It will catalogue sources of impulsive noise for which information is readily obtained, without defining a source level⁴ threshold for the level of noise to be monitored⁵; information will be collected on all low to mid frequency impulsive noise sources that have the potential to cause behavioural impacts to marine species. In UK seas, impulsive noise is generated by a range of human activities.

¹ The measurement and mapping of underwater noise is a first priority for Descriptor 11 as additional scientific and technical progress is required to support further development of criteria related to this descriptor including the introduction of other types of energy ([European Commission Decision, 2010](#)).

² Monitoring of ambient noise (D11.2) in the UK is being carried out by Cefas and will not be covered by the MNR.

³ With the exception of multibeam echosounders for which activities generating noise up to 12kHz will be recorded.

⁴ The loudness, amplitude of a sound, measured as sound pressure level or sound exposure level.

⁵ In August 2012, the MNR Steering Group agreed that initially the MNR should collect sources of marine anthropogenic impulsive noise within UK seas irrespective of thresholds stated within the UK [Marine strategy](#) (energy source level above 186dB re 1 $\mu\text{Pa}^2 \text{m}^2 \text{s}$ or zero to peak source level of 224dB re 1 $\mu\text{Pa}^2 \text{m}^2$). This decision was made for two reasons: firstly, because behavioural disturbance could occur as a result of exposure to lower levels of sound and secondly as it is not always possible to determine the exact source levels.

Activities for inclusion in the MNR include:

- i. geophysical surveys (e.g. seismic surveys, sub bottom profilers)
- ii. impact pile-driving (e.g. construction)
- iii. explosives (e.g. decommissioning and unexploded ordnance disposal)
- iv. sonar (Military)
- v. acoustic deterrent devices (ADD) (in association with licensed projects)⁶
- vi. multibeam echosounders (MBES)

Under UK regulations, most activities creating impulsive noise relevant to Descriptor 11 must be licensed and conducted under strict conditions. Licences are issued by a range of regulatory bodies including the Marine Management Organisation (MMO), UK Government Department of Energy and Climate Change (DECC-OGED), Marine Scotland (MS), Department of the Environment, Northern Ireland (DoE NI), Natural Resources Wales (NRW) and the Planning Inspectorate (PINS). For the majority of cases, data are submitted to the MNR on a mandatory basis (submission of data is made a condition of licences issued). Other activities, such as those undertaken by the Ministry of Defence (MoD), are not licensed. In these cases data are collected on a voluntary basis.

The MNR is a two-part database, one section providing a 'forward look' and the other providing a 'backward look'. The 'forward look' section collates estimated, planned information for proposed activities, while the 'backward look' section collates the actual (accurate) activity information, after the activity has taken place. The actual information will be used to map the noise events. Data input is carried out mainly by industry (i.e. individual licence holders) but may in some cases be carried out by JNCC, regulators or industry representatives.

The current focus of the MNR is to collect essential information as described in guidance produced by TG Noise, the MSFD Technical Group on Descriptor 11, Underwater Noise⁷ (Dekeling *et al*, 2014a-c). Information includes dates and locations of impulsive noise events and additional (actual and estimated) information describing the noise source (source properties) including maximum hammer energy, maximum airgun volume, TNT equivalent, frequencies, sound exposure level (SEL) and sound pressure levels (SPL). The MNR also collects more detailed information beyond that described within TG noise guidance, for example the type of seismic survey (2D, 3D, boomer, sparker) to allow a greater degree of analysis in the future (see section 2.2 and Appendix I).

2. Structure and standards

2.1. Database structure

The primary purpose for collecting proposed activity (forward-look) data is to create a list of planned activities and their expected end dates. End dates are used to set deadlines for the submission of backward look data (via a close-out report), a set number of weeks after the expected end date. This will ensure the MNR receives close-out reports for all, known, completed activities in a timely manner. Proposed data is also used as a quality check for the close-out report (See Annex III). Other potential uses for proposed activity information are discussed further in section 7.

The MNR database is kept on a secure server and all data submitted conforms to a set standard (see Annex III). Help and guidance pages are available to aid correct entry of data.

⁶ ADDs used in fishing practices will not be collected within the MNR, such as high frequency pingers.

⁷ Now known as MSFD Common Implementation Strategy Technical Group on Underwater Noise.

As the submission of data for a noise event progresses, the activity is assigned one of four statuses, draft proposed activity; proposed activity; interim close-out report and closed as demonstrated in Figure 1.

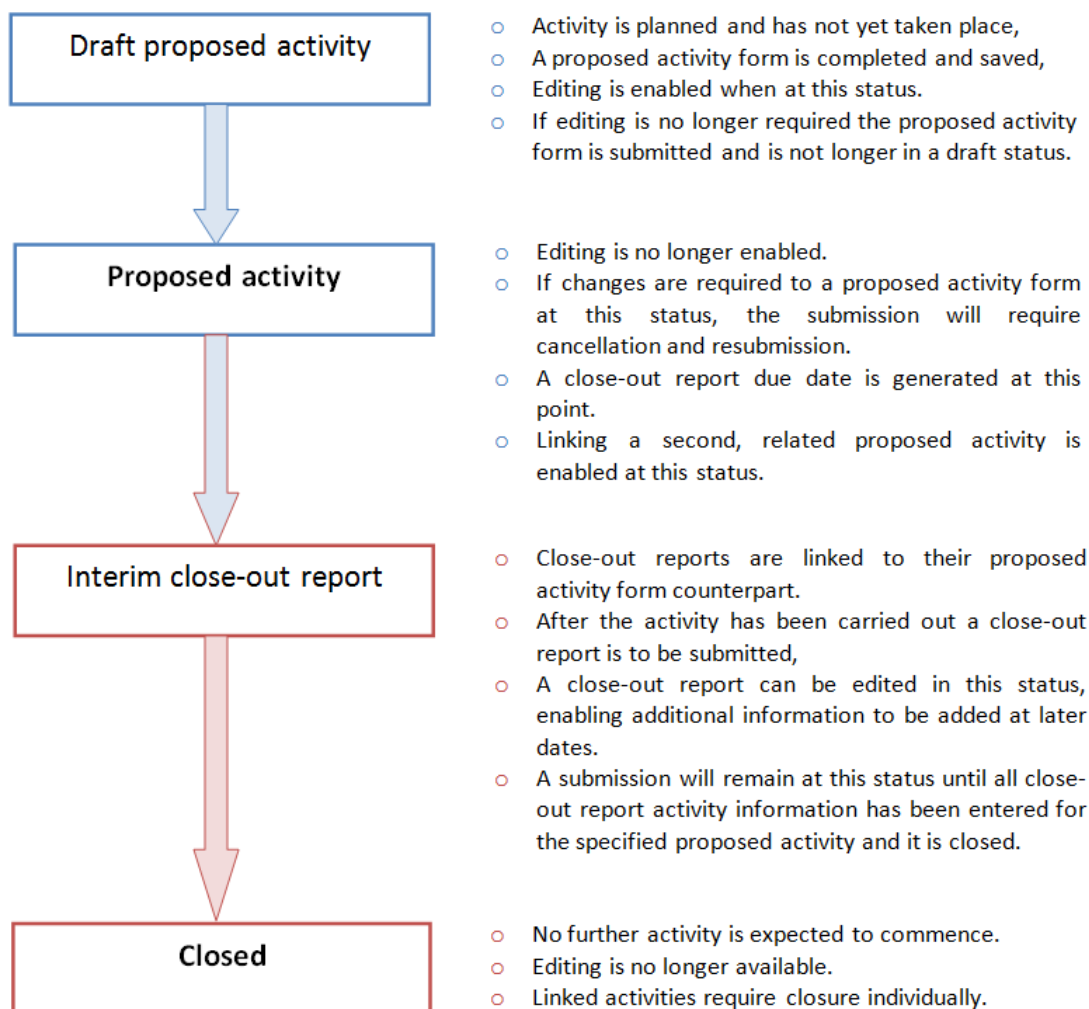


Figure 1. Stages and associated statuses related to data entry to the MNR for impulsive noise generating activities.

When a close-out report is 'closed', the MNR allocates UK oil and gas licensing blocks to the locations recorded. The UK oil and gas licensing grid defines the spatial component within which noise events will be reported. The MNR contains a full set of UK oil and gas blocks including associated reference numbers and GIS polygons describing their boundaries. The grid consists of quadrants numbered 1 to 369 and A-Z (due to extension for coastal blocks; see Annex II). Each quadrant consists of 30 blocks measuring 10 minutes latitude by 12 minutes longitude; numbered 1-30 (see Figure 2, Annex II). Noise events occurring in blocks located along the UK coastline are a number of rules to avoid introducing bias or distorting the data; see Annex II for more information.

2.2. Information required

Data are collected and stored within the MNR using the following structure. Personal details are held in conformance with the Data Protection Act, 1998.

2.2.1. User

A user is an individual that logs onto the MNR in order to submit noise event data. Each user is required to register with the MNR. User details required for registration are:

- i. Username (email)
- ii. Password
- iii. Full name
- iv. Contact phone number

2.2.2. Organisation

Organisations are companies such as operators/contractors/developers that are directly involved with planned operations involving activities resulting in the generation of impulsive sound. Details held within the MNR include:

- i. Organisation name
- ii. Contact name, email address and phone number

Users are required to join or create an organisation in order to submit noise event data to the MNR. Organisations are verified by the regulator when proposed activity information is submitted⁸.

Each organisation must nominate an administrator or administrators; their role includes keeping organisational details up to date, accepting/rejecting member requests and promoting/demoting users to and from an administrative role.

2.2.3. Regulator

Regulators are authorities that issue consents/licences for projects involving activities that generate impulsive noise. Regulator information stored within the MNR is as follows:

- i. Name of regulator
- ii. Contact name
- iii. Contact email address
- iv. Contact phone number

2.2.4. Identifier - activity application number

The MNR allocates an activity application number (AAN) to every proposed activity form completed. Proposed activity forms and close-out reports for the same noise event are linked by a common AAN. Below lists the information linked to an AAN.

- i. Organisation
- ii. Regulator
- iii. Current status of the submission⁹
 - a. Draft proposed
 - b. Proposed
 - c. Interim close-out report
 - d. Closed
 - e. Cancelled
- iv. Proposed activity information
- v. Close-out report due date¹⁰

⁸ All activity forms require the selection of a regulator, a notification is sent to the regulator when an activity form is completed, at this stage the regulator should inform the JNCC in the event of an unknown organisation or unexpected activity submission to the MNR.

⁹ Status is automatically updated by the database, see figure 1.

¹⁰ Close-out report due date is calculated within the database and is dependent on the regulator.

- vi. Close-out report information

2.2.5. Proposed activity

The proposed activity form structure is a series of information linked to the AAN.

- i. AAN
- ii. Voluntary notification¹¹
 - a. Yes/No
- iii. Earliest start date
- iv. Latest end date
- v. Duration, estimated number of working days
- vi. Activity type
 - a. Seismic survey
 - b. Sub bottom profiling
 - c. Impact pile driving
 - d. Explosives use
 - e. ADD
 - f. MBES
 - g. MoD activity
- vii. Location as either
 - a. Latitude/Longitude of a point (decimal degrees)
 - b. Latitude/Longitude of the corners of a polygon (decimal degrees)
 - c. UK oil and gas block (Quadrant/Block)

Licence applications that contain more than a single activity type can be linked within the database. Linked activities must share a common earliest start date and latest end date. Each individual activity type will have the following associated data collected:

Seismic survey

- i. Survey type
 - a. Ocean bottom cables (OBC)/ocean bottom nodes (OBN)
 - b. Vertical seismic profiler (VSP)
 - c. Site
 - d. Regional
 - e. Reservoir
 - f. Other (give details)
- i. Data type
 - a. 2D
 - b. 3D
 - c. 4D
- i. Maximum airgun volume, cu in
- ii. SPL, dB re 1 μ Pa (peak) @1m
- iii. SEL, dB re 1 μ Pa² s @1m (per pulse)

Sub bottom profiler

- i. Source
 - a. Pinger
 - b. Boomer
 - c. Sparker
 - d. Chirp
- ii. Frequency, Hz

¹¹ Is the planned activity data submitted to the MNR on a voluntary basis therefore was not required via licence condition.

- iii. SPL, dB re 1 μ Pa (peak) @1m
- iv. SEL, dB re 1 μ Pa² s @1m (per pulse)

Impact pile driving

- i. maximum hammer energy¹², kJ
- ii. SPL, dB re 1 μ Pa (peak) @1m
- iii. SEL, dB re 1 μ Pa² s @1m (per pulse)

Explosives

- i. TNT equivalent, kg
- ii. SPL, dB re 1 μ Pa (peak) @1m
- iii. SEL, dB re 1 μ Pa² s @1m (per pulse)

ADD

- i. Frequency, kHz
- ii. SPL, dB re 1 μ Pa (peak) @1m
- iii. SEL, dB re 1 μ Pa² s @1m (per pulse)

MBES

MBES of less than or equal to 12kHz will need inclusion into the MNR¹³.

- i. Frequency, Hz
- ii. SPL, dB re 1 μ Pa (peak) @1m
- iii. SEL, dB re 1 μ Pa² s @1m (per pulse)

Naval activities - MoD

The noise producing activities submitted by the MoD are unclassified and do not contain any further source property data.

- i. Active anti-submarine warfare (ASW) sonar
- ii. Active ASW sonar (check)
- iii. Explosions

ASW sonar activity is separated into two categories; ASW sonar (check) is selected for system operator checks which create very short durations of noise compared to any substantial use, tests or trials of active systems, these are recorded as 'ASW sonar'. The explosion category will capture use of exploding munitions at MoD ranges as well as other explosives use and testing.

2.2.6. Close-out report

Close-out reports require input of the actual locations and corresponding date(s) on which the activities occurred. In order to complete a close-out report a user must select the corresponding proposed activity form and select to submit a close-out report.

- i. AAN
- ii. Actual source properties¹⁴ - dependent on activity type (see 2.2.5. proposed activity)
- iii. Location(s)
 - a. Latitude/Longitude point (decimal degrees)
 - b. UK oil and gas block (Quadrant/block)
- iv. Date(s) of occurrence in relation to each location input.

¹² Maximum measured over the duration of the entire activity.

¹³ A decision made by the MNR Steering Group, November 2013 following potential links between 12kHz MBES and the mass stranding event in Madagascar in 2008 ([Southall et al 2013](#)).

¹⁴ Source properties requested in the close-out report are the same as in the proposed form. They are expected to be an estimate as there is no requirement to make real time measurements.

With the exception of locations entered as polygons, locations are automatically brought forward from the proposed activity form to the close-out report, avoiding the need for re-entry of data. Additional locations can be added if required. If the proposed activity location was completed in a polygon format, the subsequent close-out report location data will require re-entry as either point locations or oil and gas blocks. A shape file is available for download from the MNR for the use and convenience of translating latitude/longitude points or polygons into oil and gas block format where necessary.

For cases where the organisation that has undertaken a geophysical survey does not have access to GIS software or a means to translate the survey location to quadrant/block format the following method for location entry should be used. This method is not favoured due to the potential for underestimation of the spatial extent of the activity. A sequence of latitudinal/longitudinal point locations should be entered in an order corresponding to the route taken, ensuring a location point is entered for every day that the geophysical survey equipment was in use. Turning points should also be recorded. Each point location requires input of the corresponding date the survey was carried out on at the recorded point. If a survey point crosses multiple days (i.e. a point location whereby the survey paused and recommenced the following day), a pair of point location and dates should be entered to reflect such.

Appendix I is a summary of MNR data requirements for each activity.

2.3. Standards

The MNR was designed following good practice measures to ensure the highest quality of the data is entered, for example by using drop down lists, tick boxes, data validation methods and provision of help and guidance for data entry. Details of the standards and validation methods used by the MNR are listed in Annex III.

3. Data input

Dependent on the activity type and industry, the earliest data held within the MNR dates back to January 2014. This has required the co-operation and commitment of regulators in adapting current procedures, particularly to implement changes to applications, notifications, close-out reports and licence conditions. Most activities covered by the MNR requirements need licensing; therefore in most cases a condition to report to the MNR has been included in the relevant licence. In other cases, when activities are licensed but do not include an MNR condition, the proposed information is collected by JNCC or the appointed person through extraction of already collated information (such as from the MMOs MCMS database) and close-out report completion is requested on a voluntary basis¹⁵.

Two methods for data input have been developed to account for the different ways in which data are currently collated by regulators. Adjustments to regulators' systems will be necessary to fully implement the MNR and these will be made in due course.

3.1. Method 1: Online MNR interface

Where the required MNR input data is not collated electronically via an online licence application system, such as for MS, NRW and DoE NI, data input to the MNR will be a manual

¹⁵ For example, on a trial basis, projects licensed by MMO that entail an impulsive noise generating activity but do not have [complex case characteristics](#) do not have a condition included within the licence to submit close-out reports, but will be asked to submit close-out reports voluntarily. This is deemed to be in accordance with the [principles of good regulation](#).

process via the MNR online interface. This method is also used for activities that are unlicensed and but which are expected to submit data voluntarily; this includes certain geophysical surveys, some ADDs and MoD activities.

The person tasked with inputting the information (industry, JNCC or regulator) will log onto the online MNR platform and enter the required data. Use of the online platform ensures data are collected in a standardised format (see Annex III) and minimises running costs and management.

3.1.1. Unlicensed activities

Activities that do not require licensing but generate low to mid-frequency impulsive noise include some geophysical surveys associated with purposes other than oil and gas exploration, the majority of ADDs. The intention is for the MNR to collect data where possible on these activities via voluntary notifications.

Currently MMO has a process to collect geophysical survey [voluntary notifications](#) and DoE NI is considering implementing a similar process. In Scottish waters however, the majority of geophysical surveys that result in the production of impulsive noise will require a licence due to Scottish regulations on disturbance. Surveys that fall out with the Scottish regulations will be submitted to the MNR voluntarily.

ADDs very rarely require licensing however MS MNR licence conditions state that a project containing any impulsive noise generating activity that is relevant to the MNR is required to complete the subsequent proposed activity form and close-out report, therefore any projects proposing ADD use for example where an ADDs are used as mitigation for impact pile driving activities will be required to submit information to the MNR.

3.2. Method 2: Integrated data capture system

Where all or some of the required information is stored electronically, for example within an online database such as for activities regulated by DECC-OGED and MMO, an integrated data capture system is likely to be developed. This will enable the export of information already collated within online systems, directly and automatically into the MNR. Until such an integrated system is enabled, JNCC will extract the required proposed activity data from each portal manually and input into the MNR, whereas, the close-out report is completed by the developer manually via the MNR online interface.

3.3. Nationally Significant Infrastructure Projects and National projects

Licence conditions drafted by the MMO and MS are recommended for inclusion to Nationally Significant Infrastructure Projects (NSIPs) and National projects respectively to ensure prompt reporting of both proposed and actual impulsive noise generating activities to the MNR. Guidance will be located in the Planning Inspectorate's (PINS) [advice notes](#) and via [guidance pages](#) available on the MS website for applicants carrying out such a project. PINS and Department for Transport will from now on expect to see new licence conditions, relating to the MNR, associated with such projects.

4. Data access and outputs

Data held within the MNR are unlikely to be of a sensitive nature. As a condition of securing funding for databases such as the MNR, the Cabinet Office requires any data¹⁶ held to be made publicly available under an Open Government Licence. Primary outputs of the MNR are noise event distribution maps that present the number of days per year within each oil and gas block where at least one impulsive noise event had occurred (pulse block days). Regular annual outputs will be available from www.data.gov.uk, estimated to begin towards the end of 2016. Outputs will contain appropriate caveats to reduce the risk of misinterpretation (for example to highlight potential gaps in coverage).

The MNR database itself is closed to the public, however impulsive noise data held is accessible upon request (see Annex I for full terms and conditions of data access and use).

Current¹⁷ access to impulsive noise data as a user¹⁸ of the MNR is as follows:

- i. Users have access to all submissions made on behalf of their organisation. They do not have access to submissions made by other organisations.
- ii. Regulators can only view activity submissions for which they are the named regulating body.
- iii. JNCC and Defra have direct access to all data held by the MNR in order to manage the MNR and produce the required outputs.

5. Development of the MNR

The MNR was developed, and is maintained, by JNCC on behalf of Defra and the DAs. The MNR SG consisting of industry representatives, regulators and specialists was created to provide direction and guidance to the project. The development of the online MNR interface was carried out by a contractor and guided by a small user group of representatives including industry, regulators, JNCC and Defra. The online MNR platform was developed following [Governmental Digital Services \(GDS\) design principles](#). The development process followed “Agile” methods that promote adaptive planning, evolutionary development, early delivery, continuous improvement, and encourages rapid and flexible response to change.

6. Cost of the MNR to Government and industry

The cost to industry (e.g. renewable, oil and gas) of submitting information to the MNR is estimated to be low. The costs to Government and regulators of developing and managing the MNR were estimated within the [MSFD Regulatory Impact Assessment](#) document. JNCC and Defra will look into ongoing funding for management of the database.

7. Future of the MNR

As set out in the [Marine Strategy Part One](#), the risk of any potential physical effects of impulsive noise on marine life, i.e. hearing loss, death *etc.*, is only likely in close proximity to noise sources and is recognised in other legislation and managed through existing licensing regimes. The UK approach to implementing the MSFD indicator for impulsive noise (11.1.1.) aims to address the wider ranging behavioural effects, in particular the cumulative effects of noise on sensitive populations such as marine mammals and fish *etc.*, through consideration of noise levels (where available), and their distribution in space and time.

¹⁶ Excluding data associated with the data protection act.

¹⁷ Access to the impulsive noise data held by the MNR will be reviewed periodically. Data held within the MNR are also likely to be extracted and fed into a European common registry in the future (see section 7.1).

¹⁸ Users are those that have registered with the MNR in order to input data.

Whilst a good scientific understanding exists with regard to the level of noise which can cause physical harm to certain species, there is far less certainty about the levels of noise which are likely to cause negative behavioural impacts that would have effects at a population level. The difficulty in setting thresholds for behavioural impacts is further compounded by the fact that behavioural change is context specific. A sound that might have an effect in one context that may not in another.

The MNR will enable a better understanding of potential cumulative and in-combination effects, and could potentially be used to inform, where the evidence supports it, the adjustment in the scheduling of activities if it appeared that significantly adverse impacts may arise. For example the MNR could be used as a management, planning or advisory tool, to determine, through a 'forward look' approach, whether cumulative levels of underwater noise potentially resulting from planned activities would be likely to compromise the UK's ability to achieve GES for this descriptor. It is noted that use of planned activity data for advisory purposes has limitations and more work will be needed to the MNR before doing so, should a decision be made in the future that requires noise management measures to be implemented.

7.1. European common registry

Given the potential trans-boundary effects of impulsive noise, OSPAR have created a common impulsive noise registry for the North East Atlantic that was supported during development by a working group (Intersessional Correspondence Group on Underwater Noise - ICG- Noise). In order to maximise comparability and compatibility among other Member States, the UK are following TG Noise guidance to collect the recommended data. The MNR also has the flexibility to include extra fields in the future if required. The MNR is one of the first fully functioning noise registries in Europe; therefore it could be used to guide other Member States in their approach to designing and implementing an impulsive noise registry.

8. References and further reading

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Appendix I: Summary of data requirements

- i. **Blue text** indicates optional input data
- ii. **Proposed activity form** - completed before commencement of activity. Detailing what is planned for the activity.
- iii. **Close-out report** – completed after the activity has been finished. Detailing where and when the activity has occurred.

1. Seismic surveys

Proposed activity form

- Earliest start date (DD/MM/YYYY)
- Latest end date (DD/MM/YYYY)
- Expected duration of activity
- Location
 - Latitude/longitude point (decimal degrees)
 - Latitude/longitude polygon (decimal degrees)
 - Quadrant/block¹⁹
 Including the greater working area
- Type of Survey
 - 2D, 3D, 4D
 - Ocean bottom cables/ Ocean bottom nodes
 - Vertical seismic profile
 - Regional
 - Reservoir
 - Site
 - other
- Source properties:
 - Maximum airgun volume (cu in)
 - Sound pressure level (SPL), dB re 1µPa (peak)@1m
 - Sound exposure level (SEL), dB re 1µPa² s (per pulse)@1m

Close-out report

- Source properties:
 - Maximum airgun volume (cu in)
 - Sound pressure level (SPL), dB re 1µPa (peak)@1m
 - Sound exposure level (SEL), dB re 1µPa² s (per pulse)@1m
- Actual location of activity
 - Latitude/longitude point (decimal degrees)
 - Quadrant/Block¹⁶
- Actual dates on which activity took place in correspondence with the location (see table 1)

Table 1. An example close-out report location/date table in UK Oil and Gas block locations. It includes all dates an activity was carried out on within each location recorded. If an activity breaches 2 days, for example beginning at 23:49 01/01/2015 and finishing at 01:00 02/01/2015, both dates will need recording against the location.

Location	Dates
113/3	22/03/2014
113/4	23/03/2014, 01/04/2014
113/5	26/03/2014, 28/03/2014, 01/04/2014

¹⁹ UK oil and gas licensing blocks.

2. Impact pile driving and explosives

Proposed activity form

- Earliest start date (DD/MM/YYYY)
- Latest end date (DD/MM/YYYY)
- Expected duration of activity
- Location
 - Latitude/longitude point (decimal degrees)
 - Latitude/longitude polygon (decimal degrees)
 - Quadrant/block²⁰
- Source properties:
 - SPL, dB re 1 μ Pa (peak) @1m
 - SEL, dB re 1 μ Pa² s (per pulse) @1m
 - **Piling:** maximum hammer energy (KJ)
 - **Explosives:** mass of TNT equivalent (kg)

Close-out report

- Source properties:
 - SPL, dB re 1 μ Pa (peak) @1m
 - SEL, dB re 1 μ Pa² s (per pulse) @1m
 - **Piling:** maximum hammer energy (KJ)
 - **Explosives:** mass of TNT equivalent (kg)
- Actual location of activity
 - Latitude/longitude point (decimal degrees)
 - Quadrant/Block¹⁷
- Actual dates on which activity took place in correspondence with the location (See table 1)

3. Sub bottom profilers

Proposed activity form

- Earliest start date (DD/MM/YYYY)
- Latest end date (DD/MM/YYYY)
- Expected duration of activity
- Location
 - Latitude/longitude point (decimal degrees)
 - Latitude/longitude polygon (decimal degrees)
 - Quadrant/block¹⁷
- Source
 - Pinger
 - Boomer
 - Sparker
 - Chirp
- Source properties:
 - Frequency (Hz)
 - SPL, dB re 1 μ Pa (peak) @1m
 - SEL, dB re 1 μ Pa² s (per pulse) @1m

Close-out report

- Source properties:
 - Frequency (Hz)
 - SPL, dB re 1 μ Pa (peak) @1m
 - SEL, dB re 1 μ Pa² s (per pulse) @1m
- Actual location of activity
 - Latitude/longitude point (decimal degrees)
 - Quadrant/Block¹⁷
- Actual dates on which activity took place in correspondence with the location (See table 1)

²⁰UK oil and gas licensing blocks.

4. Acoustic deterrent device (ADD) and multibeam echosounders (MBES)

Proposed activity form

- Earliest start date (DD/MM/YYYY)
- Latest end date (DD/MM/YYYY)
- Expected duration of activity
- Location
 - Latitude/longitude point (decimal degrees)
 - Latitude/longitude polygon (decimal degrees)
 - Quadrant/block²¹
- Source properties:
 - **ADD:** Frequency (kHz)
 - **MBES:** Frequency (Hz)
 - SPL, dB re 1µPa (peak) @1m
 - SEL, dB re 1µPa² s (per pulse) @1m

Close-out report

- Source properties:
 - **ADD:** Frequency (kHz)
 - **MBES:** Frequency (Hz)
 - SPL, dB re 1µPa (peak) @1m
 - SEL, dB re 1µPa² s (per pulse) @1m
- Actual location of activity
 - Latitude/longitude point (Decimal degrees)
 - Quadrant/Block¹⁹
- Actual dates on which activity took place in correspondence with the location (See table 1)

5. Ministry of Defence

All information supplied by the MoD is voluntary. ASW Sonar, ASW sonar (checks) and explosions information is submitted to the MNR follows the format below:

Proposed activity form

N/A

Close – out report

- Actual location of activity
 - Quadrant/Block¹⁹
- Actual dates on which activity took place in correspondence with the location (See table 1)

²¹ UK oil and gas licensing blocks.

Appendix II: List of organisational members of the MNR Steering Group

Agri-food and biosciences institute (Wales)
Centre for Environment, Fisheries and Aquaculture Science
Department of Energy and Climate Change – Oil and Gas, Environment and Decommissioning
Department for environment, food and rural affairs
Department for Transport
Department of Environment, Northern Ireland
Joint Nature Conservation Committee
Marine Management Organisation
Ministry of Defence
Marine Scotland
Natural England
Natural Resources Wales
Oil and Gas UK
Planning Inspectorate
Renewable UK
The Crown Estate
Welsh Government

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Annex I: Marine Noise Registry - Data access/use policy

The following provides a written policy for managing access to and use of data and information held by the Marine Noise Registry (MNR).

The primary purpose of the MNR is to collect data on the distribution in time and space of activities generating low to mid frequency impulsive noise across UK seas. These data will enable the creation of noise maps and will inform research to determine whether current levels of noise are having an adverse effect on the marine environment. It may also be used for planning and management purposes in the future (see the information document, section 7 for more information).

The MNR collates data on proposed and actual activities in UK waters that generate impulsive noise. The majority of submissions to the MNR will be those licensed by the following regulatory bodies: Department of Energy and Climate Change (DECC), Marine Management Organisation (MMO), Marine Scotland (MS), Department of the Environment Northern Ireland (DoE NI) and Natural Resources Wales (NRW). The MNR will also collect data on relevant noise-generating activities that are not licensed²² as voluntary notifications, including activities carried out by the Ministry of Defence (MoD).

1. Purpose

This Data Access/Use Policy document makes transparent how permission to use and pass on data obtained from the MNR will be managed, to:

- i. ensure data are managed responsibly;
- ii. assure Data Providers of this fact; and
- iii. enable Data Users to better understand the limitations of the data and the conditions under which they are available.

2. Data storage

Data received are stored securely in the MNR which is held by the Data Host, the JNCC. All data are held in line with the Data Protection Act and government information management procedures.

Information contained in the MNR is limited to those activities for which information can be readily obtained by the Data Host from developers and regulators of noise activities. It does not necessarily contain information on all relevant activities producing impulsive noise and it does not provide any information on ambient sound.

The core information held by the MNR is a temporal and spatial record of activities producing low to mid frequency (10Hz to 10kHz) impulsive noise, comprising records of both proposed and actual (completed) noise events. The spatial scale used is UK oil and gas licensing blocks, which cover an area of 10 minutes latitude by 12 minutes longitude. Location data for proposed activities may also include longitude/latitude points and polygons²³. The temporal scale is one calendar day (24 hours). The duration of each activity is recorded only in terms of the number of days over which noise events will occur. The MNR also collects additional

²² This includes geophysical surveys for purposes other than Oil & Gas, mainly outside Scottish waters. In Scottish waters, the great majority of geophysical surveys need consent through the European Protected Species (EPS) licensing regime which is subject to Scottish regulations on disturbance, whereas in others parts of UK waters surveys other than Oil & Gas submit notifications of the planned activity voluntarily as in most cases there will not be a requirement for a EPS licence as different regulations apply. Rarely are acoustic devices and multibeam echosounders licensed therefore will also be collected voluntarily and where possible.

²³ A shape denoting the location as an area an activity has or will occur within.

data such as source properties²⁴ for all activities, both proposed and actual²⁵, and greater survey detail regarding the types of equipment used.

Data Users are reminded that any proposed activity information obtained from the MNR is, for the majority of cases, a 'worst case scenario' representation of the potential occurrence of impulsive noise both temporally and spatially. The primary purpose of the collection of the proposed information is to allocate due dates for the submission of close out reports (actual activity information) to the MNR thus ensuring their prompt completion after the end of a noise event. However, this data could in the future allow for analysis of the differences between proposed and actual work; the findings may help with future noise management if required.

3. Data access

As a condition of securing funding for the MNR, the Cabinet Office requires the MNR data to be made publically available. Although the raw data held within the MNR will not be open access to the general public, it is available on request and through [FOI](#) and [EIR](#)²⁶. Outputs will be made publicly available on an annual basis.

Access from within the MNR to data is as follows:

- i. Members of organisations can access activity submissions made on behalf of that organisation. They cannot view any submission made by another organisation.
- ii. Regulators can only access activity submissions for which they are the named regulatory body.
- iii. JNCC and Defra can access all activity submissions, proposed and actual, in order to manage the MNR and produce the required outputs.

4. Data sharing

Maps of noise events in UK waters will be made available from data.gov.uk. The maps will show, for each oil and gas block, the best available data on the number of days per month, season and year during which at least one noise event occurred (this unit is referred to as a pulse block day). Regular outputs of such maps are expected annually beginning 2016. Outputs will contain appropriate caveats to reduce the risk of misinterpretation (for example by highlighting gaps in coverage).

More detailed information from individual applications and licences will not be shown on the maps but are held within the MNR for further/future analysis. The data held within the MNR is also likely to be extracted and fed into a European (or OSPAR) common registry in the future²⁷.

5. Terms and conditions for users of material, data and/or information

All raw data held in the MNR are made available upon request for use under the [open government licence](#). Terms and conditions are set out below. Data Providers have given the Data Host their permission to hold a copy of their data within the MNR and to disseminate it according to the terms laid out in this Data Access/Use Policy.

²⁴ As recommended by TG noise guidance <https://ec.europa.eu/jrc/sites/default/files/lb-na-26555-en-n.pdf>.

²⁵ Actual source properties are not real time measurements but a product of noise modelling.

²⁶ Freedom of information act 2000 and environmental information regulations 2004

²⁷ Pending further discussion and decision by OSPAR.

5.1. Conditions of use

5.1.1. There are no restrictions on who can request raw data and information held by the MNR.

5.1.2. Users are free to copy, publish, distribute, transmit and exploit the information commercially and non-commercially, for example by combining it with other information or by including it in their own product or application.

5.1.3. Users must acknowledge the source of the data in any information products or publications, whether printed, electronic or broadcast, that are based wholly or in part on data and/or information extracted from the MNR as follows: *'These data were extracted from the Marine Noise Registry [at <http://mnr.jncc.gov.uk>] on the DD/MM/YYYY. Data are collated in the Marine Noise Registry to fulfil the UK requirement for monitoring loud, low to mid frequency impulsive noise for MSFD D11.1. These data are made available under the Open Government Licence. The Data Host and Data Providers bear no responsibility for any further analysis or interpretation of the material, data and/or information provided.*

5.2. Accuracy of information and disclaimer

5.2.1 The Data Host tries to ensure that any data and/or information are accurate, but gives no guarantee that any data and/or information are accurate, up to date or complete.

5.2.2 The Data Host accepts no liability for any loss or damage caused by inaccurate, out of date or incomplete data and/or information. All users should independently verify any data and/or information before relying upon it.

5.2.3 The data and/or information provided do not constitute any form of advice or recommendation and are not substitutes for the exercise of professional judgement. Users that lack the qualifications and/or experience to make that judgement should take professional advice.

5.2.4 The Data Host is not responsible for viruses, or other code that might be harmful, which may be picked up during access or download processes. Each user is responsible for implementing sufficient anti-virus and other security checks to ensure the safety of their systems.

IMPORTANT: By accessing the MNR you are agreeing to be bound by these Terms and Conditions. These Terms and Conditions govern the way you can use all material, data and/or information provided to you. Please read them carefully.

Annex II: Rules for coastal blocks

1. Introduction

Coastal blocks are UK oil and gas licensing blocks that bisect the UK coastline, thus containing land and water. Properties of these blocks have been recognised to potentially cause complications for analysis of GES. Complications may arise when coastal blocks contain mostly land, are split by land and or contain transitional water²⁸. Therefore the MNR SG agreed a set of rules (at the MNR SG meeting in November 2013) to help determine how to consider each coastal block.

It was also identified that the UK oil and gas licensing grid did not cover all areas of UK waters, for example in some areas licensed by Northern Ireland and other coastal regions therefore the grid was extended to cover such, this is also documented below.

2. Coastal block rules

2.1. Blocks containing <5% water

If a noise event occurs in a block that contains less than 5% water, the database will re-assign it to a pre determined adjacent block that is connected by the same water body and type²⁹. In the event of multiple potential adjacent blocks for which a noise event could be re-assigned to; the chosen block will be the adjacent block that shares the longest length of water based boundary with the original block.

When calculating pulse-block-days³⁰ the block the noise event has been reassigned too is used rather than the original block the noise event occurred within. The original location of the activity is retained within the database. The <5% water rule was also decided, by the MNR SG, to be used as a cut-off point for how far up river noise events are to be recorded.

2.2. Blocks by the water type(s) contained: coastal, transitional, both or neither (open water)

By adopting the landward boundary of the MSFD (i.e. to mean high water) it would likely omit some relevant impulsive noise generating activities, therefore the MNR SG decided that the MNR will also collate noise events occurring in transitional waters wherever possible. As the MSFD does not require the inclusion of transitional waters each block has been coded with the water type held, allowing for exclusion of transitional waters from MSFD reporting/analyses if desirable.

GIS was used to select all blocks that contain transitional water and to code them appropriately.

2.3. Split blocks; A block will be considered split if:

- i. it contains both coastal and transitional waters,
- ii. land bisects the block such that water bodies within are completely separated, or

²⁸ Transitional waters are those waters between land and sea including fjords, estuaries, lagoons, deltas and rias. They often encompass river mouths and so show the transition from freshwater to marine conditions.

²⁹ Water 'type' is the type of water body held within the block for example coastal or transitional water.

³⁰ Pulse block days are the number of days in year, season or month within a block where at least one impulsive noise event has occurred.

- iii. it contains islands, enclosed bays or other features which make it difficult to judge how noise will propagate through water in the block.

In cases where a split block contains <5% water, it will be treated as section 2.1. above, whereby the noise event is assigned to the most appropriate adjacent block connected by the same water body and type.

If in the future the MNR is used to aid regulation or planning of noise generating activities, the exact locations of noise events especially within split blocks are likely to be required in order to identify whether events occur in the same or separate water bodies. This would allow for finer scale assessment and addressing potential in-combination effects. If the Latitude/Longitude locations were not previously submitted to the MNR, the person tasked will need to approach the noise producer or relevant regulatory body in order to obtain them.

3. Additional blocks

The UK oil and gas licensing grid has been extended over areas previously not covered. This includes Lough Foyle and Carlingford Lough (licensed by Northern Ireland) and some coastal areas. Additional blocks are labelled accordingly; quadrants are letters from A to Y, double letter notation was used for quadrants in Northern Ireland (AA and AB). Blocks were numbered 1-30 following the original grid labelling structure.

4. Summary

- 4.1. Noise events within blocks with <5% water will be reassigned to an appropriate neighbouring block connected by the same body of water. Whilst also ensuring the water type is shared with the original water type (ie transitional, coastal).
- 4.2. All coastal blocks, except those containing <5% water, will be shown on MNR output maps. Noise events occurring within a block containing <5% water will be presented within the re-allocated block.

The Shapefile for the UK oil and gas grid contained within the MNR is coded for the following attributes.

- i. Quadrant (QUAD)
- ii. Quadrant/Block (New_Block)
- iii. Less than five percent? (lessthan_5)
 - a. Yes/No
- iv. Water Type (TW_code)
 - a. Coastal (C)
 - b. Transitional (T)
 - c. Both transitional and coastal (B)
 - d. Neither coastal or transitional (N)
- v. Split block? (split_bloc)
 - a. Yes/No
- vi. Point requirement? (Point_req)
 - a. Yes/No
- vii. Re-Assignment Block (Assign_Bloc)
 - a. Quadrant/Block – the block the current block should be reassigned to.
 - b. Assign by point location
 - c. n/a (no re-assignment required)

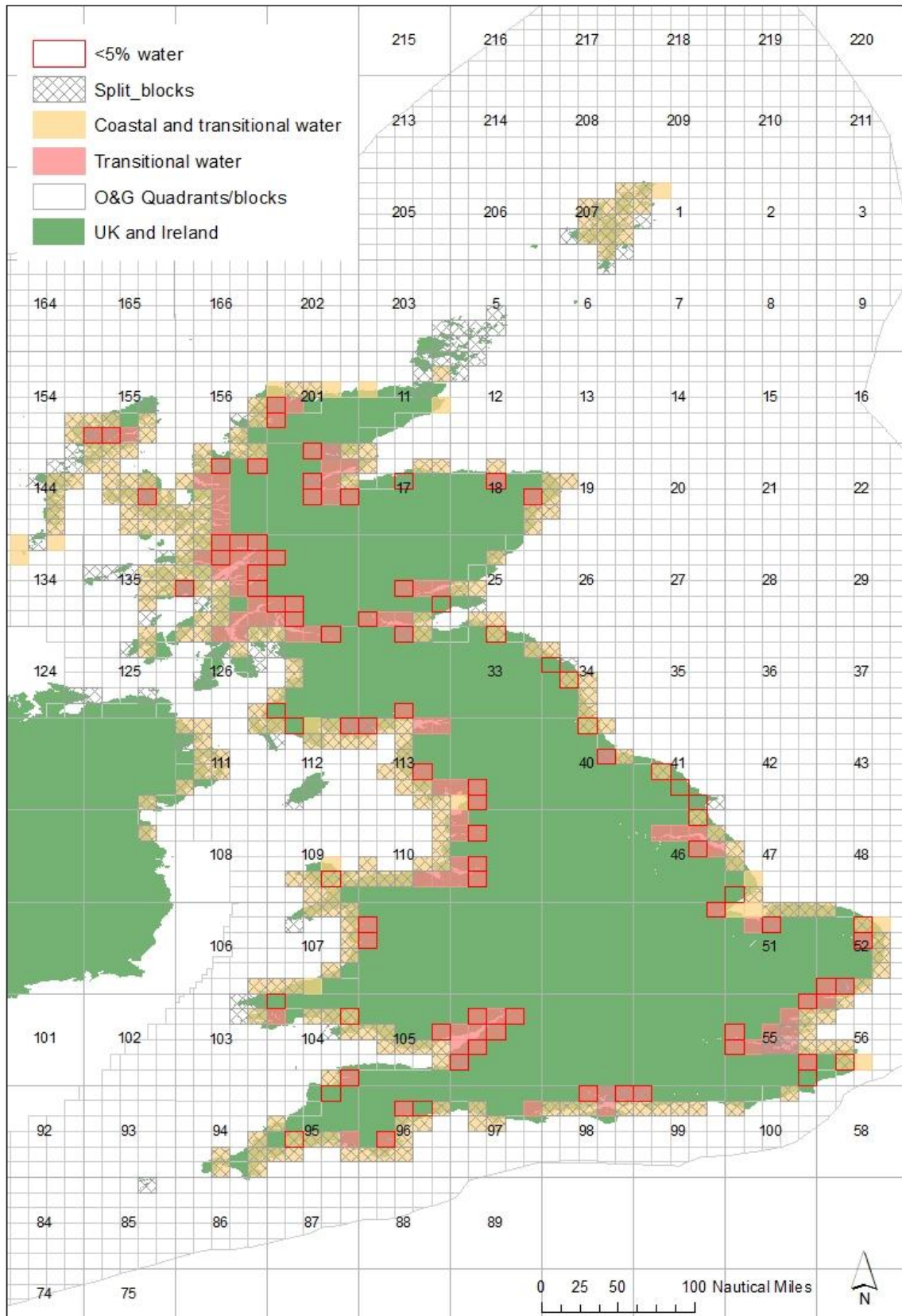


Figure 2. Map of coded UK coastal oil and gas blocks for: blocks containing <5% water (noise reassignment), blocks containing only transitional water and both coastal and transitional and split blocks. O&G Quadrant blocks = UK oil and gas licensing grid.

Annex III: Quality assurance - online MNR interface data input

The MNR has been developed with quality assurance processes in place to ensure it meets specific quality standards set by JNCC. Tables 2 and 3 describe the processes used to ensure data input to the MNR is correct and to standard.

If the format is not adhered to, mandatory data is not completed or the validation returns an error, the proposed activity form or close-out report will not be able to be submitted without correcting the error.

Table 2. Proposed activity data validation process within the data input MNR platform.

Attribute	Format	Example	Mandatory/ Optional ³¹	Validation process
Activity application number (AAN)	Integer	1,13,234	N/A	Allocated by the database
Regulator	Pre determined list	Marine Scotland, Marine management organisation...	Mandatory	Regulators are registered with the MNR prior to live date. The list is not expected to change in the short term.
Organisation	Pre determined list	Organisation A Organisation B	Mandatory	Organisations visible within the list will change dependent on the User, as Users can only view and select organisations they are a member of. It is expected that most users will be a member of a single organisation therefore will only have one option to select.
Voluntary notification	Pre determined list	Yes/No	Mandatory	Accompanying text to explain voluntary notifications
Earliest start Date and latest end date	DD/MM/YYYY	01/05/2013	Mandatory	<ul style="list-style-type: none"> • End date must not be before start date • Start date must not precede 2000 • Day value between 1-31

³¹ When mandatory the proposed activity form will not allow submission until the attribute has been correctly filled out or selected.

				<ul style="list-style-type: none"> • Month value between 1-12
				If the data entered must meet the criteria above.
Estimated Duration	Given as whole days; 00:00 to be start/end of a day	Survey starting at 23:30 on 01/05/2013 and ending at 03:00 on 04/05/2013 is recorded as 4 days	Mandatory	An error will show when the number of days stated is greater than that of number of days between start and end date.
Activity Type	Pre determined list	Sub bottom Profiler, explosives	Mandatory	
Additional seismic activity information	Pre determined list	2D, REGIONAL	Mandatory	
Additional sub bottom profiler information	Pre determined list	Pinger, Sparker, etc	Mandatory	
Activity source properties	Integers except explosives TNT equivalent - 1d.p	245	Optional	<p>Upper and lower limits are set for each source property, thus a value is entered out with the range stated, an error will be seen and the form will not be sent.</p> <ul style="list-style-type: none"> • Sound exposure level (dB re 1μPa² s (per pulse)) @1m: 0 – 500 • Sound pressure level (dB re 1μPa (peak)) @1m: 0 – 500 • Maximum airgun volume (cu in): 0 – 20 000 • Maximum hammer energy (KJ): 0 – 30 000 • Frequency (Hz): 0 – 200 000 • Frequency (kHz): 0 - 200 • TNT equivalent (kg): 0 – 300.0

Location - Points	Latitude Longitude to be input into separate text fields. Decimal degrees, WGS84 between 0 -7d.p “-“ used to indicate W.	58.275, 0.075	Optional	Values must fall within the pre set range defining UK waters. An error will be shown if data entry does not conform to the defined format, or out with UK waters.
Location – UK oil and gas blocks	QQQ/BB Blocks will be entered one at a time. Text field	93/4, D/1	Optional	All oil and gas block codes are stored within the database, if entered text does not match a stored value for an oil and gas block code, an error will be shown.
Location - Polygon	Latitude/longitude points in Decimal degrees WGS84, depicting polygon corners in a succession of latitude/longitude points in clockwise order denoting a simple polygon.		Optional	If points entered do not create a polygon, an error will appear. Points must also fall within the set parameters for UK waters

Table 3. Close-out report data input validation process within the MNR platform.

Attribute	Format	Example	Mandatory/Optional ³²	Validation process
Actual activity source properties	Integer except explosives - TNT	222 or 222.2	Optional	Upper and lower limits are set for each source property, thus if a value is entered out with the range stated, an

³² When mandatory the close-out report will not allow submission until the attribute has been correctly filled out or selected.

equivalent is to 1d.p

error will be shown.

- Sound exposure level (dB re 1µPa² s (per pulse)) @1m: 0 – 500
- Sound pressure level (dB re 1µPa (peak)) @1m: 0 – 500
- Maximum airgun volume (cu in): 0 – 20 000
- Maximum hammer energy (KJ): 0 – 30 000
- Frequency (Hz): 0 – 200 000
- Frequency (kHz): 0 - 200
- TNT equivalent (kg): 0 – 300.0

Locations entered within the proposed activity form are carried forward	Pre determined list	Yes/No	Mandatory	Locations are carried over from the proposed activity form. Yes/no selection signifies whether the activity has or not occurred within the specified location. If the original location was a polygon it is still carried over however dates of noise occurrence are not able to be inputted as polygons are not a valid input for close-out reports. Therefore additional locations will need input. All proposed locations (except polygons) will need the field selected for yes/no, otherwise the form will not submit. All fields are editable when saved as an interim close-out.
Inserting dates	Select from calendar	01/02/2015, 02/02/2015, 03/02/2015	Optional	Can only select dates between the earliest start date and latest end dates defined within the proposed form
Inserting dates	Enter manually as DD/MM/YYYY separated by a comma (,)	01/02/2015, 02/02/2015, 03/02/2015	Optional	Can only select dates between the earliest start date and latest end dates defined within the proposed form
Inputting additional locations - point	Latitude Longitude, Decimal degrees,	58.275, 0.075	Optional	Explanation text available. Values must fall within the pre set range defining UK waters

	WGS84 between 0 -7d.p “-“ used to indicate W			
Inputting additional locations – oil and gas block	QQQ/BB Blocks should be entered one at a time.	93/4 or D/1	Optional	All oil and gas block codes are stored within the database, if entered text does not match an oil and gas block code, an error will be shown.

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