

Potential for joined up marine monitoring and data collection between SNCBs and industry

## **1. Northwest Oil and Gas Licence Area**

### **1.1. Overview**

#### **State area of sea in relation to coastline, 12nm and continental shelf, estuaries etc**

Liverpool Bay is part of the wider Irish Sea lying against the coasts of North Wales and North-West England, and incorporates waters from the Mersey, Ribble and Dee estuaries. Liverpool Bay was one of the first significant near-shore areas of the UK to show commercially exploitable oil and gas.

#### **State industry this case study focuses on**

This case study will focus on the oil and gas industry.

#### **1.1.1. Generic Current Status of Industry Sector**

##### **Overview of sector development and status**

The north-west of England to the north of the Wales marine territory boundary has a mixture of activities in operation within or close to MPA areas. This includes approximately twenty oil and gas leased blocks.

##### **History and forecast (where known) of requirements to conform to legislation in environmental monitoring**

Offshore oil and gas developments are required to meet UK regulations, most notably the Offshore Chemicals Regulations 2002, The Offshore Petroleum Activities (Conservation of Habitats) (Amendment) Regulations 2007, The Offshore Petroleum Production and Pipeline (Assessment of Environmental Effects) 2009, The Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2010, and the Marine and Coastal Access Act 2009.

##### **Development of monitoring requirements through different stages of sector development, e.g. licensing rounds**

Offshore environmental impact surveys have been carried out by oil and gas operators in the North Sea since 1975, initially as part of corporate environmental management programmes and latterly as a regulatory requirement. Routine monitoring of the area around installations to confirm impact hypotheses of the seabed and check the general health of the marine environment is now endorsed in UK Regulations notably under The Offshore Chemicals Regulations, 2002. Historically, seabed environmental surveys in the context of offshore oil and gas operations have generally been conducted in a localised area around offshore installations. As a consequence, there was much uncertainty regarding the extent of seabed sediment impacts beyond the vicinity of the platform (UKOOA, 2001).

Monitoring programmes have since evolved to a greater focus on pre-operational baseline monitoring across the wider environment. This is normally carried out through side-scan and/or multi beam sonar and swathe bathymetry surveys to identify potential ecologically important benthic habitats and species

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which can then be screened out of the development area utilising 'ground truthing' methods such as seabed imagery and sediment sampling.

### **Emphasis on particular biological (and biophysical) parameters and reason for this**

Since the 1980's, the scale of activity in the maritime area has dramatically increased. New field developments have occurred and new production technologies have been introduced (e.g. sub-sea structures, changeover from oil-based to alternative drilling mud) and the quantities of produced water being discharged have increased. Moreover, a broader range of concerns about potential impacts of the offshore industry has been expressed. OSPAR has therefore recognised that a coordinated chemical and biological effects monitoring programme is essential for identifying the nature and extent of environmental impacts. The aim of the OSPAR guidelines is to harmonise monitoring of environmental impacts of discharges from offshore installations, and to harmonise reporting and assessment of the data (OSPAR, 2004).

In 1995, the UK Biodiversity Steering Group established the framework and criteria for identifying species and habitat types of conservation concern – defined as priority species and habitats. An original list of priority species and habitats was created between 1995 and 1999, and included a number of marine species and habitats. This list was revised following the Priority Species and Habitats Review, completed in 2007, and the current list of UK BAP priority marine species now totals 87. Priority marine habitats identified included *Sabellaria alveolata* Reefs, Saline Lagoons, Mud Habitats in Deep Water, Serpulid Reefs, and Maerl Beds. Priority marine species included the native oyster (*Ostrea edulis*), Loch Goil Sea Squirt (*Styela gelatinosa*), Blue Whale (*Balaenoptera musculus*), Herring (*Clupea harengus*) and Loggerhead Turtle (*Caretta caretta*) (<http://jncc.defra.gov.uk/> page-1592).

Protected species and habitats of conservation significance under the UK's Conservation of Habitats and Species Regulations 2010 (which implements the EC Habitats Directive 92/43/EEC) occurring in the Liverpool Bay area are:

- Bedrock and stony reef (*Sabellaria spinulosa* colonies or mussel beds)
- Methane Derived Authigenic Carbonate (MDAC, Annex 1 of the EC Habitats Directive)
- Areas of potential Annex 1 sandbank habitat in water depth 20m<LAT
- Seapens and burrowing megafauna

### **Approach to data standardisation (especially qualitative assessments) within sector**

To standardise the data collected during marine surveys OSPAR have issued a set of guidelines. The aim of these is to harmonise monitoring of environmental impacts of discharges from offshore installations, and to harmonise reporting and assessment of the data (OSPAR, 2004).

#### **1.1.2. Overview of Case Study Industry Activities**

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### **Characteristics of main industry in case study including status of development and development round**

One license block (and a minor part of another) approximately 2nm offshore of Formby, sits entirely within the Liverpool Bay SPA, and is also in proximity to other MPAs such as the Ribble and Alt Estuaries SPA / Ramsar, and Sefton Coast SSSI. This is license P791 operated by Perenco UK Ltd 1992 – 2027 (block operated by BHP Petroleum Ltd). This has the Douglas to Lennox pipelines running to the platform.

Two license blocks approximately 8km offshore of Blackpool have the largest overlap with MPAs in this area, these being overlapped with Lune Deep SAC. Both blocks relate to the same license P1548, operated by Venture North Sea Gas Ltd 2007 – 2033.

Another overlap with oil/gas license blocks and MPAs in this area occurs closer to shore by Barrow-in-Furness, with overlap into a small part of the Morecambe Bay SAC. This includes two blocks, both relating to license P1475 operated by Nautical Petroleum PLC 2007 - 2033. Pipelines also cross this license area in three closely grouped routes from the Barrow-in-Furness terminal, operated by HRL (PL945: NMT trunkline; and PL144: SMT trunkline) and ConocoPhillips (PL1945/6: gas /chemical). These cross a distance <1nm of the Morecambe Bay SAC.

### **Characteristics of other industries in area**

In addition to the oil and gas industries, other principal industry developments include multiple electricity cables crossing the Lune Deep SAC. Also in the area but not within MPA boundaries include the Dong Energy windfarms at Walney and Burbo Bank; and aggregate licenses 331, 392 and 457. Heysham nuclear power plant is located within Morecambe Bay and a number of ports for the commercial, fishing, ferry and leisure sectors are in the area.

### **Specific local / national drivers for monitoring**

A number of regulations must be adhered to by offshore Oil and gas developments these include Offshore Chemicals Regulations 2002, The Offshore Petroleum Activities (Conservation of Habitats) (Amendment) Regulations 2007, The Offshore Petroleum Production and Pipeline (Assessment of Environmental Effects) 2009 and The Offshore Marine Conservation (Natural Habitats, &c.) (Amendment) Regulations 2010.

The Birds Directive (79/409/EEC) creates a comprehensive scheme of protection for all wild bird species. The directive recognises that habitat loss and degradation are the most serious threats to the conservation of wild birds. The Liverpool Bay area is an area used regularly by 1% or more of the Great Britain population of bird species in Annex 1 of the Birds Directive, used by regularly occurring migratory species and an area used by over 20,000 waterfowl or 20,000 seabirds.

### **1.1.3. Overview of Case Study MPA Designations**

The European Council's Directive 79/409/EEC on the conservation of wild birds (the Birds Directive, 1979) aims to promote the maintenance of biodiversity. The Directive requires the UK (as a Member State) to identify and designate as Special Protection Areas (SPAs) the most suitable sites for the protection of rare or vulnerable wild birds (listed in Annex I of the Directive) as well as regularly occurring migratory species (not listed in Annex I), to ensure their survival and reproduction in their area of distribution. The UK is required to establish conservation measures for SPAs which is achieved through management of potentially damaging activities where the habitats and species are present and in their vicinity. Liverpool Bay is designated as a Special Protected Area (SPA) and is designated as a site of particular importance for seabirds (DEFRA, 2010).

Liverpool Bay has been identified by Natural England and CCW as qualifying for SPA status under the following Stage 1 guidelines:

Stage 1 (1). Liverpool Bay regularly supports over 1% of the GB population of one species listed on Annex I of the EC Directive on the Conservation of Wild Birds (79/409/EEC): red-throated diver (*Gavia stellata*). The mean peak count of overwintering red-throated divers within the pSPA boundary over the period 2001/02 – 2005/06 was 922 individuals: or 5.4% of GB's total estimated overwintering population.

Stage 1 (2). Liverpool Bay regularly supports more than 1% of the biogeographical population of one regularly occurring migratory species: common scoter (*Melanitta nigra*). The mean peak overwintering common scoter population of 54,675 individuals between 2001/02 – 2005/06 is an estimated 58% of the GB population.

Stage 1 (3). The site also supports more than 20,000 waterbirds in the non-breeding season with a mean peak average over 2001/02 – 2005/06 of at least 55,597, with at least 80,346 in winter 2001/02 (NE and CCW, 2009).

## **1.2. Industry Monitoring Programme**

### **1.2.1. Survey Characteristics**

#### **Development of monitoring through different stages of sector development**

Early in the 2000s, the Oil and Gas Industry Marine Monitoring and Assessment Committee was established to ensure that adequate environmental data was available to support the offshore licensing and permitting regime. In addition to the comprehensive review of UK offshore oil and gas environmental surveys, the committee commissioned two surveys to investigate long-term trends in contaminant persistence and biological recovery of the seabed around a number of established fields (UKOOA, 2001).

As the oil and gas industry expanded the committee initiated a seabed monitoring programme designed to provide the information required to fill perceived gaps in knowledge. This work uses a wide area, stratified random sampling strategy developed by the Fisheries Research Service (now Marine Scotland) in the Fladen Ground (surveyed in 2000 and 2001) and the East Shetland Basin (surveyed in 2002) to

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investigate potential far-field environmental impacts. To date, relevant surveys have been undertaken within the Irish Sea among other locations (UKOOA, 2001).

Before a site can be surveyed for its applicability for development the interested party must apply for one of a number of licences. Part of the licensing process may include the requirement of an Environmental Impact Assessment. The majority of the surveys within Liverpool Bay stem from this requirement and include Environmental Baseline Reports and Habitat Reports in combination with a number of geophysical reports with a small element of biological data collection.

During operation and post development there is a requirement for the reporting on the environmental performance of onshore and offshore operations in accordance with DECC Guidance and Reporting Requirements in relation to OSPAR Recommendation 2003/5. Permits are also required to allow for any discharges of oil contaminated sediments.

### **Biological (and biophysical) features monitored**

Sediment samples are collected to be analysed for physico-chemical analyses (hydrocarbons and metals), particle size analyses and macrofauna. Photography and video footage along with acoustic surveys are used to identify features on the seabed such as potential reefs. Organic content is also measured. A number of surveys in the area have also utilised beam trawling to collect epifauna samples, which provide a broader and more representative picture of the dominant epifauna than grab sampling. To add to the interpretation of faunal communities, water analysis for pH, turbidity, salinity, temperature and percentage saturation of dissolved oxygen is also undertaken.

The majority of surveys within Liverpool Bay which have utilised seismic equipment during surveying have undertaken marine mammal surveys, with records collected for the time and date of each sighting, species and behaviour.

Effluent and discharge concentrations from platforms/rig sites have also been monitored. The required sampling strategy for produced sand/scale discharges is set on a case-by-case basis, and is detailed in the permit schedule. Samples collected have been analysed for oil content (mg/kg or mg/l) using current DECC approved standards (DTI, 1992).

### **Temporal characteristics, including period of survey (e.g. seasonal control), inter-annual requirements, also frequency of measurements for data logging (e.g. every minute, hour or day)**

The majority of surveys are one off point source surveys for pre-development purposes so do not have inter-annual or frequent measurements. Marine mammal surveys have been undertaken before, during and after the seismic aspect of individual surveys. Discharge concentrations are measured annually.

It is understood that BHP Billiton are undertaking a 10 year monitoring programme as part of the Douglas and Lennox Oil and Gas field development, however, at the current time, further information on the monitoring undertaken at this site is unobtainable.

**Spatial scale, including distribution or coverage / extent of survey effort and density of focused survey points / lines; also important to account for area of impact as dictated by tidal excursion**

The surveys undertaken usually involve small scale sites to investigate locations for proposed wells/pipeline routes/platforms. These are usually centred on a 4x4km/1x1km grid. Samples are normally collected within these grid areas in a cruciform pattern, are randomly stratified or are located to cover habitat/sediment changes. If surveying for a proposed pipeline or platform sampling locations are situated at specific distances along the route/from the platform location (500, 800, 1200, 2500 and 5000m etc.). If there are existing wells within the area samples are required to include a 500m exclusion zone.

**Table 1, showing the industry lead monitoring schemes already in place in the Liverpool Bay area**

Data Type	Source	Stage	Date	Comments
Photographic (stills and video)	BHP Billiton Petroleum Ltd	Debris clearance survey - operational	15 <sup>th</sup> – 18 <sup>th</sup> Oct 2009	
Photographic (stills and video)	Centrica Energy/HRL	Exploration drilling – pre-development	11 <sup>th</sup> Aug – 01 Sept 2010	
Benthic Samples	Burlington Resources (Irish Sea) Ltd	Pre-development	26 <sup>th</sup> Mar – 03 <sup>rd</sup> Apr 1999	
Benthic Samples	BGS/Gateway Gas Storage Ltd	Exploration for gas storage – pre-development	01 <sup>st</sup> Jan – 31 <sup>st</sup> Dec 2010/20 <sup>th</sup> Jul – 10 <sup>th</sup> Aug 2010	
Benthic Samples/Video and digital stills	BGS/EOG Resources UK Ltd	Drilling hazard, platform and environmental site survey – pre-operational	2 <sup>nd</sup> – 05 <sup>th</sup> Aug 2011	
Benthic Samples/Video and digital stills	BGS/EOG Resources UK Ltd	Drilling hazard, jack up rig and environmental seabed infrastructure – pre-operational	2 <sup>nd</sup> – 05 <sup>th</sup> Aug 2011	
Benthic Samples/Video and digital stills	BGS/Centrica Energy	Jack up rig – Pre-operational	30 <sup>th</sup> Sept – 14 <sup>th</sup> Oct 2011	
Benthic Samples/Video and digital stills	Floyd and Associates Ltd/Gateway Gas Storage Ltd	Jack up rig geotechnical drilling barge emplacement – pre-operational	02 <sup>nd</sup> May – 24 <sup>th</sup> Jun 2007	
Benthic Samples/Video and digital stills	EOG Resources UK Ltd	Drilling of a well and jack up rig emplacement – pre-development	2 <sup>nd</sup> and 3 <sup>rd</sup> Nov 2007	
Benthic Samples/Video and digital stills	Venture Production Ltd (Centrica)	Site survey – pre-development	12 <sup>th</sup> Nov 2008	
Benthic Samples/Video and digital stills	Venture Production Ltd (Centrica Energy)	Site survey – pre-development	15 <sup>th</sup> – 16 <sup>th</sup> Nov 2008	

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Benthic Samples/Video and digital stills	EOG Resources UK Ltd	Jacket emplacement and drilling site survey – pre-development	29 <sup>th</sup> – 30 <sup>th</sup> Nov 2008
Photographic (stills and video)	Centrica Energy	Rig site survey – pre-development	4 <sup>th</sup> – 20 <sup>th</sup> Apr 2009
Benthic Samples/Video and digital stills	Centrica Energy	Rig site survey – pre-development	12 <sup>th</sup> – 23 <sup>rd</sup> Apr 2009
Benthic Samples/Video and digital stills and Beam Trawling	Hoegh LNG AS	Pipeline route survey – pre-development	17 <sup>th</sup> Nov – 16 <sup>th</sup> Dec 2007
Benthic Samples/Video and digital stills and Beam Trawling	Ormonde Energy Ltd	Survey around proposed windfarm and gas field development pipelines – pre-development	28 <sup>th</sup> May - 19 <sup>th</sup> Jun 2004
Photographic (stills and video)	EOG Resources UK Ltd	Rig site Survey – pre-development	24 <sup>th</sup> – 27 <sup>th</sup> Sept 2009
Benthic Samples/Video and digital stills	EOG Resources UK Ltd	Pipeline route survey – pre-development	7 <sup>th</sup> -12 <sup>th</sup> Oct 2009
Benthic Samples/Video and digital stills	Centrica Energy	Pipeline route survey – pre-development	24 <sup>th</sup> Aug – 01 <sup>st</sup> Sept 2010
Benthic Samples/Video and digital stills	Burlington Resources Ltd	Site survey – pre-development	29 <sup>th</sup> Apr – 16 <sup>th</sup> May 2004
Photographic (stills and video)	BHP Billiton Petroleum Ltd	Site survey – pre-development	15 <sup>th</sup> – 18 <sup>th</sup> Oct 2009
Photographic (stills and video)	Gateway Gas Storage Ltd	Pipeline route survey – pre-operational	7 <sup>th</sup> Jul – 02 <sup>nd</sup> Sep and 30 <sup>th</sup> Jul – 08 <sup>th</sup> Aug 2010
Photographic (stills and video)	Centrica Energy	Jack up rig site survey – pre-development	26 <sup>th</sup> – 30 <sup>th</sup> Aug 2010
Benthic samples	Oil and Gas UK	Wide area impact monitoring study	2008

### 1.2.2. Monitoring methods

#### Monitoring protocols and survey methods

All biological surveys within Liverpool Bay follow OSPAR (2004) guidance. These guidelines suggest aspects to address during all phases of petroleum activities with monitoring to be fit for purpose and to take account of local and regional differences, operational practices; past and current field activities and discharges and what is known about impacts from previous work.

The majority of the current surveys located within Liverpool Bay have utilised the same approach in selection of sampling locations. Initially a review of acoustic data is investigated, followed by a 'ground

truthing' with seabed stills and photography to rule out the presence of protected habitats/species. Sediment samples are then collected at each sampling location utilising a form of grabbing equipment. This is mainly achieved with a Day grab, however other grabbing equipment such as Hamon grab, mini-Hamon grab, double-Van Veen grab and box corer have been used to collect (normally) three sediment samples for analysis. This sampling strategy is recommended by DECC (DTI, 1992), OSPAR Recommendation 2003/5 and JNCC Guidance notes as best practice. Sub-samples are taken for granulometry, hydrocarbon, metals and macrofaunal analysis. Samples are processed offshore with sediment being processed through a selection of sieve sizes, normally 0.5mm or 1mm mesh size. Particular attention is paid to the avoidance of low-level contamination from the sampling equipment or the survey vessel itself.

Two surveys have recorded the utilisation of a beam trawl to collect epibenthic samples. In both cases four trawls were collected in a variety of locations over a set known distance, the contents of which are emptied into plastic containers for identification and counting.

In relation to oil and gas seismic surveys in the UKCS, it is a requirement of the consent issued under Regulation 4 of the Petroleum Activities (Conservation of Habitats) Regulations 2001 (and 2007 Amendments) by the Department for Energy Climate Change (DECC), that the JNCC Seismic Guidelines must be followed, and the elements of the guidelines that are relevant to a particular survey are incorporated into the legally-binding condition of consent. JNCC guidelines include pre-shooting searches for marine mammals before commencement of any seismic activity. In addition to visual sightings, for any seismic surveys planned to commence outside of daylight hours it is considered best practice to deploy Passive Acoustic Monitoring (PAM) (JNCC, 2010).

### **1.2.3. Post Survey Data Processing**

**Type of processing and data products derived, including level of detail provided. Provide detail for different parameters as relevant.**

Macrofaunal processing involves sieving in the field through a required mesh size (normally 0.5mm or 1mm) and then buffering in a preservative solution such as formalin. Samples are then sent off to the lab for analysis. Samples are sorted using a microscope and then removed for identification. Dependent on the laboratory or the survey type, taxa are identified to varying levels such as genus or species. Once this is recorded, the data is analysed, with a division of the faunal data into taxonomic groups and then analysed with a range of statistics and statistical software e.g. PRIMER and a number of diversity indices. Epifauna is identified to species level and then described.

Video footage and photographs are analysed to describe sediment type, flora or fauna observed and whether there is a presence of any protected species/habitats. These are displayed in a number of ways but the most common is by a creation of photo plates.

Bathymetry data and seabed features plots are also regularly created using GIS to further enhance the faunal data interpretation. This is also in combination with maps to identify the locations of the acquired samples.



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Particle size analysis, total organic carbon and total organic matter are also calculated within the lab from the sediment samples. This uses a variety of methods, including a mastersizer and oven drying. Hydrocarbons are analysed by gas chromatography and gas chromatography-mass spectrometry with metals such as barium, zinc, lead and tin etc. analysed by inductively coupled plasma mass spectrometry or atomic emission spectrometry. There are a number of different specific method variations between the surveys within Liverpool Bay which may cause issues if trying to pool the data.

**Metadata completed and standards used, whether internal / external and if required by regulations or completed anyhow. Provide detail for different parameters as relevant.**

As oil and gas survey information is very sensitive, clients and contractors do not regularly share the data, with the exception of reports produced for the regulators. However, there are a number of surveys within the Liverpool Bay which share survey data on the MEDIN website. This allows access to information about the survey location, activities and when the survey was undertaken, however, to access the data itself, the data owner needs to be contacted.

**Quality assurance carried out whether internal / external and if required by regulations or completed anyhow (and confidence of data). Provide detail for different parameters as relevant.**

Quality assurance is an essential part of environmental monitoring programmes. The contractor company used for environmental monitoring studies must be able to document that it, or its subcontractors, is accredited, or is in the process of seeking accreditation, according to the relevant ISO standards. Accreditation shall include all aspects of the work, from sample collection and analysis to presentation of the results. Exceptions can be made for activities for which no official approvals exist. For these types of analyses the contractor must be able to document that it has established quality control to at least ISO-9001/9002 and follows the relevant guidelines for the relevant type of sampling, sample analysis and reporting (OSPAR, 2004).

All contractors/clients who have undertaken marine surveys within Liverpool Bay have accreditation to one form of internal/external quality assurance. These include BS/EN/ISO 9001:2008; BSI, 2008; the CONTEST and Aquacheck scheme administered by the lab of Government Chemists (LCG), NMBAQC scheme, STACKS proficiency testing scheme (LGC), Quasimeme and RT Corp proficient testing schemes. Some data have also been analysed using UKAS accredited methods.

On analysing the data collected from the surveys, it is quality checked before issuing, and when it has been received, any reports will have been quality checked internally and externally before a final draft is issued.

#### **1.2.4. Dissemination of Data Products**

##### **Ultimate owner of data and any restrictions in place**

With all Oil and Gas surveys the client e.g. Centrica Energy, EOG Resources Ltd is the ultimate owner of the data. Contractors and sub-contractors will have access to survey data they have collected but will

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have restrictions on its release. Data is considered highly confidentially and is rarely released to the general public.

#### **Any external delivery of data, e.g. into national database or to partnership working**

At the current moment in time, there are no partnerships with industry clients and other bodies. At the discretion of the oil and gas provider, data may be uploaded and contributed to MEDIN. Details such as the type of survey, location of survey and equipment utilised is freely available, however, specific details such as the data collected within the survey must be requested from the data owner.

Oil and Gas UK (formerly UKOOA) commissioned an analysis of seabed environmental surveys carried out on behalf of UK North Sea offshore oil operators. The purpose of these surveys was to monitor the seabed in the vicinity of offshore operations with the aim of detecting environmental impacts (Oil and Gas UK, 2009). The analysis was completed in three phases. Phase 1 consisted of the compilation of an inventory of surveys carried out in the UK sector. This initially summarised the results of 472 environmental surveys carried out between 1975 and 1998 by environmental monitoring contractors, government agencies and universities. Phase 2 involved the production of database files containing detailed biological, chemical and location data. Phase 3 examined the extent of contamination from offshore exploration and production activities and impacts on the biota, and attempted to determine any large-scale trends over wider geographical areas (UKOOA, 2001). This final phase was completed in April 2001. Care has been taken to record the database in a format that ensures the contaminant concentrations measured by different analytical methods are kept separate. Data is published within a report entitled 'Analysis of UK Offshore Oil and Gas Environmental Surveys' (UKOOA, 2001) and is available within the UK Benthos Database.

#### **Sensitivity of data, obstructing data sharing**

Data collected within the surveys is highly confidential and will only be shared upon request under specific circumstances.

#### **1.2.5. Internal Survey Management**

##### **Internal system adopted / used, protocols**

Internal system management is on a company by company basis and will differ depending on who has undertaken the survey.

Internal systems include the Liverpool Bay Environmental Management System (EMS) operating in compliance with the BHP Billiton Charter and Sustainable Development Policy. These draw on the UK Health and Safety Executive's publication 'Successful Health and Safety Management' - HS(G)65. The principles of the International Standard for Environmental Management Systems (ISO14001: 2004) are also incorporated.

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A number of other companies who have undertaken surveys within Liverpool Bay conform to ISO 16665:2005 (e.g. juveniles recorded separately from adults in macrofaunal analysis), have internal Quality Assurance Programmes (QAP) and Quality Assurance Manual (QAM).

A number of quality assurance procedures and guidelines are also adhered to during the collection of data in the field.

#### **Health and safety and risk management policies / approach**

One oil and gas provider (Gateway Gas Storage Ltd) operating within Liverpool Bay operates under an integrated Business Management System that includes a comprehensive Environmental Health and Safety (EH&S) management system. This system will help to ensure that the project is undertaken on a sound environmental basis (Gateway, 2007).

Each company undertaking surveys within Liverpool Bay has its own set of health and safety and risk management policies.

#### **Restrictions / freedom of plans considering internal and external factors**

There are a number of large and small scale restrictions due to a number of internal and external factors. These range from equipment failure, weather down time, through to alterations of survey design and well/pipeline/platform location changes.

#### **Disclosure of survey plans and timing / reason**

Due to the highly confidential nature of the oil and gas survey data, the client has ultimate discretion of the disclosure of survey plans as the owner of the data. This is issued to the subcontractors as and when needed on a case by case basis.

#### **Timescales working to with planning, contracts, survey, data processing etc**

Surveys within the Liverpool Bay area have been undertaken over a variety of timescales. These vary from six months to a number of years and are different on a case by case basis.

#### **Funds available for programme, source and flow of money**

Ultimately the funds available for the surveys are dependent on the size, nature and type of survey required. This will be on a case by case basis and at the discretion of the client.

### **1.2.6. "Upwards" Contractual Obligations**

#### **Contractual limitations in liability of equipment**

Standard operating procedures for surveys in Liverpool Bay generally specify that all survey equipment will be supplied in good operational condition and will be tested prior to mobilisation and again in the presence of a company representative prior to sailing.

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Due to the sensitive and vulnerable nature of the equipment the sub-contractor reserves the right after evaluating seabed conditions, to determine if it is safe to deploy the equipment without significant risk of damage. If there is deemed to be a significant risk, e.g. in areas of boulders or rocky outcrops, the sub-contractor shall decline to deploy equipment.

Owing to the remote nature of seabed photography, the success of the results cannot be guaranteed during operations, particularly when combined with other sampling operations. The correct functioning of the equipment will be tested prior to sailing (including a wet deployment).

Geotechnical equipment will be provided that is capable of achieving the stated penetration, however actual penetration achieved is subject to conditions encountered and cannot be guaranteed.

#### **Contractual limitations in liability of infrastructure**

The sub-contractor uses reasonable endeavours to detect cables (live or redundant) and determine depth of burial of said cables within the operating parameters of the equipment used. Existing wells are also detected to avoid sampling on their locations.

#### **Contractual limitations in liability of accident**

All personnel undergo a number of different forms of health and safety training before they are able to undertake surveys. All companies carry Employer's Liability Insurance as required by UK legislation. Due to the nature of the work, these safety precautions are followed at all times. Personnel follow rigid safety guidelines when aboard vessels and are able to stop the survey if they feel unsafe to continue.

#### **1.2.7. "Downwards" Contractual Set Up**

##### **Number of tiers sub-contracted survey operation, organisations involved and management / level of interaction or involvement by client**

The current surveys within the Liverpool Bay area currently involve the client and typically one large consultancy managing a number of subcontractors specific to the type of survey involved. Typically if the survey is for an EIA, the biological aspect of the survey will be carried out by one main subcontractor. This will then contribute to the larger EIA put together by the consultancy and form one of a number of baseline assessments contributed by various subcontractors in each specific field identified within the EIA scope.

##### **Whether contracts are back to back (same as client's) or if terms change between organisations and related impacts / issues**

Each survey and contractor is different and therefore contracts are written based on one standard contract and then altered on a case by case basis dependant on the survey type and individual contractor.

##### **Impact of sub-contractors on timescales / flow of money**

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The subcontractor will have an impact on the timescales and flow of money for each survey dependant on survey success. If the survey is a success then timescales will not change/have to be altered. If the survey is unsuccessful due to one of a many number of issues, the survey may be abandoned or may extend beyond the predicted timescale.

### **1.3. MPA Monitoring Characteristics**

#### **1.3.1. Survey Characteristics**

##### **Biological (and biophysical) features monitored**

A range of surveys have been carried out within the Liverpool area in relation to the biological and biophysical features within MPA monitoring. These include benthic sampling (Bangor University), sediment analysis, video and photographic surveys (BGS), marine mammal observations (The Whale and Dolphin Conservation Society) and a range of oceanographic measurements have been and continue to be taken by the Liverpool Bay Coastal Observatory. Cefas has collected multi-beam bathymetry and backscatter data as part of seabed habitat mapping surveys. These surveys are predominantly conducted as part of environmental assessment of human activities or in the context of the identification and assessment of areas of conservation interest (MEDIN, 2012). Trawl surveys and diver observation surveys have also been completed within the area for collection of biological data. An extensive formal consultation was carried out prior to MPA classification, involving a number of agencies and stakeholders. The project was headed by the Irish Sea Conservation group and included the collection of both biophysical and biological data through stakeholder questionnaires.

##### **Temporal characteristics, including period of survey (e.g. seasonal control), inter-annual requirements, also frequency of measurements for data logging (e.g. every minute, hour or day)**

Surveys vary quite extensively through the area. A number of the surveys looked at ran over a period of years (Liverpool Bay Coastal Observatory, DASSH) while others lasted just one day (BGS) and some are still continuing for an indefinite period. In all cases the data can be utilised for the MPA monitoring, whether that be for past, current or future analysis. For example, Natural England undertakes regular monitoring of the SACs (Lune Deep and Shell Flat) within the Liverpool Bay area every 5-6 years.

##### **Spatial scale, including distribution or coverage / extent of survey effort and density of focused survey points / lines; also account for area of impact as dictated by tidal excursion**

Some surveys are part of a national survey (MCZ mapping project) while others are more specific to the Liverpool Bay area (Bangor University). Sampling methods focused on predefined points as well as transects, polygons and random station selection. The Liverpool Bay Coastal Observatory continuously take a range of oceanographic readings within the Bay including current and tide readings which, along with the use of tidal diamonds, would enable the analysis of the impacts dictated by tidal excursion. .

**Table 2, showing current monitoring schemes in the Liverpool Bay area**

Data Type	Source	Stage	Date	Comments
Multi-beam bathymetry and backscatter	CEFAS	Seabed and habitat mapping – project data collection complete, updated as deemed necessary	01 <sup>st</sup> Jan 2009 – 05 Apr 2009	Data used as part of environmental assessments of human activities or to assess areas of conservation interest.
Incorporation of a range of data sources from available published and grey literature	The Whale and Dolphin Conservation Society	Repeatedly and frequently updated	23 <sup>rd</sup> Nov 2011	MPA for Cetaceans through assessment of critical habitat, abundance and behaviour.
Benthic stations	Bangor University School of Ocean Sciences	Academic paper - Complete	01 <sup>st</sup> Jan 2006 – 31 <sup>st</sup> Dec 2006	Survey of the bivalve community in Liverpool Bay.
Physical and biogeochemical oceanographic measurements, and complementary meteorological measurements. Hydrographic data include temperature, salinity, dissolved oxygen, attenuation, turbidity, fluorescence, chlorophyll, nutrients, irradiance, waves and currents while meteorological measurements include air temperature, air pressure, wind velocities, humidity, precipitation and atmospheric irradiance	Liverpool Bay Coastal Observatory	Continuous data collection	Continuous	Data is freely available for use in teaching and research providing that users are acknowledged in publication.  Data is collected by a collaboration of a number of researchers and Liverpool Bay users.
Video and photography, seabed sampling and geophysical	British Geological Survey (BGS), Department for energy and Climate Change (DECC).	Strategic Environmental Assessment programme – Complete	30 <sup>th</sup> Aug 2011	Data publically available.
Biophysical data - digital mapping	Department for Environment, Food and Rural Affairs (DEFRA)	MCZ Mapping project	25 <sup>th</sup> Aug 2011	A number of reports produced to help identify MCZ locations.

## Potential for joined up marine monitoring and data collection between SNCBs and industry

Benthic Stations	DEFRA	Distribution of <i>Crassostrea gigas</i> in the UK and Isle of Man	1 <sup>st</sup> Mar 1989 – 23 <sup>rd</sup> Aug 2011	Work to support the delivery of the MPA network .
Benthic stations	Data Archive for the Seabed Species and Habitats (DASSH)	Mollusc presence records from the Irish Sea area	1 <sup>st</sup> Jan 1950 -31 <sup>st</sup> Dec 1993	
Diver observations	DASSH	Marine Nature Conservation Review (MNCR)	Jan 1997 – 31 <sup>st</sup> Dec 1980	Species observations.
Benthic Stations	Marine science laboratories	Academic research	July 1973	Benthic studies in the South east of Liverpool Bay (No map available).
Benthic stations	Royal Haskoning	Baseline survey	Not available	Survey carried out for Natural England as part of MCZ recommendation project.
Stakeholder focus groups	Irish sea conservation zones	Assessment of bay usage by stakeholders	Not available	Part of the MCZ recommendation project.
Aerial photography, transect surveys and quadrat sampling	Institute of Estuarine and Coastal Studies (ICES)/Natural England	Mapping, condition and conservation assessment of <i>Sabellaria alevelolata</i> reefs of the Eastern Irish Sea Coast	November 2002	Mapping.

### 1.4. Conclusions from desk study

A number of surveys within the Liverpool Bay area have collected biological data, both within MPA monitoring and within the oil and gas industry. Methods for the surveys are essentially the same; however, the finer details may be incomparable between surveys.

One of the main issues which are likely to arise is acquiring further details of the monitoring/sampling effort contained within the oil and gas surveys. As mentioned above, this industry has a highly confidential approach and is reluctant to freely share data with the public. This may be overcome with extensive discussions and workshops with various parties involved.

## Potential for joined up marine monitoring and data collection between SNCBs and industry

While not specifically relevant to the current moment in time, once the developments reach the end of field life and are to be decommissioned a decommissioning feasibility study will be undertaken to examine drill cuttings and any environmental contamination within the area. These projects will have to undergo EIA to identify the potentially significant environmental, social and health impacts. This will add to the existing surveys contained within the Liverpool Bay area and could potentially be included within the joint monitoring approach.

Overall, the desk study has highlighted that there is potential for the current surveys within Liverpool Bay to join up and contribute to one large source of data, however, there will be a number of obstacles in this process.



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