

## 9 UNDERWATER NOISE & VIBRATION

### 9.1 INTRODUCTION

Measurement of underwater noise has been undertaken by Subacoustech Ltd, the contractor carrying out the current COWRIE study on subsea noise and vibration. Baseline and during construction work has been undertaken on the North Hoyle Offshore Wind Farm and is reported in previous Annual FEPA report (Feb 2006).

The conditions of the Food and Environment Protection Act (FEPA) 1985: Part II, licence 31579/02/0 (as amended) to NWP Offshore Ltd. for the proposed North Hoyle Offshore Wind Farm specifies:

*“Detailed post construction data must be collected on the frequencies and magnitudes of underwater noise produced by the North Hoyle Offshore Wind Farm.”*

NWP Offshore Ltd appointed Subacoustech Ltd to write a detailed specification for a post construction monitoring programme which has been submitted to the Licensing Authority for approval. Further discussion with the Crown Estate indicates that the results of the COWRIE study may be used to discharge this monitoring condition.

### 9.2 LATEST PUBLICATIONS

In July 2006 a report was published by Biola (Biologisch-landschaftsökologische Arbeitsgemeinschaft) titled the "Effects of offshore wind farm noise on marine mammals and fish", based on an earlier report as part of EIA work for wind farms in German waters. COWRIE have translated this report for inclusion on the COWRIE website. The report comprises an assessment of noise during construction / operation based on measurements from across Europe, the transmission of the noise and definition of zones of noise influence (audibility, response, masking, Temporary Threshold Shift (TTS)) on marine mammals and fish.

### 9.3 SUMMARY OF FINDINGS

The report predicted that for harbour porpoises and harbour seals, the zone of audibility for pile-driving extended well beyond 80 km, perhaps hundreds of kilometres from the source. Behavioural responses are possible over many kilometres, perhaps up to ranges of 20 km. Masking might occur in harbour seals at least up to 80 km and hearing loss might be a concern at 1.8 km in porpoises and 400 m in seals. Further, severe injuries in the immediate vicinity of ramming activities cannot be ruled out. Operational noise of smaller turbines of 1.5 MW should have only minor influence as the detection radii for both species are rather small. However, since operational noise of larger turbines cannot be assessed reliably yet, these results are rather preliminary.

The report indicated that cod and herring can perceive piling noise at large distances, perhaps up to 80 km from the sound source. Dab and salmon might detect pile-driving pulses also at considerable distances from the source. However, since both species are predominantly sensitive to particle motion and not pressure, the detection radius cannot be defined yet. Behavioural effects are possible due to piling noise. The spatial extension of the zone of responsiveness cannot be calculated, as the available threshold levels vary greatly. The zone of potential masking might in some cases coincides with the zone of audibility. Also physical effects, like internal or external injuries or deafness (Temporary Threshold Shift /Permanent Threshold Shift) up to cases of mortality, are possible in the close vicinity to pile driving. The report suggests that operational noise of wind turbines will be detectable up to a

distance of approximately 4 km for cod and herring, and probably up to 1 km for dab and salmon, although this would entirely depend upon the background underwater noise climate including other anthropogenic influences. The report also speculates that behavioural and/or physiological (stress) effects are possible due to operational wind farm noise. However, they should be restricted to very close ranges.

In contrast to the findings of the COWRIE study monitoring of working wind turbines by divers at North Hoyle undertaking a monopile colonisation survey in 2004 found this claim to be completely unfounded with a range of fish and other species attached or in very close proximity to structures where noise from the turbines was audible by the divers.

The 2006 COWRIE report provides the most recent review of studies undertaken and will enable COWRIE to identify further work required to complement the existing programme of work being carried out by Subacoustech at UK offshore wind farm sites.