

# Strategic Environmental Assessment

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## Site Specific Baseline Trawsfynydd

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May 2010

An Environmental and Sustainability Report will be published as part of the Strategic Environmental Assessment (SEA) of the Revised NDA Strategy. It has been produced in compliance with the SEA Directive (2001/42/EC) and transposing regulations (S.I.1633, 2004).

The following pages contain specific baseline information, and maps, for the Trawsfynydd site. This information is used in the preparation of the Environmental and Sustainability Report. A short introduction is followed by a table containing the current baseline information, organised by sustainability headings. The final section includes information about future developments and environmental issues.

The NDA is committed to openly sharing information and making it accessible to all. In making this non-confidential environmental and sustainability information available we believe that it will provide a useful ongoing resource to the general public.

## Site Specific Baseline for Trawsfynydd

### Trawsfynydd

Trawsfynydd nuclear power station is located in Gwynedd, North Wales and covers 15 hectares. It commenced electricity generation in 1965 and operated for 28 years until 1993. Decommissioning began in 1995 after defuelling of the reactors was completed. The care and maintenance preparation is due to finish in 2022. Care and maintenance is due to commence in 2022 and last until 2088, when final site clearance will begin with completion in 2098.

### Site End State Assumption

The assumed end state for the Trawsfynydd operational site is that all above ground structures and buildings containing radioactive material will be demolished and cleaned away with completion by 2098. The site will be cleared to a standard that will enable the reuse of the site for recreational purposes, reflecting its location within the Snowdonia National Park, or for use in tourism, leisure, commercial or industrial use as appropriate.

### Current Environmental Baseline

**Table 1: Baseline Data across all topics for Trawsfynydd**

SEA Objective	Key Environmental Baseline	Source
<b>Air Quality</b>	<p>The Radioactivity in Food and the Environment (RIFE) report highlighted that Trawsfynydd discharged <math>5.10 \cdot 10^{-7}</math> TBq beta to the atmosphere (1 % of the annual discharge limits). Additionally, 0.0959 TBq of tritium was discharged (13% of annual discharge limits) along with 0.00213 TBq of carbon-14 (21% of annual discharge limits). The discharges were assessed to result in doses to the critical group (a group or representative individual who receive the largest dose from artificially produced radionuclides due to their habits, diet and where they spend their time) of less than 0.005 mSv/y, or less than 0.5% of the public dose limit (from all sources) of 1 mSv/y.</p> <p>Non-radioactive discharges from the site include NO<sub>2</sub> and PM<sub>10</sub> from vehicles and plant machinery emissions. These are not considered to be of significant levels.</p>	<p>NDA (2005) Trawsfynydd EAPINS Project Questionnaire; Magnox North (2008) Trawsfynydd Site EIA Baseline; Environment Agency (2009) Radioactivity in Food and the Environment</p>
<b>Global Climate Change and Energy</b>	<p>In 2006, some 1,357 tonnes of CO<sub>2</sub> was emitted largely due to indirect emissions from the use of 7TJ which was consumed at Trawsfynydd that year. No data on the amount of CO<sub>2</sub> emissions is known for 2007, and future emissions are likely to be minimal post-2022 when the site enters a prolonged phase of care and maintenance.</p>	<p>NDA (2005) Trawsfynydd EAPINS Project Questionnaire; NDA (2008) NSP Returns</p>

<p><b>Biodiversity, Flora and Fauna</b></p>	<p>The 2 main designated wildlife sites in the immediate area of the Trawsfynydd site and lake are Coed y Rhygen (a NNR and SSSI) which is part of the Meirionnydd Oakwoods and Bat Sites Special Area of Conservation (SAC), and the Afon Eden Cors Goch SAC (also designated as a SSSI). The Rhinog SAC (which takes in a National Nature Reserve and a SSSI) is also near to the site.</p> <p>The lake located immediately south of the Trawsfynydd site is an important recreational game and coarse fishery.</p> <p>A generic assessment on the impacts of the radioactive discharges on wildlife from the UK's nuclear power stations concluded that the chronic dose rate guideline was not exceeded for any of the assessed marine or terrestrial organisms. Furthermore, the estimated doses to wildlife were below the level at which effects could be observed.</p> <p>The supporting figure highlights the context of the nuclear licensed site and its immediate surroundings. The area shown in the figure does not attempt to identify all potential designated sites that may be affected by activities associated with the UK Nuclear Industry LLW Strategy. Rather, it attempts to strike a balance between highlighting those sites that are in the vicinity of the nuclear licensed site between different topic themes. Hence, more expansive coverage would reduce the visibility of other designated sites (such as Scheduled Ancient Monuments which, by their nature, have significantly smaller coverage than ecological based designated areas).</p>	<p>Enviros (2008) <i>Llyn Trawsfynydd Environmental Assessment</i>, Environment Agency (2002) <i>Impact Assessment of Ionising Radiation on Wildlife</i></p>
<p><b>Landscape and Visual</b></p>	<p>The site is located in the Snowdonia National Park.</p> <p>The current reactor buildings are highly visible from a number of areas within the national park. Plans for care and maintenance include a reduction in the height of the reactor buildings and the introduction of a contoured profile for the reactor buildings. This will be implemented during care and maintenance preparations. In addition, the new ILW store at Trawsfynydd has been clad with local slate to minimise its visual impact.</p>	<p>NDA (2005) <i>Trawsfynydd EAPINS Project Questionnaire</i></p>
<p><b>Cultural Heritage</b></p>	<p>Tomen y Mur a Roman, Celtic and medieval site within 1 km of site. Tomen y Mur is a Scheduled Ancient Monument (SAM). Two other ancient monuments and eight listed buildings are found within 5 km of the Trawsfynydd site. The area of Trawsfynydd Basin and Cwm Prysor to the east is included in the draft Register of Landscapes, Parks and Gardens of Special Historic Interest. The landscape around Trawsfynydd is registered as Grade II* on the Register of Landscapes, Parks and Gardens in Wales as it was designed by Dame Sylvia Crowe.</p> <p>The remaining reactor buildings (including two 55 metre high structures) at Trawsfynydd have been proposed for listing due to their potential historical significance as works by the architect Basil Spence, and the cultural importance of nuclear power generation in Wales. Cadw will consider the potential for listing in due course.</p>	<p>NDA (2005) <i>Trawsfynydd EAPINS Project Questionnaire</i>; Magnox North (2008) <i>Trawsfynydd Site EIA Baseline</i></p>
<p><b>Groundwater, Geology and Soils</b></p>	<p>In terms of radiological contamination, whilst no land at the site is classified as 'contaminated land' under Part IIA of the Environmental Protection Act 1990, it is currently estimated that there is 9,500 m<sup>3</sup> of radiologically contaminated soil on site.</p> <p>There is also some hydrocarbon contamination of groundwater below the operational site, with some samples from boreholes recording in excess of 600 µg/l. Since hydrocarbons are a Groundwater Regulations List 1 substance, which should not be allowed to enter groundwater, this may require remediation. However, no contamination is thought to be spreading outside of the licensed site.</p> <p>Groundwater is considered to be of good quantitative status in accordance with the Water Framework Directive.</p>	<p>NDA (2005) <i>Trawsfynydd EAPINS Project Questionnaire</i>; NDA (2007) <i>Trawsfynydd IWS</i>; Magnox North (2008) <i>Trawsfynydd Site EIA Baseline</i>; Environment Agency (2009) <i>Water for life and livelihoods – River Basin</i></p>

		<i>Management Plan Western Wales River Basin District</i>
<b>Surface Water Resources and Quality</b>	<p>There are no records of breaches of surface water quality standards. However, Llyn Trawsfynydd is considered to be at risk of failing to meet the Water Framework Directive 'good standard' requirements by 2015 according to assessments undertaken by the Environment Agency. At present Llyn Trawsfynydd is considered to have potential for moderate ecological water quality status.</p> <p>Trawsfynydd discharged 0.0026 TBq of tritium (less than 1% of the annual discharge limits) to the aquatic environment. In addition, the site discharged <math>1.72 \times 10^{-4}</math> of strontium-90 (less than 1% of annual discharge limits), along with <math>8.0 \times 10^{-4}</math> TBq of caesium-137 (2.7% of annual discharge limits) and <math>1.18 \times 10^{-3}</math> TBq of other radionuclides (less than 1% of annual discharge limits).</p> <p>The Trawsfynydd lake sediments contain some low concentrations of radiocaesium as well as low concentrations of other radionuclides. However, these are primarily due to historic discharges while the site was operational and sediment activity has declined substantially since the cessation of generation.</p> <p>The discharges were assessed to result in doses to the critical group (a group or representative individual who receive the largest dose from artificially produced radionuclides due to their habits, diet and where they spend their time) of 0.010 mSv/y, or equivalent to 1% of the public dose limit of 1 mSv/y.</p> <p>In 2007 the site consumed some 14,503 m<sup>3</sup> of mains water.</p>	<p>NDA (2005) Trawsfynydd EAPINS Project Questionnaire;</p> <p>Environment Agency (2009) <i>Radioactivity in Food and the Environment</i>;</p> <p>NDA (2008) <i>NSP Returns</i>;</p> <p>Environment Agency (2009) <i>Water for life and livelihoods – River Basin Management Plan Western Wales River Basin District</i></p>
<b>Waste</b>	<p>In 2003/4 the total volume of special or hazardous wastes disposed to landfill and by other means was 115 tonnes (10%). In 2003/4 the total amount and nature of waste material released to market for reuse and recycling or reused on site was 28,445 tonnes including: 23,500 tonnes inert waste and 4,843 tonnes scrap metal.</p> <p>In 2007, some 1,040 tonnes of non-hazardous waste was generated, of which 88% was reused or recycled, whilst 20.7 tonnes of hazardous waste was generated, of which 94% was reused or recycled. The amount of waste generated is likely to be minimal post-2022 as due to the relatively low level of activity until 2088, when the remaining structures will be demolished.</p> <p>It is estimated that a total of 5,894 m<sup>3</sup> of Intermediate Level Waste (ILW) will be generated by decommissioning up until final site clearance is completed. Some 1,437 m<sup>3</sup> of packaged ILW had been retrieved and conditioned by 1<sup>st</sup> April 2007. This represents 18% by volume (34% by activity) of the total eventual conditioned ILW volume.</p> <p>There were estimated to be 2,760 m<sup>3</sup> of unpackaged Intermediate Level Waste (ILW) in storage as of April 2007. Of this 41% by volume or 44% by activity was estimated to be packaged by April 2007. Packaged waste will be placed in an on site ILW store until an off site disposal facility is available to receive these wastes.</p> <p>There is an estimated 58,549 m<sup>3</sup> of Low Level Waste (LLW) that will be generated during decommissioning, which once packaged will result in 82,152 m<sup>3</sup> for disposal.</p>	<p>NDA (2005) Trawsfynydd EAPINS Project Questionnaire ;</p> <p>NDA (2007) <i>Trawsfynydd IWS</i> ;</p> <p>NDA (2007) <i>Environment Agency Nuclear Sector Plan Data</i></p> <p>NDA (2008) <i>Site Operator Input</i></p>

<p><b>Economy, Society and Skills</b></p>	<p>According to national statistics, the total population of Gwynedd is approximately 116,843.</p> <p>There has been minimal growth in the population of Gwynedd in recent years but the proportion of the population of working age has declined.</p> <p>Gwynedd and the adjoining unitary authority areas of the Isle of Anglesey, Conwy and Denbighshire all currently receive Convergence funding from the European Union (EU). Convergence funding is the follow on from the EU Objective 1 funding received between 2000 and 2006, which was aimed at areas where prosperity, measured in Gross Domestic Product (GDP) was 75% or less of the European average.</p> <p>The local economy remains reliant upon an overly narrow economic base. Employment is largely low value and dominated by the public sector, tourism and land based industries.</p> <p>In 2000 Trawsfynydd directly employed 120 people with an additional 100 people indirectly employed. Some 350 staff and contractors will be required for the construction of the radioactive waste storage building providing a short term increase employment for 3 years in the area. During Care and Maintenance employment is anticipated to decrease significantly to between 2 and 3 people who will be required for monitoring purposes.</p> <p>The qualifications of the working age population in Gwynedd are influenced by the presence of Bangor University. This has resulted in a relatively high proportion of the working age population with NVQ4 and above.</p> <p>There were 1,872 people on Work-Based Learning (WBL) provision in Gwynedd in 2000/01.</p> <p>10% of the employed workforce in Gwynedd went on workforce development training in 2001 compared with 11.5% in Wales.</p>	<p>NDA (2005) Trawsfynydd <i>EAPINS Project Questionnaire</i></p> <p>NDA (2008) Trawsfynydd Socio-Economic Plan 2007/08 ;</p> <p>NDA (2007) <i>Trawsfynydd IWS ;</i></p> <p>ELWA (2004) Gwynedd Report: Baseline Data and Intelligence; Magnar North (2008) <i>Trawsfynydd Site EIA Baseline</i></p>
<p><b>Traffic and Transport</b></p>	<p>The main access route to the site is via the A470. There were some 400 HGV movements in 2004. In 1999, the AADT for the A470 to Trawsfynydd recorded 550 HGV movements. The number of HGV movements varies year on year depending on the level of activity occurring on site and therefore does not follow any specific trend, nor can an 'average' figure be provided.</p> <p>In 2004, the total number of miles covered by road transport was approximately 50,000 miles, and is estimated to be some 31,000 miles per annum at present.</p> <p>In 2007, the ILW store roof construction involved 230 lorry movements carrying a total of 3,312 tonnes of wet concrete for 9 miles with the vehicles making a return trip of 9 miles to the concrete plant.</p>	<p>NDA (2005) Trawsfynydd <i>EAPINS Project Questionnaire</i>; Magnar North (2008) <i>Trawsfynydd Site EIA Baseline</i></p>
<p><b>Land Use and Material Assets</b></p>	<p>Trawsfynydd occupies an area of 15.4 hectares on an NDA owned estate of 65 hectares. The site consists of the power station buildings, entrance road, car park and a number of grassy areas.</p> <p>The surrounding area is relatively rural and is used for recreational activities and agriculture.</p> <p>In 2007, the site consumed some 7 TJ of energy along with 14,503 m<sup>3</sup> of mains water.</p> <p>In 2004, the annual consumption of other natural resources and of what type (e.g. primary aggregate, steel etc.) was 200 tonnes steel and 100 tonnes wet concrete.</p> <p>In 2007, the ILW store roof construction involved a total of 3,312 tonnes of wet concrete.</p>	<p>NDA (2005) Trawsfynydd <i>EAPINS Project Questionnaire</i> ; NDA (2008) <i>NSP Returns</i></p>
<p><b>Noise and Vibration</b></p>	<p>In 2004 levels were not reported, as relevant work was not taking place. There had been no complaints recorded. Noise limits of 50dB are in place for the on-site ILW store.</p>	<p>NDA (2005) Trawsfynydd <i>EAPINS Project Questionnaire</i></p>
<p><b>Health and Safety</b></p>	<p>The discharges to the atmosphere were assessed to result in doses to the critical group (a group or representative individual who receive the largest dose from artificially produced radionuclides due to their habits, diet and where they spend their time) of less than 0.005 mSv/y, or less than 0.5% of the dose limit for members of the public of 1 mSv/y. The critical group dose from discharges to water was assessed as 0.010 mSv/y or 1% of the dose limit for members of the</p>	<p>Environment Agency, (2009) <i>Radioactivity in Food and the Environment</i>; NDA (2008)</p>

	<p>public.</p> <p>The mean worker dose for employees was 0.088 mSv/y in 2007, with the mean dose for contractors slightly higher at 0.112 mSv/y. The maximum individual worker dose for 2007 was 1.932 mSv/y.</p> <p>During 2007/2008 the site had no RIDDOR reportable events. Trawsfynydd also had an Occupational Safety and Health Administration (OSHA) Total Recordable Incident Rate (TRIR) of 0 in 2007/08.</p>	<p><i>Nineteenth Progress Report on the Decommissioning of Trawsfynydd Power Station;</i></p> <p>NDA (2008) <i>Annual HSSE Report</i></p>
<b>Hazard Reduction</b>	<p>The top strategic priority for the NDA is to ensure that radioactive wastes on its sites are converted in to a safe form for disposal. This process is known as hazard reduction. In determining the level of hazard potential, consideration was given to its physical form, quantity and conditions of storage, as well as the amount of radioactivity it contains. In 2008, Trawsfynydd was ranked 6<sup>th</sup> out of the 19 NDA sites in terms of the level of concern for hazards, with 1<sup>st</sup> place indicating most concern regarding hazards and 19<sup>th</sup> least concern about hazards on site.</p>	<p>NDA (2008) <i>Project to assess levels of concern posed by radioactive wastes at NDA sites.</i></p>

## Future Developments

There is expected to be a significant decrease in the number of people employed on site post-2022, which is likely to noticeably affect the local economy and the number of indirect jobs supported by the activities at the operational site.

Discharges declined significantly when the site shut down and are expected to continue to decline during the care and maintenance preparations, although certain decommissioning activities may result in short term increases in discharges for example as legacy wastes are retrieved and processed to make them passively safe.

It is anticipated that there will be negligible discharges from the site during the care and maintenance period. Higher discharges especially those to air may be anticipated to occur during final site clearance when the reactors are dismantled but these discharges have not been estimated in detail at this time.

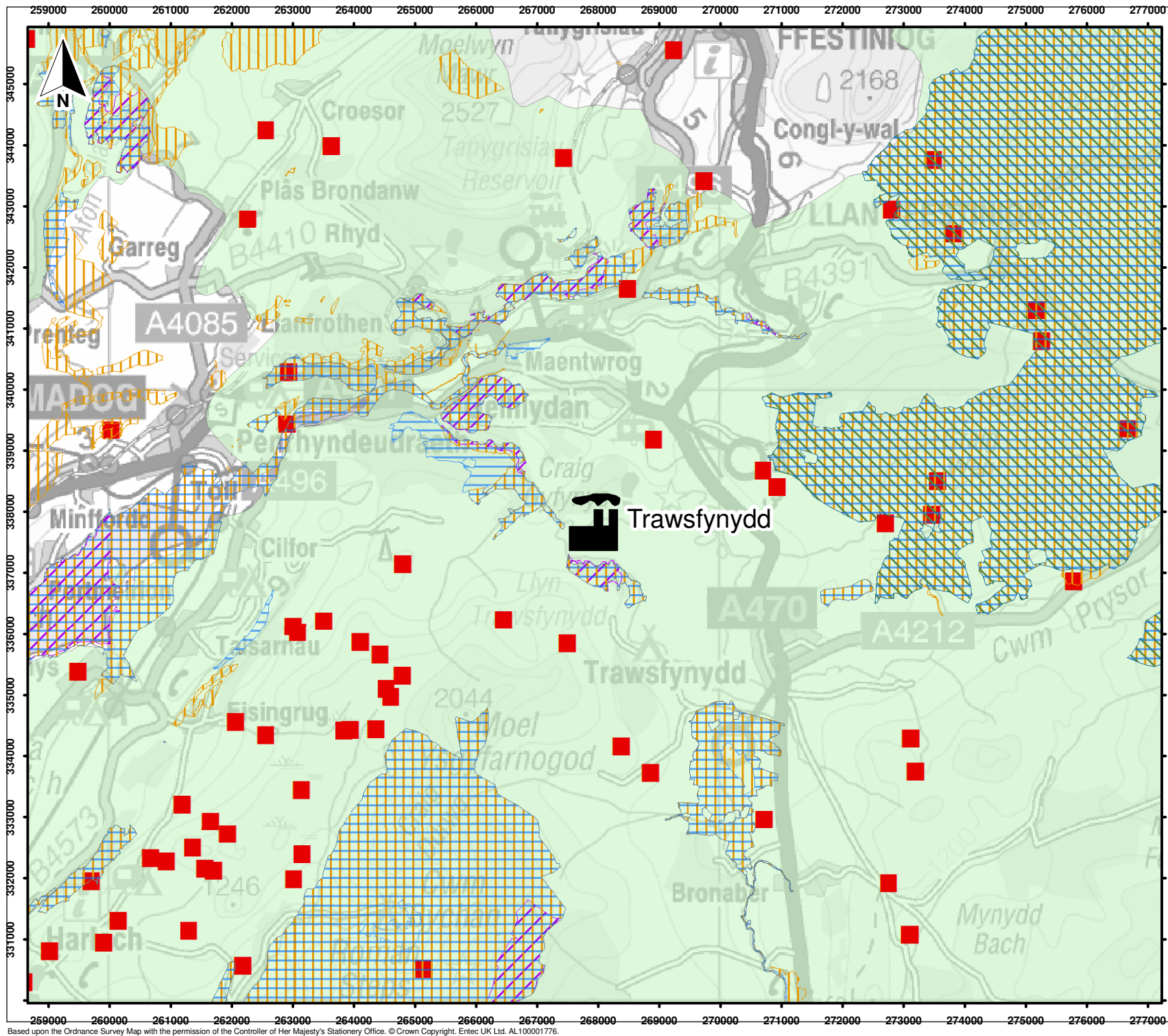
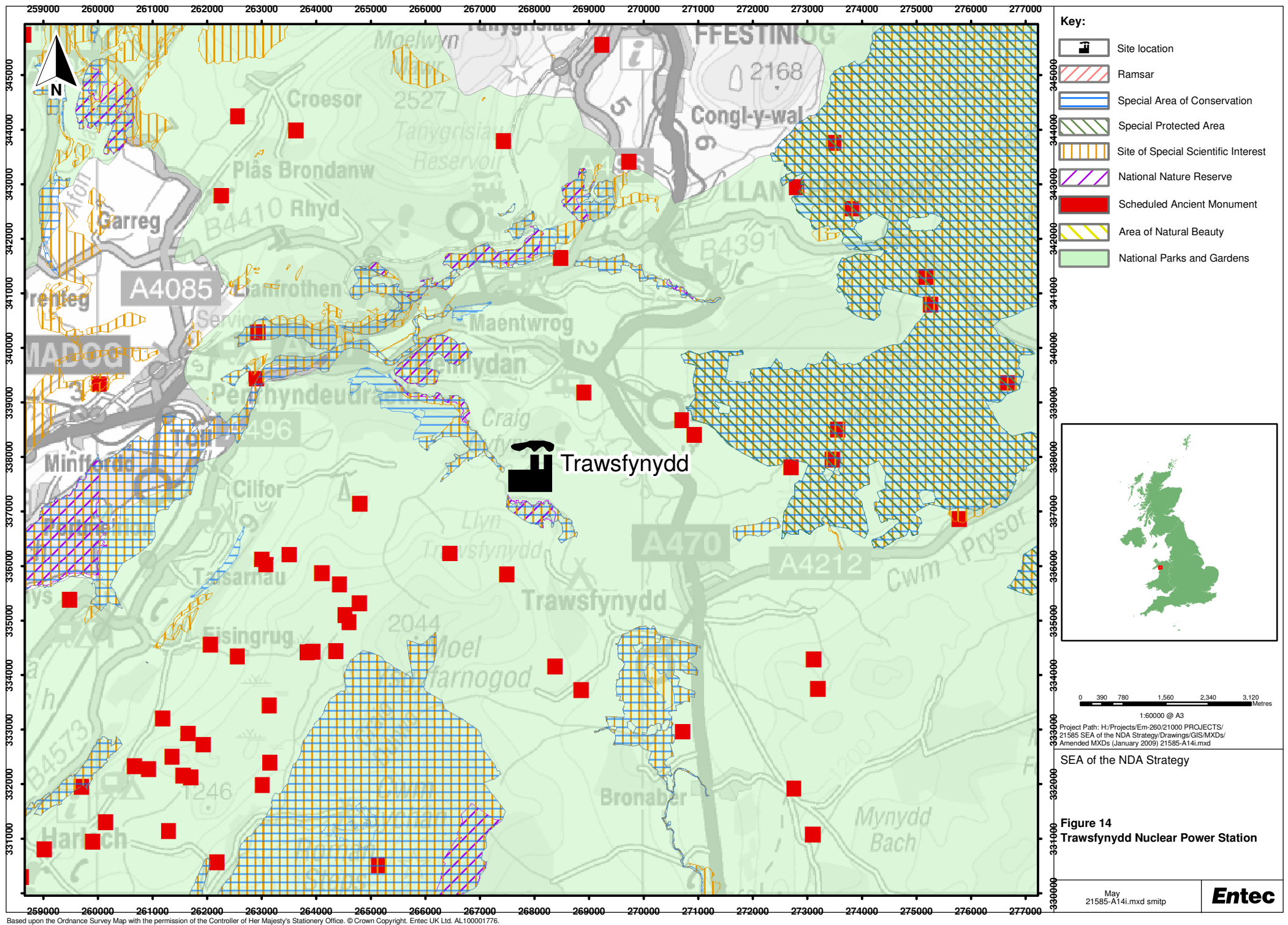
Significant volumes of radioactive waste will be generated, which will be treated, packaged and where necessary stored on site in purpose built temporary structures, until it is removed for permanent off site disposal. Discharges of radioactivity to the air and water are likely to reduce during care and maintenance, before increasing during final site clearance due to the increase in activity levels associated with reactor demolition.

## Environmental Issues

The operational site is located within the Snowdonia National Park. Therefore the impact of the site on the recreational value of nearby areas is significant and the site's care and maintenance plans have been developed to mitigate the visual impact of the site over this period.

The radioactivity in the Trawsfynydd lake sediments reflect earlier discharges made to water by the nuclear power station. The activity present in the sediment will continue to fall as discharges of radioactivity decline and the

activity discharged during the operation of the power station is subject to radioactive decay. Land quality (ground and groundwater) at Trawsfynydd is of potential concern due to radioactive and non-radioactive contamination, as described above.



**Key:**

- Site location
- Ramsar
- Special Area of Conservation
- Special Protected Area
- Site of Special Scientific Interest
- National Nature Reserve
- Scheduled Ancient Monument
- Area of Natural Beauty
- National Parks and Gardens

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SEA of the NDA Strategy

**Figure 14**  
Trawsfynydd Nuclear Power Station

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**Entec**