

## 5 Impact on human activity

### 5.1 Population, employment and socio-economic activity

This chapter assesses the potential impact of the proposed project on human activity. It covers the potential impact on the population of the area, on socio-economic activity (particularly on the fishing industry) and on the land use and amenity value of the area.

It also looks at the potential human impact of electromagnetic fields arising from the project.

### 5.2 Population

#### 5.2.1 Receiving environment

The proposed project is located off Belderra Strand west of Belmullet in County Mayo. Table 5-1 summarises the population of Belmullet and its electoral divisions. For reference, the population of the state and of County Mayo are also included here. All data is from the Central Statistics Office's census results 1996–2006.

**Table 5-1: Population change in Belmullet, 1996–2006**

Population	Persons 1996	Persons 2002	Persons 2006	Per cent change in population 1996-2002	Per cent change in population 2002-2006
Belmullet area total	8339	7927	7923	-4.9	-0.1
<i>Electoral Divisions of Belmullet</i>					
051 An Geata Mór Thuaidh	898	883	843	-1.7	-4.5
052 An Geata Mór Theas	993	929	921	-6.4	-0.9
053 Bangor	464	463	478	-0.2	3.2
054 Barr Rúscáí	159	134	109	-15.7	-18.7
055 Béal an Mhuirthead	1884	1880	2011	-0.2	7
056 Gleann na Muaidhe	270	248	251	-8.1	1.2
057 Gleann Chaisil	483	490	520	1.4	6.1
058 Glenco	114	100	92	-12.3	-8
059 Guala Mhór	194	168	155	-13.4	-7.7
060 Cnoc an Daimh	470	389	356	-17.2	-8.5
061 Cnoc na Lobhar	867	847	857	-2.3	1.2
062 Moing na Bó	363	309	326	-14.9	5.5
063 Na Monga	277	258	237	-6.9	-8.1
064 Cnoc na Ráithe	873	804	742	-7.9	-7.7
065 Sheskin	30	25	25	-16.7	0.0
<b>State</b>	3626087	3917203	4239848	8.0	8.2
<b>Mayo County</b>	111524	117446	123839	5.3	5.4

The development is also located within the Iorrais (Erris) area of the Mayo Gaeltacht (Irish-speaking area), which encompasses a geographical area of 905km<sup>2</sup> and comprises three distinct areas – Iorrais, Acaill and Tuar Mhic Éadaigh. Béal an Mhuirthead (Belmullet) in Iorrais (Erris) is the main town in the Mayo Gaeltacht.

The populations of the total Gaeltacht areas in the State, the applicable Electoral Areas and the nearest town of Béal an Mhuirthead from Census of Ireland data produced by the Central Statistics Office are shown in Table 5-2 summarises changes in the population of the Béal an Mhuirthead Gaeltacht.

**Table 5-2: Population change in the Béal an Mhuirthead (Belmullet) Gaeltacht**

Population	Persons 1996	Persons 2002	Persons 2006	Per cent change in population 1996-2002	Per cent change in population 2002-2006
Béal an Mhuirthead Gaeltacht	7,679	7,290	7,281	-5.1	-0.1
Total State Gaeltacht Areas	86,039	90,048	95,503	4.7	6.1
Gaeltacht Areas in Mayo County	11,494	10,947	10,868	-4.8	-0.7

The population in County Mayo increased by 5.3% and 5.4% respectively during the periods 1996 to 2002 and from 2002 to 2006.

In the Mayo Gaeltacht areas there was an overall decrease in population numbers of 4.8% between 1996 and 2002 and 0.7% between 2002 and 2006.

A key objective of the *Mayo County Development Plan 2008 – 2014* is to support a number of key towns, including Béal an Mhuirthead, to enable population growth and to support towns and villages where population decline has occurred. This is in line with the West Regional Authority's *Regional Planning Guidelines for the West Region, 2010–2022*.

The Development Plan also indicates that Mayo's share of the West Region population continued to decline, from 31% to 30% during the period 2002 to 2006 with a trend towards movement from town centres to peripheral rural areas.

### **2011 Census: preliminary results**

Preliminary census results for Census 2011 indicate a national increase of 341,421 persons (8.1%) since 2006. In the Western Region population growth was 6.8%, while in Co. Mayo it was 5.4%, with the population of the county rising from 123,839 to 130,552.

### **5.2.2 Impact of the development**

As the proposed development contains no residential component, it will not have any significant direct impact on the composition of the population in the immediate area.

However, through the provision of some local employment it will help sustain the existing population and help prevent decline in the population of the area.

### **5.2.3 Mitigation measures**

Local employment opportunities should be identified and local business should be encouraged to avail of any opportunities that arise in the project.

### 5.2.4 Conclusion

The proposed development contains no residential component, and will not have any significant direct impact on the composition of the population in the immediate area.

## 5.3 Employment and socio-economic benefits

### 5.3.1 Receiving environment

Data from the CSO indicated that the number of people at work in County Mayo increased by 7,513 people between the period 2002 and 2006, (an increase of 16.8%). The distribution of persons employed during those periods, in the State and in County Mayo, across the various sectors of the economy is shown in Table 5-3.

**Table 5-3: Distribution of persons employed 2002 to 2008**

Sector	Year			
	2002		2006	
	State %	Mayo %	State %	Mayo %
Agriculture, forestry and fishing	5.9	11.4	4.6	9.1
Mining, quarrying and turf production	0.4	0.7	0.4	0.6
Manufacturing industries	14.9	14.7	12.6	12.8
Electricity, gas and water supply	0.7	0.7	0.6	0.6
Construction	9.1	12.0	11.1	14.9
Wholesale and retail trade	13.4	13.3	13.3	13.5
Hotels and restaurants	5.0	6.3	5.2	6.5
Transport, storage and communications	5.9	4.2	5.5	3.8
Banking and financial services	4.3	2.0	4.4	2.0
Real estate, renting and business activities	9.2	5.2	9.4	5.3
Public administration and defence	5.8	5.1	5.2	4.8
Education	6.7	6.8	6.6	6.6
Health and social work	8.7	10.0	9.9	10.9
Other community, social and personal service activities	3.9	3.4	4.2	3.5
Industry not stated	6.2	4.3	6.9	5.1

The Irish economy peaked in 2007 and started to decline in 2008. This is reflected in levels of unemployment – Figure 5-1 shows the trend in the average monthly figure for the Live Register for County Mayo and for the Beal an Mhuirthead area in general. There was a steady decline in unemployment to 2007 followed by a rapid increase in unemployment commencing in 2008. By contrast the rise in the rate of unemployment was much lower in the Belmullet area – this reflects to a large extent on local enterprise and the impact of Údarás na Gaeltachta on industrial development in the area.

Údarás na Gaeltachta is the body charged with economic development in the Gaeltacht areas. Although seriously affected by the national and global economic downturn, a total of 710 new jobs were created nationally in companies assisted by Údarás na Gaeltachta in 2009 despite net losses of 721 or 8.8% from the 2008 base. This compares to a net loss of 11.8% in the Irish

economy in general. Total full-time employment in companies assisted by Údarás na Gaeltachta in all Gaeltacht areas now stands at 7,472.

Employment in the Iorrais (Erris)/Belmullet area traditionally derived from farming and fishing activity but with the decline of these in the mid 1980s, employment in the services, tourism and manufacturing industry increased.

### **5.3.2 Impact of the development**

#### ***Construction phase***

The installation of the proposed marine cable will not have a significant impact on employment either at the construction stage or otherwise. The construction of the substation, access roads and cable ducts, however, will generate short-term employment for up to six months.

There is also potential for short-term employment of guard vessels and small boats during the cable-laying and landing operations.

The impact during construction is predicted to be positive but of short duration.

#### ***Operational phase***

The expected lifetime of the development is up to fifteen years. The project has the potential to make Erris a hub of ocean energy development which could in turn give rise to spin-off projects. This trend has already been observed in the case of the Orkney Islands, which hosts the European Marine Energy Centre (EMEC) test site at Billia Croo, where approximately 200 people provide a range of services to the renewables sector including wave and tidal test site activities. It is therefore likely that a cluster of specialised services to the ocean energy sector will become established in the Belmullet area. These could include, for example,

- Marine contractors
- Fabrication
- Design
- Performance verification
- Environmental surveying and impact assessment.

There is potential for up to twelve jobs that could be created during the operation of the test site –between operational staff and those employed directly by wave energy device developers. This potential was identified based on experience at the European Marine Energy Centre in Orkney.

Additionally, wave energy converters or arrays under test will require workboat services for operation and maintenance, including crew boats, guard vessels and boats with cranes/winches.

Maintenance of an assortment of oceanographic monitoring equipment will require regular service visits. Frequent promotional visits to the test areas will also be required

It is expected that the site will also be used for research projects by universities and industry. For example the IBM/Biospheric Engineering/Marine Institute acoustic impact study may be located at the test site. These projects will require significant workboat support.

It is also envisaged that environmental monitoring of the site will continue during its development, operation and decommissioning as part of an environmental management plan for the project. This will require the hire of workboats for marine surveys.

As part of the AMETS development, SEAI in conjunction with Mayo County Council, are proposing to enhance the pier facilities at Frenchport to allow for convenient access to the test site. This would involve the installation of a new slipway and the extension of the existing quay. Short term employment opportunities in construction would result from this proposed upgrading. In the longer term the fishing community would benefit from the presence of enhanced facilities at Frenchport.

Although some specialised services will require external expertise coming into the area for short periods, a range of local services will be required which are likely to include:

- Engineering and electrical support
- IT, accountancy and office supplies
- Vehicle servicing and fuel supply
- Building maintenance services
- Accommodation and catering
- Scuba-diving services

Long-term employment opportunities will be associated with the operational phase of the development and overall a long-term positive impact on employment is expected with economic benefits to the Erris area, including supplementing existing incomes and generating new employment.

### ***Decommissioning phase***

The project will be decommissioned at the end of its defined lifetime. This may involve decommissioning of the substation, and access road and reinstatement of the site to its original use. A study will be carried out to determine the approach to decommissioning of the submarine electricity cables, land cables and ducting. The decommissioning phase will offer short-term employment opportunities. However, any long-term employment specifically associated with the operation of the AMETS test site will be lost. Those who have worked on the test site, however, will have a skill base that should make it easier for them to find employment in what at that stage will be a well-established ocean energy sector.

### **5.3.3 Mitigation**

To derive the maximum economic benefit from the wave energy test site, transferable skills development and training programmes should be established in the Belmullet area. These will fill the needs of an emerging marine energy sector off the west coast of Ireland. The skills developed should be transferable across a range of related industries such as wave energy, gas and wind energy

### **5.3.4 Conclusion**

Overall, a long term positive impact on employment in the area is predicted. The development offers both short-term and long-term employment opportunities which will benefit the overall economy of the Erris area. To maximise the potential for employment, specialised training courses designed to provide transferable skills across the wave, wind and gas energy sectors should be established in the Belmullet region. Údarás na Gaeltachta are leading an initiative in this regard.

## 5.4 Electromagnetic fields (EMF)

### 5.4.1 Introduction

This section reviews the potential impact on humans of electromagnetic fields (EMF) arising from the project.

Both electric and magnetic fields occur naturally. The Earth's magnetic field, which is due mainly to currents circulating in the outer layer of the Earth's core, varies between about  $30\mu\text{T}$  (microtesla,  $1000\mu\text{T} = 1\text{mT}$ , millitesla) at the Equator and about  $60\mu\text{T}$  at the poles. This field may be distorted locally by ferrous minerals or by steelwork such as in buildings.

At the Earth's surface there is also a natural electric field, created by electric charges high up in the ionosphere, and varying between 100 and 150 Volts per metre (V/m) in fine weather. Below a storm cloud containing large quantities of electric charge for example, the field may reach intensities up to  $20\text{kV/m}$  over flat surfaces, while above hillocks or other irregularities or near the tops of objects such as trees, the field strength can be considerably higher. In mountains, for instance, the presence of these fields produces electrical discharges and crackling noises on sharp ridges and on the ends of ice peaks. Sailors throughout the centuries have observed this same phenomenon, known as St Elmo's Fire, at the tops of the ships' masts. The cause is local ionisation of the air.

### 5.4.2 EMF from submarine cables

The flow of electric current, within an electrical sub-sea cable, results in the production of electric and magnetic fields.

Sub-sea electricity cables are designed to use either direct current (DC) or alternating current (AC), both of which emit EMF. The two constituent fields of the EMF are defined as the E (electric) field and the B (magnetic) field. The AMETS cables will be AC cables. Industry standard AC cables will effectively shield against direct electric field emissions but do not completely shield the magnetic component. This magnetic field may induce an electric field outside and adjacent to the cable termed the induced electric field (iE field). The electromagnetic field emissions from the marine cable proposed for the development are very small from a human perspective. The export capacity of the test site cables is 10 MW and the cables are rated at 10kV.

As part of a review of electric and magnetic Fields on marine organisms, Vattenfall (the principal electricity generating company in Sweden) this study it modelled the magnetic field for five different AC power cables (10 – 145 kV, 100 – 500 A), as well as induced electric fields. The modelling results showed that:

- The strength of the magnetic field produced by the cable is from 2 – 35  $\mu\text{T}$ , depending on the cable set-up and current load.
- The magnetic fields produced by the generating units (wave energy converters) are negligible compared to the fields from the cables.
- An induced electric field of 0.3 – 4 mV/m, depending on cable set-up and current load, will be generated by an AC cable.
- The field strengths decrease rapidly with the distance from the cable. For example, a maximum of 35  $\mu\text{T}$  immediately above the cable will be reduced to 2.2  $\mu\text{T}$  at a distance of 2 meters from the cable.

In addition the Vattenfall study indicated that any electric and magnetic fields associated with the WECs themselves would be largely shielded by the devices or would quickly reduce with distance from the device.

### **Impact**

In 1998, the International Commission on Non-Ionising Radiation Protection (ICNIRP, s the World Health Organisation's adviser on non-ionising radiation matters) issued guidelines for exposure to time-varying EMF (up to 300 GHz), including power-frequency exposure limits.

ICNIRP reviewed the cumulative body of existing scientific literature on EMF and health, and set the basic restriction for the induced current density in the central nervous system at 10mA/m<sup>2</sup> for occupational and at 2mA/m<sup>2</sup> general public exposure. Since it is not possible to directly measure induced current density, ICNIRP produced reference levels for both electric and magnetic field exposure, which are assumed to correlate to the induced current density restrictions under a number of suppositions.

The reference levels for residential and occupational magnetic field exposure are 100µT and 500µT, respectively, and 5kV/m and 10kV/m for electric field exposure, respectively.

The ICNIRP guidelines have been endorsed and adopted by the World Health Organisation (WHO, 2002 and WHO, 2007), the European Council (EC,1999), and many national regulatory agencies, including the Irish Government . It should be noted that as applied in the EU these exposure guidelines apply only where members of the public could be expected to spend significant periods of time (EC, 1999).

In 2010 ICNIRP issued *Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 Ghz)* which indicated that in their opinion the scientific literature published since the 1998 guidelines has provided no evidence of any adverse effects below the basic restrictions and does not necessitate an immediate revision of its guidance on limiting exposure to high frequency electromagnetic fields.

The magnetic field and induced electric field from the proposed submarine electricity cables are well below the ICNIRP guidelines.

**Table 5-4: ICNIRP's EMF exposure guideline reference levels (1998)**

Exposure characteristics - ICNIRP Guideline reference levels		Electric field strength, kV/m	Magnetic flux (µT)
Occupational	Whole day	10	500
General public	Up to 24 hrs/day	5	100

### **5.4.3 Mitigation**

The AMETS Project regards the protection of the health, safety and welfare of their staff, future users of the test site and the general public as a core company value. It is the AMETS Project policy to:

- Design and operate its infrastructure in compliance with legislation and with due regard to the most up-to-date recommendations and guidelines of the leading expert and independent international bodies.
- Closely monitor and support engineering and scientific research in the area of EMF and human health.
- Provide advice and information to its workers and the general public on the issue.

The AMETS proposed development fully complies with the 1998 ICNIRP *Guidelines* and consequently no mitigation measures are required.

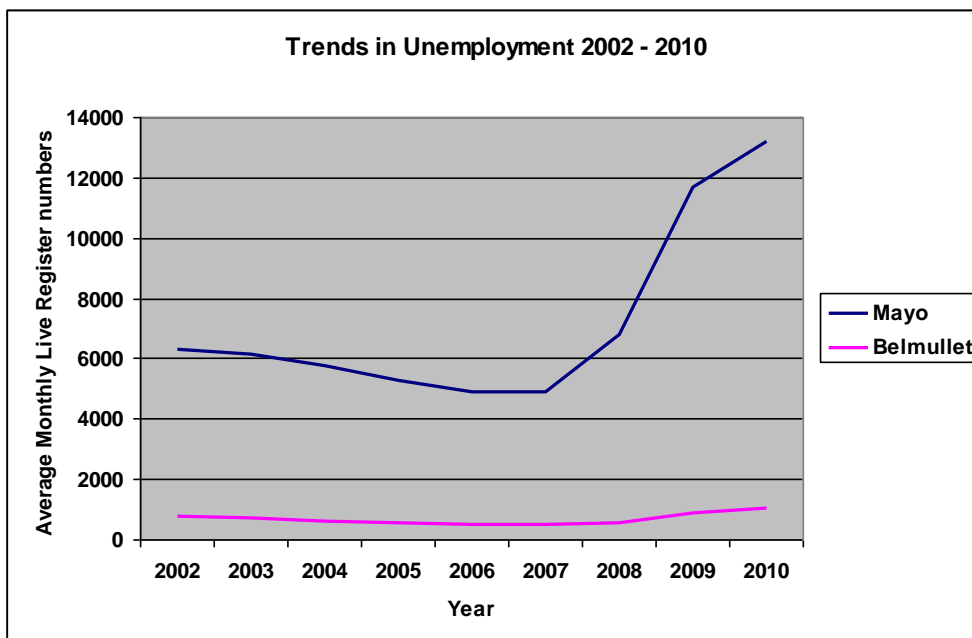
**Conclusion**

The proposed AMETS development will not pose any significant EMF risk to any human beings during the construction, operational or decommissioning phase of the project.

**5.4.4 Conclusion**

Although there will be some temporary loss of amenity value to the area during the construction and decommissioning stages, these will be short term and the impact will be very low.

Careful design of the submarine electricity cable corridor on the approach to Belderra Strand will ensure minimum impact on the sand bank immediately offshore to the beach area. The project may have an overall positive impact on marine tourism to the area.



**Figure 5-1: Trends in unemployment in Co. Mayo and Belmullet**

Source: CSO data