Trawsfynydd Site

Strategic Environmental Assessment Site Specific Baseline

September 2014

FOREWORD

This document has been prepared to support the NDA's Strategic Environmental Assessment of its decommissioning strategy for the 10 Magnox Sites. This document contains baseline environmental information and other relevant environmental data.

STRATEGIC ENVIRONMENTAL ASSESSMENT
Site Specific Baseline – September 2014

Trawsfynydd Site
Blaenau Ffestiniog
Gwynedd
LL41 4DT

Trawsfynydd Site

Trawsfynydd Site (hereafter referred to as the Site) is a twin reactor Magnox power station undergoing decommissioning, and is located inland within Snowdonia National Park, in the Meirionnydd area of Gwynedd, North Wales. It is situated adjacent to Llyn (lake) Trawsfynydd, an artificial lake / reservoir (originally built to supply hydroelectric power) from which it drew cooling water supplies during its operational phase, and covers an area of 13 hectares.[1] The following describes the key dates for the site:

- Construction of the site commenced in 1959, and electricity was first supplied to the grid in 1965.[1]
- The site ceased electricity generation in 1991 (during a routine outage; permanent shutdown was subsequently announced in 1993) after 26 years of operation.[1]
- Defuelling of the reactors was completed by 1995.[1]
- The Magnox Optimised Decommissioning Plan (MODP) was implemented in 2010, and Trawsfynydd was identified as one of the two 'accelerated sites', for which several of the key decommissioning objectives have been brought forward, in order to achieve entry into Care and Maintenance (C&M) at any earlier date than originally planned.[2]
- The initial Care and Maintenance Preparations (C&MP) phase of the decommissioning process is scheduled to be completed in 2016 Reduction of the height of the reactor buildings to reduce their visual impact is scheduled to take place as a separate, standalone project between 2020 – 27.[3a] The site will enter the Care and Maintenance (C&M) phase at this point.
- Final Site Clearance (FSC) is scheduled to commence at the end of the C&M phase. All remaining structures on the site will be cleared by 2083.[2]

1. Magnox Ltd (2013) Trawsfynydd. Available at http://www.magnoxsites.co.uk/site/trawsfynydd/
2. Nuclear Decommissioning Authority (NDA) Business Plan, 2012-2015
3. Magnox Ltd. (2011) LC35 Magnox Optimised Decommissioning Plan, Trawsfynydd Site

[a] *The C&M phase at Trawsfynydd is subdivided into 2 distinct phases as part of the Magnox Optimised Decommissioning Plan (MODP). The initial period of C&M after the C&MP works have been completed, but prior to the start of the reactor building height reduction starting in 2020, is called Interim Care and Maintenance (IC&M). Following the completion of the height reduction works in 2027 the Main Care and Maintenance (MC&M) phase, which is the extended quiescent period, will begin.*

Site End State Assumption

The planned end state for Trawsfynydd Site is defined in the NDA Strategy Document 2011. This states: *'Radioactive and non-radioactive contamination will be reduced to meet the requirements of the relevant regulatory regime for the next planned use of the site and the current use of adjacent land. Where the next planned use no longer requires a nuclear site licence, radioactive contamination will be reduced to meet the criteria for delicensing, with any remaining radioactive substances being subject to the relevant environmental permitting regime. The physical state of designated land will be made suitable for the next planned use of the site; structures and infrastructure will be made safe or removed where necessary, having first explored opportunities for their re-use.'*

Current Environment Baseline

Table 1: Baseline Data for all SEA Objectives for Trawsfynydd Site

SEA Objective	Environmental Baseline Data	References
Air Quality & Dust	*Radioactive Discharges* • Aerial discharges of radioactivity have reduced since the cessation of generation. The reactor cores at Trawsfynydd are enclosed within Steel Pressure Vessels (SPVs), which are in turn contained within concrete structures ('bioshields') designed to protect site personnel from radiation originating from within the cores. During operations discharges of aerial activity resulted from ventilation of the bioshield voids, which released gaseous activation products when the reactors were under load. • Periodic venting of reactor coolant gas was carried out during the operational phase. This has ceased since the end of generation. • Nuclear operations including waste retrieval which are being undertaken as part of the decommissioning works result in minor routine aerial discharges of radioactivity. *Conventional Discharges* • Vehicles and diesel generators are employed on the site, which are sources of air quality contaminants including NO_x (oxides of nitrogen), SO_x (oxides of sulphur), and PM_{10} (particulate with a diameter <10µm). These sources run only intermittently, and due to the rural nature of the site average levels of these pollutants are likely to be low. • Discharges from these sources will likely remain steady throughout the C&MP phase. • Dust is occasionally generated from construction and demolition activities undertaken on the site as part of C&MP. Mitigation of this dust is undertaken in all instances. • The location of the site is not currently designated an Air Quality Management Area (AQMA).[1]	*1. DEFRA (2014) Air Quality, http://aqma.defra.gov.uk/aqma/list.php*

Global Climate Change and Energy	• Throughout its lifetime the site has drawn power from the National Grid to satisfy domestic power needs (heavy plant items such as the gas circulators and cooling water pumps were driven by power derived directly from the station's output). The use of this energy has resulted in indirect CO_2 emissions, due to the mixed generation used in the UK. • In addition to grid supplies, the site has several essential items of plant for the provision of back-up power, which are fossil fuel powered. This auxiliary equipment consists of small diesel generators which are not in constant use; instead they are there for emergencies, but are regularly run for testing purposes. • A number of vehicles (including vans, forklift trucks, waste package transporters) are based at the site, which are either used within the site or move from the site to further afield (e.g. vehicles used in carrying out the District Survey), and have associated carbon emissions. Indirect carbon emissions originate from the use of hire vehicles by site personnel when travelling on company business in addition. • Magnox Ltd. has registered under the Carbon Reduction Commitment (CRC) and also has a company-wide Energy Efficiency Policy. Both of these schemes are currently being implemented on a site by site basis, with the aim of minimising greenhouse gas emissions across the company. *Climate Change and Flooding* • The inland nature of the site means that it is not vulnerable to increased risk from sea flooding due to climate change-induced sea level rise and more frequent storm surges, as the majority of the other Magnox Sites are (given their low-lying coastal situations). • It is possible that changing patterns of rainfall due to the effects of climate change could affect the site through changes to the local hydrology during the C&M phase. The risks posed by this possibility, and the necessary defensive measures that would be necessary to prevent this eventuality will be identified through the Periodic Safety Review. Furthermore, any changes in rainfall patterns during the C&M period will be gradual, allowing the advance planning of any necessary mitigation measures. • Revised wind loading guidance together with climate change uncertainties have led to the commissioning of major strengthening work for the two Safestore buildings to ensure their integrity is maintained until height reduction work is commenced.	

Biodiversity, Flora and Fauna	• The site is situated in a rural setting, and has 5 statutorily designated areas in close proximity.
	• These designated areas are:
	  ○ Snowdonia National Park *
	  ○ Coed y Rhygen Site of Special Scientific Interest
	  ○ and National Nature Reserve (which is part of the wider network of sites making up the Meirionnydd Oakwoods and Bats Special Area of Conservation [SAC])
	  ○ Rhinog SAC
	  ○ Afon Eden and Cors Goch SAC.
	  ○ Migneint-Arenig-Dduallt SAC.[1]
	  ○ Llyn Trawsfynydd is an important recreational fishery, incorporating populations of both natural and stocked species.[2]
	• The site Biodiversity Action Plan considers how the site manages its impacts on local ecosystems. This document is reviewed and updated on a regular basis.
	• The Environment Agency (EA) concluded that exposure to ionising radiation from authorised discharges of radioactivity from the UK's nuclear installations did not significantly impact wildlife in England and Wales.[3]
	** The site is located in the central region of the National Park, so is surrounded by protected land.* [4]
		1. Trawsfynydd Site Environmental Impact Assessment Baseline (EIAB) Report
		2. Attridge et al. (2009) Llyn Trawsfynydd Development Research Report, MEN/EWST/TRA/REP/0008/09
		3. Environment Agency (2002) Impact Assessment of Ionising Radiation on Wildlife
		4. Snowdonia National Park (2011) Location Map http://www.eryri-npa.gov.uk/visiting/snowdonia-national-park/location-map

Landscape and Visual	• The site is unique amongst the Magnox fleet in that it is located within a National Park (Snowdonia), immediately adjacent to Llyn Trawsfynydd.[1] As such, the site surroundings are particularly sensitive in terms of environmental, ecological and visual impacts from the site; it also obligates the site and Magnox Ltd. to give additional cognisance to all planning matters. • The designation of the National Park predates the granting of planning permission for the construction of the station, so architectural aesthetics were taken into account from the offset of the design and construction project.[2] • The surrounding National Park landscape is rural and mountainous, and is described as a 'High Sensitivity Landscape' and visual receptor.[2] • The 55m high reactor buildings, and other site structures are visible from the nearby A470 road, local farms and	*1. Ordnance Survey (2011) 1:25,000 Sheet OL18, Harlech, Porthmadog and Y Bala* *2. Trawsfynydd Site Environmental Impact Assessment Baseline (EIAB) Report*

	settlements, and many elevated vantage points within the surrounding landscape. As such, the site comprises a very prominent feature in the local landscape.[2] • Due to the site's visual impact in a landscape of national importance, combined with some degradation in the concrete cladding on the buildings, the Site Life Time Plan prior to the implementation of MODP contained plans to reduce the height of the reactor buildings, and the introduction of a contoured profile for the upper surfaces of the reactor buildings using local materials. Some preparatory works have already taken place in order for this to take place, including the partial dismantling and disposition of the heat exchangers and primary circuit ductwork. It was due to be undertaken in 2010, but funding constraints mean that works are planned to commence in 2020. Safestore repairs are currently being made to cater for this timescale.	
Cultural Heritage	• There are 3 Scheduled Ancient Monuments near to the site, with the Tomen y Mur site being located within 1km of the site.[1] • There are 8 Listed Buildings in the vicinity of the site.[1] • There is 1 entry in the Register of Landscapes, Parks and Gardens of Special Historic Interest near to the site (Trawsfynydd Basin and Cwm Prysor), as listed by Countryside Council for Wales.[1]	*1. Trawsfynydd Site Environmental Impact Assessment Baseline (EIAB) Report*
Groundwater, Geology and Soils	• Made ground consisting of blasted bedrock (rock fill) and reworked Till underlies the site itself. The natural superficial (drift) deposits near the site consist of a mixture of unconsolidated glacial sediments (Glacial Till / Moraine). • The bedrock at the site consists of Lower Cambrian Rhinog Grits, a series of layered coarse green sandstones and shaley bands that have undergone metamorphosis to sandstone – quartzites and psammites. • This rock unit incorporates a series of Palaeozoic igneous intrusions, consisting primarily of dolerite and microdiorite. • The superficial deposits are considered a Minor aquifer with variable characteristics. The bedrock is considered a mixture of minor and non-aquifers in the weathered / non-weathered and fractured / non-fractured material, respectively. • No major abstraction of these aquifers is undertaken at the site. • The soils in the area surrounding the site are classified as acidic loams and clays.[1] *Llyn Trawsfynydd* • Active effluent originating from the site is extensively treated and diluted to remove radioactivity, much more than at other Magnox Sites. This requirement arises from the closed-system nature of the lake, which prevents effective dispersal.	*1. Trawsfynydd Site Environmental Impact Assessment Baseline (EIAB) Report*

However, even with these measures in place over the course of the operational, defuelling and decommissioning phases (to date) there has been a cumulative concentration of radionuclides / fission products in the lake bed sediments, resulting in low-level contamination, due to authorised discharges.

- Knowledge of this is within the public domain, and is of particular importance given the National Park location, the lake's ecological sensitivity, and its current and planned / anticipated increased future use for public recreational purposes.
- However, separate studies have indicated that radioactive decay will render the contamination of the sediments as trivial within the C&M timeframe (approximately 30 years).

Land Quality

- The site contains known areas of radioactive and non-radioactive land and groundwater contamination, resulting primarily from historical (during the generation phase) events.
- The radioactive land and groundwater contamination is associated with leakage from the ponds during the 1970s/80s, due to a joint weakness in the pond structure. Extensive (9500m^3) sub-surface low level (above SoLA) radioactive land contamination has resulted. The extent and low level of the contamination results from the permeable nature of the made ground beneath the site (formed largely of blasted bedrock fragments). However, the low permeability of the underlying (undisturbed) bedrock and the topography of the bedrock surface have limited both the vertical and lateral extent of the contamination. Much of the resulting contaminated groundwater passing through the contaminated made ground is intercepted by engineered drainage. The intercepted contaminated water is currently fed into the outlet of the site surface water drainage system, which runs via an oil interceptor to a pumping station that diverts the contaminated water away from the headwaters of the local stream catchment and pumps it (under authorisation) to Llyn Trawsfynydd (which has also received all the authorised aqueous radioactive discharges from the main site).
- Characterisation and formulation of plans for long-term management (for the Care and Maintenance phase) of this contamination is a focus for land quality efforts at the site.
- The chemical land and groundwater contamination is associated with low levels of hydrocarbon contamination that are found in groundwater in a number of areas of the site. The main source of such contamination was a leaking oily drain system that has since been decommissioned. Interception of groundwater and use of an oil interceptor ensures there is minimal impact on the local watercourses.
- There is also an area of the site containing licensed disposals of asbestos-containing wastes. The licence for this facility was surrendered in 1993. Options to assure the continued presence of adequate cover over the buried wastes for the

	duration of the multi-decade C&M period are under consideration. • Routine (quarterly) monitoring is carried out in surface- and ground waters, which has ascertained that no contamination is migrating beyond the boundary of the licenced site. • The site shall continue to manage land quality through the production and maintenance of a Land Quality file, Land Quality Characterisation Plan and Land Quality Strategy. • The site will also maintain and monitor appropriate arrangements for the control of work that could affect areas of land contamination.	
Surface Water Resources and Quality	• The nearest water body to the site is Llyn Trawsfynydd, a large artificial reservoir that ranks as the third largest inland water body in Wales. • The major watercourse draining into and out of (via the Trawsfynydd dam) the lake is the Afon Prysor, which which in turn joins the Afon Dwyryd downstream. The lake also spans the watershed between the Afon Tafarn-helyg and this watercourse also has a system of tributaries in the area around the site. • The ecological and chemical status of Llyn Trawsfynydd is currently considered good under the Water Framework Directive, although it is at risk of failing to meet this good standard by 2015 due to changes in the classification thresholds. • Aqueous effluent discharges (and cooling water discharges during the operational phase) have always been made to Llyn Trawsfynydd. • Given that the lake is essentially a closed body of water, there is no effective dispersal of contaminants. In order to manage any accumulation of radionuclides in the lake much more stringent controls were set for the activity levels permitted in the effluent discharged from the site, thus treatment (ion exchange filtration) and dilution of effluent prior to discharge was much more extensive than at other Magnox Sites. • A substantial decline in caesium-137 levels in sediments and discharges was observed in the late 1990s in line with reducing discharges. In the earlier part of the last decade, the observed concentrations were mainly affected by sample variability. More recently, following years of sustained reductions in discharges of caesium-137, the sediment levels have stabilised.[1] • Independent studies by the NRPB and the EA concluded that within approximately 30 years (of 2005) the residual impact of this contamination will have undergone sufficient natural decay such that its impact will be considered 'trivial'.[2] • Algal blooms have been recorded in Llyn Trawsfynydd which is likely due to phosphate inputs to the lake. The site is not thought to make any significant contribution to this input, and mechanisms are in place to limit the phosphate loadings in	1. CEFAS (*Centre for Environment, Fisheries and Aquaculture Science*) (2012) Radioactivity in Food and the Environment 18 2. NDA (2005) EAPINS Questionnaire Return for Trawsfynydd Site

	sewage effluent discharge from site.[2]	
Waste	• Both operational and decommissioning activities at nuclear sites generate radioactive and conventional waste. • Low Level Waste (LLW) is generated at the site from a range of routine operational and decommissioning activities, and comprises a range of different materials. • Opportunities to characterise or decontaminate to Very Low Level Waste (VLLW for controlled burial) or out of scope (for permitted landfill), size reduce, incinerate or metal melt, in order to reduce LLWR consignments, are actively sought. • Intermediate Level Waste (ILW) is generated from both operational and decommissioning activities and has accumulated at several locations at the site. The majority of this waste will be retrieved during C&MP given that the ILW store on site is currently available. The exception to this are some Miscellaneous Activated Components (MAC) stored in vaults in the concrete bioshield which will be retrieved during FSC.[1] *Site Waste Strategy Baseline* • The use of self-shielding Ductile Cast Iron Containers (DCICs) for interim storage and eventual final disposal of solid and wet (which is dried within the container) ILW has been developed by Magnox Ltd. However, the use of these containers will not be implemented at the site, because Radioactive Waste Management Directorate (RWMD) 3m^3 boxes and cementitious encapsulant are already in use at the site for the immobilisation of wet and solid ILW. • These packages are consigned to the site ILW store, in conjunction with concrete overpacks for shielding purposes, pending phased transfer to the UK national Geological Disposal Facility (GDF) circa 2040 (but possibly as early as 2029).[2]	*1. Magnox Ltd. (2011) Trawsfynydd Site Integrated Waste Strategy (IWS)* *2. DECC (2011) Implementing Geological Disposal Annual Report April 2010 – March 2011*
Traffic and Transport	• The site access road connects to the A470 trunk road which is the major north – south trunk road through Wales, and connects directly to the national motorway network at Jct. 12 M53 via the A55 in the north or Jct. 7 of the M54. • The nearest railhead to the site is located on the Trawsfynydd and Blaenau Ffestiniog Branch Line (the line from Blaenau Ffestiniog to the site has been disused since the completion of defuelling at the site). The nearest passenger rail station is Blaenau Ffestiniog station.	Ordnance Survey (2011) 1:25,000 Sheet OL18, Harlech, Porthmadog and Y Bala

Land Use and Material Assets	• The site occupies an area of 15 hectares on a total NDA estate of 65 hectares (areas of land adjoining the lake are under NDA ownership, in addition to the power station site).[1] • The site consists of two reactor buildings, ILW store, ponds complex, various ancillary and support buildings, a Switchyard (National Grid-leased), access roads, grassy areas and areas of hardstanding. • The surrounding area is rural in nature and is used for a mixture of agricultural, forestry and recreational purposes. • The primary land use in proximity to the site is the lake. A Public Right of Way runs close to the site, but not through the site footprint.[2] • The site incorporates a significant quantity of material that is potentially eligible for direct reuse or recycling: • This includes a substantial quantity of recyclable metal in the boilers, the gas ducts, the SPVs, and as rebar incorporated into large concrete structures such as the bioshield.[1] • A proportion of this recyclable metal will be made available for recycling during the C&MP phase, such as from general building dismantling. • At Trawsfynydd, the 12 boilers (6 per reactor) have already been partially separated from the primary circuit and size reduced as part of the facilitation works for the reactor building height reduction project. The sections from these very large (1000 tonnes, approximately) boilers have been stored in the reactor buildings.[1] • As such, this material could potentially be made available and consigned to suitable facilities for recycling within the C&MP or C&M timeframe, pending the necessary arrangements to facilitate this being made. • The remainder of the primary circuit, the bioshield and the SPVs will be dismantled at FSC, so a large volume of the recyclable metal on site will be produced at this time. A proportion of this material will be classified as ILW (activated reactor components in particular) so will likely not be suitable for recycling (and will likely be packaged and consigned to the UK GDF), but the remainder will be LLW or exempt, and as such eligible for recycling and reuse within or outwith the nuclear industry.[2] • A large volume of inert concrete and masonry rubble will be produced through demolition activities during C&MP and FSC, and will likely be reused on- or off-site as infill material, or similar.[2]	*1. Trawsfynydd Site Environmental Impact Assessment Baseline (EIAB) Report* *2. Magnox Ltd (2011) Trawsfynydd IWS*

Noise and Vibration	• Noise and vibration can originate from a number of sources at the site, but also from the adjacent National Grid and Scottish Power sites, from the A470 trunk road and from reasonably frequent air traffic. • Monthly noise monitoring data has been undertaken at the nearest receptor, Ty Gwyn Farm (situated approximately 0.5km from the site) since 2004. • Noise levels in excess of 50 dB have been recorded at this location, but in each instance it has been clear that the noise is not attributed to the site. • The criteria for the significance of noise are the proximity of noise sources to the receptors, and the presence of any screening / nature of the ground between the source and the receptor. • Since the cessation of generation the profile of noise and vibration from the site has changed, but remains occasionally significant due to the nature of decommissioning works.	*1. Trawsfynydd Site Environmental Impact Assessment Baseline (EIAB) Report*

Table 2: Environmental Discharge Data for Baseline Years 2012 and 2013 for Trawsfynydd Site

In addition to the baseline information, which describes the permanent, semi-permanent and inherent features and impacts of Trawsfynydd Site and its surrounding area, the following table outlines discharge data for the site for the years 2012 and 2013[2], and how these quantities will likely change in future. This is intended to provide a quantitative 'snapshot' of the features of the site and impact that it has (and is anticipated to have in future), in order to supplement the baseline information.

SEA Objective	Environmental Discharge Data	Future Changes in Environmental Discharges	References
Air Quality	• Total Alpha discharged to air was below the reporting threshold in 2012 and 2013. • Total Beta and Gamma (excluding Tritium) to air in 2012 was 1.90E-03 TBq and 1.4E-06 TBq in 2013. • Total Tritium to air was 4.30E-02 in 2012 and 4.2E-02 in 2013.[1] The *total dose* from all pathways and sources of radiation was 0.025 mSv in 2012, which was less than 3 per cent of the dose limit, and up from 0.012 mSv in 2011. The higher value in 2012 was due to an increase in the direct radiation from the site. Infants living near to the site were the most exposed people, a change from the situation in 2011 (adults). In 2011, the majority of the dose was received from the consumption of fish combined with external exposure from activity in lakeside sediment. *Total doses* remained broadly similar from year to year, and were low.[2]	• Discharges of radioactivity to the atmosphere decreased significantly upon the cessation of generation. • As decommissioning progresses through the C&MP phase the trend will be for discharges to remain steady or continue to decrease. • However, certain decommissioning activities such as the as the retrieval, treatment and passivation of wastes and draining of the pond may result in short term spikes in aerial discharges of radioactivity. • Once the major hazard reduction projects have been completed and the site enters the extended, quiescent C&M phase, aerial discharges of radioactivity will be extremely low. • The degassing of desiccant material in storage, bioshield concrete and core graphite may result in very minor discharges of tritium. • Dust from demolition and traffic movement may affect the local area during all 3 decommissioning phases. Civil works will be a source of dust. • FSC will result in a temporary increase in aerial	*1. Magnox 2012 and 2013 Nuclear Industry Sector Plan (NISP) Submissions* *2. CEFAS (Centre for Environment, Fisheries and Aquaculture Science) (2012) Radioactivity in Food and the Environment 18*

[2] *Data from 2012 and 2013 are presented to provide an indication of variances*

		discharges of radioactivity. This is because the radioactive reactor cores and associated equipment and infrastructure will be dismantled at this point. Detailed estimates for the discharges from this process have not been made, but will likely comprise particulate as major remaining structures are demolished. • Retrieval of waste packages from site for transfer to the GDF when it becomes available during the C&M phase will result in periodic traffic movements to the site. This retrieval will likely be phased over an extended period of time, so the impact from this is likely to be limited.	
Global Climate Change and Energy	• In 2012, 8936 MWh of energy was used at the site reducing to 7001 MWh in 2013. • In 2012 direct emissions of CO_2 totalled 6.9E-04 megatonnes, decreasing in 2013 to 3.9E-04. • Energy consumption and use of fuel for transport resulted in the indirect emission of 3.6E-03 megatonnes of CO_2 in 2012 and 3.80E-03 in 2013.[1]	• The site will draw power from the grid and operate plant and vehicles for decommissioning works such as ILW processing and for general domestic needs until the completion of C&MP. • During C&M the site's power usage will be very low, but periodic inspections and maintenance will result in very small spikes in energy usage. • The retrieval of waste packages from the site ILW store during C&M will result in intermittent vehicle movements to and from the site. Energy use and the operation of numerous vehicles will resume on a significant scale during FSC. • However, the types of the vehicles in use and the nature of energy mix in use in the UK at these dates cannot be predicted, thus the associated CO_2 emissions relative to the present are unknown.	*1. Magnox 2012 and 2013 Nuclear Industry Sector Plan (NISP) Submissions*

Surface Water Resources and Quality	• Alpha liquid discharges were below the reporting threshold in 2012 and 2013. • Total Beta Gamma (excluding Tritium) liquid discharges were 4.21E-03 TBq in 2012 and 2.9E-03 TBq in 2013. • Total Tritium liquid discharges were 1.93E-03 in 2012 and 4.51E-03 in 2013.[1] Discharges of liquid radioactive waste are made to a freshwater lake making the power station unique in UK terms. Discharges of caesium-137 and other radionuclides increased in comparison to those in 2011. The aquatic monitoring programme was directed at consumers of freshwater fish caught in the lake and external exposure over the lake shoreline. The majority of activity concentrations in fish and sediments result from historical discharges. Concentrations of radiocaesium in fish in 2012 were similar to those in 2011. Caesium-137 concentrations in the lake sediments generally decreased in comparison to those in 2011, but were similar to those in previous years. In 2012, sediment concentrations of strontium-90, americium-241 and plutonium radionuclide at two locations (Bailey Bridge and fish farm) were lower than those in 2011, but overall, sediment activity concentrations in 2012 were similar to those in recent years prior to 2011. Strontium-90 and transuranic concentrations in fish continued to be very low in 2012 and it is the effects	• Discharges of aqueous radioactivity decreased significantly upon the cessation of generation and dispatch of all the spent fuel to Sellafield. • As decommissioning progresses through the C&MP phase the trend will be for discharges to continue to decrease. • However, certain decommissioning activities such as the as the retrieval, treatment and passivation of wastes may result in short term spikes in aqueous discharges of radioactivity. • Once the major hazard reduction projects have been completed and the site enters the extended, quiescent C&M phase, aqueous discharges of radioactivity will be very low, but not zero [3]. • FSC will result in temporary discharges of aqueous radioactivity, primarily from waste treatment as the radioactive reactor cores and associated equipment / infrastructure are dismantled. Detailed estimates for the discharges due to this have not been made, however.	1. Magnox 2012 and 2013 Nuclear Industry Sector Plan (NISP) Submissions 2. CEFAS (*Centre for Environment, Fisheries and Aquaculture Science*) (2012) Radioactivity in Food and the Environment 18

	of caesium-137 that dominate the fish consumption and external radiation pathways.[2]		
Waste	• The following waste metrics are for 2012 and 2013: • In 2012 the site produced 264.94m^3 of LLW from routine decommissioning activities. • 62.8m^3 of LLW was treated, 164m^3 of LLW to landfill (as HV LLW or exempt waste) and 37.5m^3 of LLW was disposed to LLWR.[1] • In 2013 the site produced 828.4 m^3 of LLW from routine decommissioning activities. • From this total 2 m^3 of LLW metal was recycled, 237.9m^3 of LLW was treated and 19.50 m^3 of LLW was disposed to LLWR. • In 2012, 2023 tonnes of inert waste was produced by the site from decommissioning activities. 100% of this total was recycled. • 429.7 tonnes of non-hazardous waste was produced from decommissioning activities. 90% of this total was recycled.[1] • In 2013, 439.6 tonnes of inert waste was produced by the site from decommissioning activities. 100% of this total was recycled. • 386.9 tonnes of non-hazardous waste was produced from decommissioning activities. 88% of this total was recycled.	• As decommissioning progresses through the C&MP phase the trends for waste generation will likely remain at current levels or increase. When the site enters C&M in 2015 these levels will fall significantly.	*1. Magnox 2012 and 2013 Nuclear Industry Sector Plan (NISP) Submissions*

The following table illustrates further parameters that are significant for the site.

Table 3: Additional Data for baseline Years 2012 and 2013 for Trawsfynydd Site

SEA Objective	Additional Data	Changes in Additional Parameters	References
Surface Water Resources and Quality	• In 2012 the site consumed 693953 m^3 of water and 639036 m^3 in 2013.[1] • This figure is much higher than at other equivalent decommissioning sites because each cubic metre of active effluent discharged from site is diluted with 250m^3 of water from Llyn Trawsfynydd prior to discharge, in order to minimise the impact on the lake.	• Similar levels of water consumption at the site are likely to continue for the duration of the C&MP period at a similar level.	*1. Magnox 2012 and 2013 Nuclear Industry Sector Plan (NISP) Submissions*
Economy, Society and Skills	• The site is located in a rural and sparsely populated area of Gwynedd. The only major settlement within 10km of the site is Blaenau Ffestiniog to the north, although a number of small and other settlements are located in closer proximity to site, including Gellilydan to the north, Maentwrog to the northwest and Trawsfynydd village to the southeast.[1] • The Gwynedd population was 121900 during 2013.[2] With a working population of 56700 during 2013.[2] • The dominant working sectors in Gwynedd during 2013 were Services (43100, 86.4%) and Public Admin Education and Health (19400, 38.8%). • Employment in the Electricity, Gas and Water Supply industry in Gwynedd was not listed, but the effect of employment at the site is likely to be low against the	• The number of personnel employed on site will decrease significantly after the completion of C&MP. • Personnel numbers at the site will increase again for the duration of FSC.	*1. Ordnance Survey (2011) 1:25,000 Sheet OL18, Harlech, Porthmadog and Y Bala* *2. Office for National Statistics (2014) Official Labour Market Statistics, available at http://www.nomisweb.co.uk/* *3. EU (2014) Cohesion Policy 2007 – 13, available at http://ec.europa.eu/regional_policy/atlas2007/index_en.htm*

	total working population of this district. • In 2013 (25300, 34.6%) of the population were employed to NVQ4 level or above. • Gwynedd is currently subject to Convergence Funding from the EU.[3]		
Traffic and Transport	• The Annual Average Daily Traffic (AADT) from all traffic movements on the A470 adjacent to Llyn Trawsfynydd, to the south of the site access road, from recent measurements was 6981, of which 411 were Heavy Goods Vehicle (HGV) movements. At a point approximately 2km to the north on the A470, the AADT was 4990, of which 300 were HGV movements.[1] • The proportion of these total movements that are directly attributable to the site is very low, and will continue to be so even during periods of increased work at the site.	• It is anticipated that general traffic and HGV movements will remain steady or increase during the remainder of the C&MP phase at Trawsfynydd Site. • Higher numbers of personnel will be on site due to the requirements of MODP, meaning that the daily commuting movements will likely be maintained. • Movement of materials for potential future major construction or other projects e.g. height reduction of the reactor buildings will generate extra traffic movements, as will movement of demolition waste and other inert material for reuse or conventional disposal. • A similar increase in traffic flows on local roads can be expected for the duration of the FSC phase.	*1. Department for Transport (2014) Annual Average Daily Traffic Flows, http://www.dft.gov.uk/matrix/search.aspx*

Figure 1: Statutorily Designated Areas in the Vicinity of Trawsfynydd Site