Nuclear Restoration Services

Trawsfynydd site: Demolition of the ponds complex to ground slab level, infilling of its below-ground voids, capping of its footprint, and modifications to the surface water drainage.

Environmental Impact Assessment

Non-Technical Summary

November 2024

Report for

Nuclear Restoration Services
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Trawsfynydd Site
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Contents

1. Introduction

1.1 Introduction

1.1.1 Trawsfynydd Power Station is a twin nuclear reactor site located in Eryri National Park in Gwynedd. The Power Station was operational from 1965 to 1991 and is now undergoing a programme of decommissioning. The Trawsfynydd ponds complex is a collection of 36 structures, some of which have below ground voids. The ponds complex was initially built over half a century ago to process spent fuel from the reactors and undertake waste storage and processing operations.

1.1.2 The Proposed Development comprises the demolition and disposal of the Trawsfynnyd ponds complex as part of the ongoing decommissioning[1] of the former Trawsfynydd Power Station.

1.2 What is Environmental Impact Assessment?

1.2.1 An (Environmental Impact Assessment) EIA is an environmental assessment process to ensure that the approval of the Proposed Development by decision makers is made with knowledge of the likely significant environmental effects that may arise as a result of the proposed activities associated with the Proposed Development.

1.2.2 The objective of the EIA is to identify any likely significant effects which may arise from the Proposed Development and identify measures to prevent, reduce or offset any adverse effects and to enhance any beneficial effects.

1.2.3 During the EIA process, management measures have been identified and incorporated within the proposals to prevent or reduce any adverse environmental effects and to enable sustainable design and construction principles to be embedded within the proposals. The outcome of the EIA process is reported within the Environmental Statement (ES).

1.2.4 The ES comprises the following elements:

- Part 1:
  - Chapter 1: Introduction
  - Chapter 2: Site and Surroundings
  - Chapter 3: The Project and Its Alternatives
  - Chapter 4: Regulatory Context
- Part 2
  - Chapter 5: Biodiversity
  - Chapter 6: Noise and Vibration

[1] Nuclear decommissioning is the process leading to the complete or partial closure of a nuclear facility, including its nuclear reactor. The process is managed according to a decommissioning plan, which includes the whole or partial dismantling and decontamination of the facility, and restoration of the land to enable future use.

- Chapter 7: Geoenvironmental Impacts and Surface Water Quality
- Chapter 8: Flood Risk and Drainage
- Chapter 9 Long-Term Radiological and Non-radiological Impacts
- Chapter 10: Summary

1.3 Purpose of this Non-Technical Summary

1.3.1 This Non-Technical Summary (NTS) presents a summary of the information and environmental assessment undertaken for the Proposed Development, as presented in the ES. This NTS includes a brief description of the Proposed Development and a summary of the EIA work undertaken. **Table 1-1** presents an outline of the content of each section.

Table 1-1 Summary of sections

Section	What's included
Key legislation and guidance	This section provides a summary of the key policy and legislation relevant to the Proposed Development and the EIA.
What is being proposed?	An overview of the Proposed Development including how the ponds complex will be demolished, what will remain in place and the timeframes over which works will be undertaken. Also details the various approaches considered for the demolition of the ponds complex.
Environmental Impact Assessment Process	This section explains how environmental impacts have been assessed and informed by consultation.
Biodiversity	An outline of the key considerations and outcomes for the EIA of Biodiversity.
Noise and Vibration	An outline of the key considerations and outcomes for the EIA of Noise and Vibration.
Geoenvironmental Impacts and Surface Water Quality	An outline of the key considerations and outcomes for the EIA of Geoenvironmental Impacts and Surface Water Quality.
Flood Risk and Drainage	An outline of the key considerations and outcomes for the EIA of Flood Risk and Drainage.
Long-term Radiological and Non-Radiological Impacts	An outline of the key considerations and outcomes for the EIA of Long-term Radiological and Non-Radiological Impacts.
Cumulative Effects	An outline of the combined effect of the Proposed Development in combination with the effects of different projects.

1.4 Who is the Applicant?

1.4.1 Nuclear Restoration Services (NRS), the Applicant, is the Site Licence Company (SLC) for the Trawsfynydd site. NRS is a wholly owned subsidiary of the Nuclear Decommissioning Authority (NDA) and NRS is responsible for decommissioning 13 nuclear sites in a safe and secure manner and the operation of one hydro-electric plant.

2. Key Legislation and Guidance

2.1.1 The Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations (as amended) 1999[2] (EIADR) is a legal instrument that, in general, requires the environmental impact of decommissioning nuclear power stations, and other nuclear reactors, to be considered in detail before the decommissioning project can be granted consent to commence. However, as decommissioning at Trawsfynydd started before 19th November 1999, its decommissioning did not require consent from ONR.

2.1.2 If any decommissioning project, regardless of when it commenced, requires a change or extension that may have a significant adverse effect on the environment, then under Regulation 13 of EIADR the nuclear site licence holder is required to seek a determination from ONR as to the next steps. The Applicant has considered whether this would be required and found that no other consenting processes are required by ONR under EIADR.

2.1.3 The application for the Proposed Development therefore falls under the jurisdiction of the relevant local planning authority (Eryri National Park Authority (ENPA)). Planning applications for certain types of development are, or may be, required to be accompanied by an "Environmental Statement". Such development is referred to in Town and Country Planning legislation as "EIA Development". To determine whether a particular development is EIA Development, under the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[3] (hereafter the "TCPA(EIA) (Wales) Regulations") an "EIA screening opinion" may be obtained from the relevant local planning authority. To this end, the Applicant submitted a formal request for an EIA screening opinion to Eryri National Park Authority (ENPA) on 26th January 2022.

2.1.4 On 13th May 2022, ENPA issued a screening determination confirming that the Proposed Development constitutes EIA Development and an assessment of the likely effects of the Proposed Development should be assessed and that an Environmental Statement should be submitted with the planning application.

2.1.5 Other regulatory regimes also apply to the proposal for the demolition, infilling, and capping of the ponds complex and associated works which the Applicant will comply with as part of the Proposed Development, such as Environmental Permitting. Further information on relevant legislation is provided in **Chapter 4 Regulatory Context** of the **ES**.

[2] Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999. [Online] Available at: https://www.legislation.gov.uk/uksi/1999/2892/contents/made [Accessed 03 April 2024].
[3] The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. [Online] Available at: https://www.legislation.gov.uk/wsi/2017/567/contents [Accessed 25 July 2024].

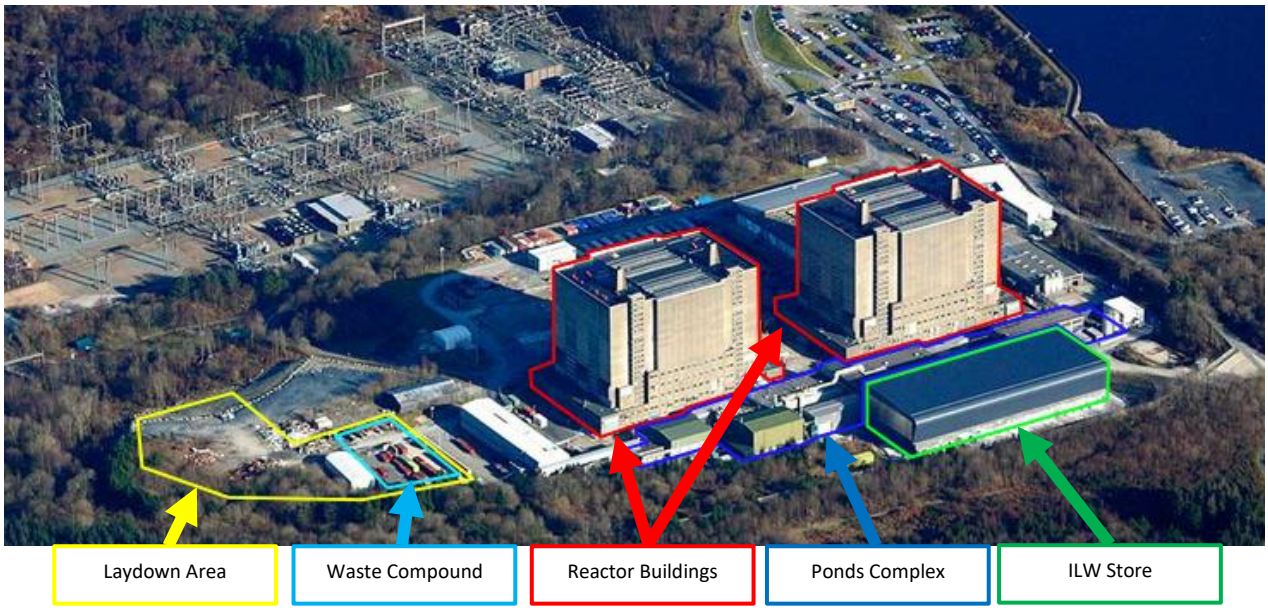
3. The Trawsfynydd Site: What is being Proposed?

3.1 Location of the Proposed Development

3.1.1 The Proposed Development is located near to Blaenau Ffestiniog, Gwynedd. The Proposed Development, and its Application Site boundary lies within the former Trawsfynydd Power Station site (the 'Trawsfynydd site'), and is located in Eryri National Park (formerly known as Snowdonia National Park), North Wales, on the northern side of Llyn Trawsfynydd.

3.1.2 The former Trawsfynydd Power Station is a twin nuclear reactor site. This station was operational from 1965 to 1991 and is now undergoing a programme of decommissioning and waste management operations. The main features on the Trawsfynydd site are shown in **Graphic 1** below. The ponds complex to be demolished can be seen located between the two reactor buildings and the Intermediate Level Waste (ILW) store[4].

Graphic 1 Main Features on the Trawsfynydd Site



3.2 The Surrounding Area

Natural Environment

3.2.1 The Trawsfynydd site is situated within a mountainous area of the Snowdonia National Park. North of the Trawsfynydd site is a lowland valley running westward from Ffestiniog

[4] Radioactive waste is broken down into two main categories for management, Higher Activity Waste (HAW) and Lower Activity Waste (LAW). Intermediate level waste falls under the HAW category which is stored on-site until a geological disposal facility is operational and able to receive HAW.

to the coast at Penrhyndeudraeth. The Trawsfynydd site itself sits at the northern end of a wide valley occupied by Llyn Trawsfynydd.

3.2.2 The surrounding natural environment is made of semi-natural woodlands, agricultural land, and scattered residential properties and farmhouses.

3.2.3 There are six statutory biodiversity sites of international importance (European Sites) within 10km of Trawsfynydd site, including five Special Areas of Conservation (SACs) and one Special Protection Area (SPA). There are 15 statutory biodiversity sites of national or local importance within 5km, including nine SSSIs and six National Nature Reserves (NNRs). The nearest designated site is a component of the Meirionnydd Oakwoods and Bat Sites SAC, located 0.93km south-west from the Trawsfynydd site.

Built Environment

3.2.4 There are several residential properties and outbuildings close to the Trawsfynydd site with vehicular access provided by the A470 road. Most settlements are located along the valley through which the A470 trunk road passes. There are many small settlements located near the Trawsfynydd site - north at Gellilydan and south at Trawsfynydd.

3.2.5 There are two Grade II* registered historic park and garden elements, known as Dragon Garden and Dame Sylvia Crowe Garden located within the Trawsfynydd site.

The National Park

3.2.6 Snowdonia National Park is Wales' largest National Park and is a hub for culture, history and heritage. Snowdonia National Park has several special qualities[5] including:

- Diverse landscapes;
- Tranquility and solitude;
- Opportunities for recreation and leisure;
- Cultural and architectural heritage; and
- Varied biodiversity.

3.3 Description of the Proposed Development

Overview

3.3.1 The Proposed Development is part of the wider decommissioning works across the former Trawsfynydd Power Station. There are three phases proposed as part of the demolition and disposal of the ponds complex, these are:

- Preparatory Phase – these activities do not form part of this planning application and include internal works such as de-planting the buildings and structures and the removal of asbestos from within buildings that make up the ponds complex;

[5] Snowdonia National Park Authority (2020). *The Snowdonia National Park Partnership Plan 2020*. [Online] Available at: https://snowdonia.gov.wales/wp-content/uploads/2022/02/Cynllun-Eryri-Easy-Read_English_2020_30.04.20.pdf [Accessed 25 July 2024].

- Works Phase (expected duration about 24 months) - the main demolition activities, void infilling, construction of concrete cap and drainage installation; and
- Post-Works Phase - environmental monitoring and various maintenance activities

3.3.2 The Works Phase activities comprise:

- demolition, disposals, installation of a cap (capping) and drainage works. These activities are outlined below. The Post-Works Phase includes periodic inspections and repairs of the drainage system surrounding the cap and the concrete cap. This also includes long-term monitoring of boreholes.

3.3.3 The Trawsfynydd site final end-state will be reached towards the end of the century, details of this can only be determined once all other decommissioning activities on the site have been completed.

Table 3-1 Key elements of the Proposed Development

Key elements of the Proposed Development	Description
Disposal	Following the demolition of the buildings and structures forming the ponds complex, the materials arising from demolition will be used to backfill the below ground voids following demolition of the existing structures.
Capping	A capping slab is to be installed following the demolition and backfilling of the voids. The cap will be made from concrete and will ensure rainwater does not enter the voids.
Drainage	Once the cap for the void is in place, a new drainage system is to be installed around the cap. This will direct surface water away from the ponds complex disposals and link to the site's existing surface water drainage system.
Transport Movements	Heavy Goods Vehicles (HGVs) will be required to bring materials to site, for example ready mixed concrete. The busiest period for HGVs is expected to be during the construction of the capping slab.

Timescales and Working hours

3.3.4 The project Works Phase duration is expected to be approximately 24 months. Working hours are anticipated to be:

- 08:00-18:00 Monday to Friday during the Works Phase;
- Some works may be undertaken on Saturdays 08:00-13:00.

3.3.5 Physical external works are not expected to take place outside of these hours with the possible exception of limited time critical activities.

3.4 Alternatives Considered for the Demolition of the Ponds Complex

3.4.1 **Chapter 3: The Project and Its Alternatives** of the ES presents an overview of the alternatives considered for the demolition of the ponds complex. **Table 3-2** presents a summary of the alternatives considered and resultant implications.

Table 3-2 Summary of Alternatives

Topic	Alternatives Considered and Implications
The timing of demolition of the ponds complex	If demolition of the ponds complex were to be further delayed for any significant period, there would be the following consequences: • a new weatherproof overbuilding would have to be constructed over most of the ponds complex, resulting in additional construction works, additional materials use and additional costs, with long-term maintenance also being required; • there would be limited benefit from radioactive decay by deferring the demolition works; and • there would continue to be little space to the west of the reactor buildings, limited to that space between the reactor buildings and the ponds complex, and this space is needed to facilitate other site decommissioning works. For these reasons, demolition of the ponds complex in the near-term is proposed.
On-site versus off-site disposal of radioactively contaminated concrete and masonry	The complete clean-up of the Trawsfynydd site including the ponds complex structures, radioactively contaminated land, the reactor bioshields, and the previously authorised asbestos disposals, would be extremely challenging and would require significant expenditure and time with large excavations and increased off-site lorry movements. The on-site disposal of the radioactive components of the ponds complex and near-by sub-surface infrastructure (including leaving some structures permanently in place and infilling below-ground voids with radioactive demolition arisings) is preferred as: • reaching a “radiologically clean” end-state could only really be achieved after reactor dismantling, some decades from now, meaning that a new ponds complex overbuilding would be required (see above); • there is a significant engineering challenge in reaching a radiologically clean end-state, with very high costs and unnecessary use of off-site radioactive waste facility disposal capacity; • there will be no significant safety or environmental disadvantages associated with the proposed on-site disposals as; and • the on-site disposals are consistent with NDA strategy and emerging UK policy for decommissioning and radioactive waste management.
Radioactive inventory management	The buildings that make up the ponds complex are undergoing clean out activities where internal items are removed leaving rooms completely or largely empty (some pipework may remain). Based on the assumption that the radioactive inventories used for the radiological estimates are generally over-estimates, it is not currently proposed to seek to remove further radioactivity. Such an approach would result in unnecessary cost, additional effort and increased off-site waste disposal demands without resulting in a meaningful reduction in radiological consequences of the on-site disposals.

	The issue of radioactive inventory reduction will be kept under regular review.
Under-ponds drains	There is, at present, a series of drains that run underneath the main parts of the ponds complex (known as “sampling drains”). These are radioactively contaminated, and some are in contact with groundwater. Prior to the Proposed Development commencing, it is proposed to remove the contents of the wettest drains, and to backfill those with clean concrete. Some other under-ponds drains that are occasionally in contact with groundwater are likely to be grouted to fix the radioactivity and to exclude water, prior to this development commencing. No interventions as part of this Proposed Development are proposed for the remaining under-ponds drains because of the cost and worker dose and engineering complexities of doing so, without any significant long-term radiological benefit.
Demolition methods, processing and segregation	The demolition arisings for void infill are expected to be a combination of broken concrete and masonry, cut concrete blocks and intact precast concrete elements. There is expected to be some crushing of non-radioactive demolition arisings, but only where there is an engineering need, for example to form the base for the reinforced concrete cap. Crushing of the slightly radioactive demolition arisings would introduce more project complexity and a greater need for radiological and contamination controls; therefore this will be minimised or avoided. Freshly exposed concrete surfaces can interact with water creating leachate alkalinity. The option to emplace some or all the concrete demolition arisings as cut blocks or intact precast elements greatly reduces the surface area of freshly exposed concrete. However, this approach would likely require a much more “hands-on” work approach than conventional demolition and would be much more time consuming and costly. It may also have implications for how much waste can be accommodated in the below-ground voids. Steel rebar within demolition arisings will be removed as far practicable from concrete demolition arisings (by machines such as munchers), applying the waste hierarchy in relation to metals recycling. Some voids, specifically those that extend below the groundwater table, will not have demolition arisings left in a “loose” condition. They may be “solidified” using a cement grout, or else the demolition arisings will be emplaced above a clean concrete mass installed at the base of the void. This is to minimise the risk of direct discharges of pollutants from the infill to groundwater. The option of completely filling the below-ground voids in these ways has been ruled out due to the large amounts of cement or concrete that would be required.
Detailed capping design	The top of the ponds complex will be covered by a newly constructed, reinforced concrete cap. Concrete is needed because the area will be required for future decommissioning works and will need to be sufficiently load bearing. The concrete cap will be designed to minimise the risk of water getting into the former voids below. Additional improvements to the cap design that have been considered include the use of impermeable liners or similar; and a thicker cap, or the use of intrusion barriers such as large boulders, or the use of a visual warnings. However, most of these measures would introduce construction complexities and potentially reduce the cap long-term integrity. These will remain options that could be used as part of the works to achieve the final site end state.

Surface water drainage design	The proposal is that drainage from the cap over the ponds complex footprint will continue to discharge to the existing site drainage system, which as now will discharge to Llyn Trawsfynydd. There will be no increase in the volume or radioactivity of water discharging to the lake. Surface water runoff from the cap cannot be directed to infiltrate the ground at the present time. This is for a variety of reasons, including the presence of existing ground contamination in some locations and the presence of underground structures and services. Surface water runoff being collected for use on site is not an option as there is no demand for reuse of “grey water” within the site.

4. The Environmental Impact Assessment Process

4.1 The Environmental Impact Assessment

Scoping and Engagement

4.1.1 The EIA assesses the environmental effects on resources (such as the water environment) and receptors (such as human beings) arising as a result of the Proposed Development.

4.1.2 Scoping forms one of the early stages of the EIA process, which sets out the potential environmental aspects that may be significantly impacted by the Proposed Development and which, therefore, would need to be assessed as part of the EIA.

4.1.3 An EIA Scoping Report, outlining the proposed scope and assessment methodology for the environmental aspect studies to be undertaken as part of the EIA, was submitted to Eryri National Park Authority (ENPA) in September 2022. The Scoping Report was accompanied with a request for ENPA to provide its written opinion as to the scope and level of detail of information proposed to be provided within this ES.

4.1.4 In addition, the Applicant has undertaken early engagement with the public, to give local communities the opportunity to be involved in the development of the EIA.

4.2 Assessment process

4.2.1 The environmental effects of the Proposed Development have been assessed in terms of changes to the existing (i.e. current) environment (the baseline). This has been determined by collecting information on existing environmental conditions through surveys, reviews of databases, records and mapping and consultation with stakeholders. This has allowed the identification of sensitive receptors and resources that may be impacted by the Proposed Development.

4.2.2 The approach to the assessment considers the sensitivity, importance or value of an affected resource or receptor' and the predicted change to the environment (i.e. the 'magnitude' or severity of an effect) as a result of the Proposed Development. consideration is then given on whether the Proposed Development would have likely significant environmental effects (either positive or negative).

4.2.3 The aim of the EIA process is for 'significant' effects to be identified, with the goal of reducing any significant adverse effects through the design process or other measures. 'Significant' effects are considered to be those effects that represent key factors or material influences in the decision-making process.

4.2.4 The EIA has taken into consideration all 'in-built' aspects (referred to as embedded measures) which may include design and management measures such as those set out within the Construction and Demolition Environmental Management Plan to limit the extent and magnitude of potential environmental effects.

4.2.5 If significant effects are still likely to occur, consideration has been given as to whether any additional mitigation measures would avoid, offset or reduce the significance of effects.

4.2.6 A conclusion on whether an effect is considered to be significant or not has been reached, taking into account all committed mitigation.

4.3 The Scope of the Environmental Impact Assessment

4.3.1 **Table 4-1** outlines the topics assessed as part of the EIA and the location of the relevant assessments within the ES.

Table 4-1 Topics addressed in the ES

Topics to be assessed under the EIA Regulations (2017)	Chapter scoped in or out of further assessment	Chapter titles in the ES
Human Health	Scoped out and considered in a separate Health Impact Assessment document submitted with the planning application.	Chapter 6: Noise and Vibration, Chapter 7: Geo-environmental Impacts and Surface Water Quality and Chapter 9: Long-term Radiological and Non-radiological impacts all consider impacts on human receptors.
Biodiversity	Scoped in.	Chapter 5: Biodiversity Chapter 9: Long-term Radiological and Non-radiological impacts all consider impacts on non-human receptors. Also considered in a shadow Habitats Regulations Assessment submitted with the planning application.
Land / soil / water	Scoped in.	Chapter 7: Geo-environmental Impacts and Surface Water Quality Chapter 8: Flood Risk and Drainage Chapter 9: Long Term Radiological and Non-Radiological Impacts.
Air	Air quality impacts are scoped out.	N/A (though see Planning Statement submitted with the application and impacts on ecological receptors considered in Chapter 5: Biodiversity of the ES).
Climate	Scoped out. A greenhouse gas assessment was scoped out of the air quality assessment as the demolition works	N/A

	will have negligible emissions.	
Material Assets	Scoped out.	N/A
Population	Socio-economic impacts are scoped out as limited receptors likely to be impacted.	Chapter 6: Noise and Vibration, Chapter 7: Geo-environmental Impacts and Surface Water Quality and Chapter 9: Long-term Radiological and Non-radiological impacts all consider impacts on people.
Cultural heritage	Scoped out.	N/A (though see Planning Statement submitted with the application).
Landscape	Scoped out.	N/A (though see Planning Statement submitted with the application).

5. Biodiversity

5.1 Introduction

5.1.1 This section summarises the assessment methodology and findings for biodiversity, reported within **Chapter 5: Biodiversity** of the **ES**.

5.1.2 To support the assessment a desk study (Ecology) was prepared and the following surveys undertaken to establish any habitats and features with potential to support protected and/or notable conservation priority species: Phase 1 Habitat Survey (including a preliminary bat roost assessment), woodland survey, further bat surveys and aquatic surveys.

5.2 Baseline

5.2.1 Six statutory biodiversity sites of international importance including five Special Areas of Conservation (SAC) and one Special Protection Area (SPA) were identified within 10km of the Application Site boundary during the desk study. The nearest designated site is part of Meirionydd Oakwoods and Bat Sites SAC is located approximately 0.9km from the Trawsfynydd site, which is primarily designated for Lesser Horseshoe bats.

5.2.2 Based on the desk study, potential sensitive biodiversity receptors initially identified included broad-leaved woodland, running water (due to potential contamination of off-site watercourses) and bats.

5.2.3 A total of 10 bat species have been recorded within 5km of the Trawsfynydd Site, however no bat roosts were identified in any of the buildings on site. There is a soprano pipistrelle maternity roost in the pump house, which is approximately 200m from the Application Site boundary. Whilst that roost will not be directly affected by the Proposed Development, there are potential indirect disturbance effects on bat due to increased noise and light levels and the woodland habitat immediately outside the Application Site is used by bats for foraging and commuting.

5.2.4 Broad-leaved woodland was scoped out from further assessment as the woodland was found not to be a Habitat of Principal Importance following surveys. Running water was also scoped out from further assessment following the conclusion within **Chapter 7: Geoenvironmental Impacts and Surface Water Quality** that there will be no significant effects on surface and groundwater quality resulting from the Proposed Development.

5.3 How Biodiversity effects have been assessed

5.3.1 The assessment of effects on biodiversity as a result of the Proposed Development has been undertaken in line with standard industry guidance[6] provided by the Chartered Institute of Ecology and Environmental Management.

[6] Chartered Institute of Ecology and Environmental Management, (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland*. [Online] Available at: https://cieem.net/resource/guidelines-for-ecological-impact-assessment-ecia/ [Accessed 25 July 2024].

5.3.2 The assessment considers the existing ecological features (habitats and species) that could be affected by the Proposed Development. The assessment uses data collected from field surveys, desk surveys and relevant published information.

5.3.3 As set out above, the assessment has considered the effects of the Proposed Development on bats. The assessment considers the importance of the ecological feature based on relevant legislation and policy and relative to the Proposed Development. From this, the assessment concludes the significance of any potential significant effects.

5.4 Assessment of Effects

5.4.1 Of all the environmental disturbances associated with the Proposed Development it was considered that bat species would be potentially vulnerable (i.e. exposed and sensitive) to:

- Disturbance of bat species present within 30m of the Application Site due to increased noise and vibration.
- Disturbance of bat species present within 30m of the Application Site to increased light levels.
- Disturbance of bat species foraging along the margins of the Application Site due to increased noise and vibration.
- Disturbance of bat species foraging along the margins of the Application Site to increased light levels.

5.4.2 Given the proposed mitigation measures and the temporary, low-level change during the works no significant effects for Biodiversity have been identified as a result of the Proposed Development.

6. Noise and Vibration

6.1 Introduction

6.1.1 This section summarises the assessment methodology and findings for noise and vibration, based on **Chapter 6: Noise and Vibration** of the **ES**.

6.1.2 To support the assessment noise monitoring was carried out at the closest residential receptors to the Proposed Development to understand the current conditions in line with BS 7445-1:2003 noise monitoring methodology.

6.2 Baseline

6.2.1 The nearest sensitive human receptor locations are isolated cottages and farmhouses. The nearest residential receptor (Ty Gwyn Farm) is approximately 500m north-east of the Application Site boundary. Three further residential receptors were identified approximately 1km from the Application Site boundary.

6.2.2 The baseline results indicate the Proposed Development is located within an area of low background noise (Category A). The acoustic environment is described as typical of a quiet rural location with livestock present. Noise from the nearby A470 can be heard and a faint constant industrial noise is audible from ongoing decommissioning activities at the Trawsfynydd site and overhead pylons in the area.

6.2.3 The Trawsfynydd site is located in a rural setting and, in general, it is anticipated that there would not be a significant shift in future baseline conditions current baseline.

6.3 How Noise and Vibration effects have been assessed

6.3.1 The assessment of construction and demolition effects has been undertaken in accordance with the ABC method, BS 5228-1[7]. This method compares predicted construction noise levels with noise levels representative of the current environment. These are then compared with a threshold of significance.

6.3.2 Baseline sound levels are defined as Category A, B or C, with Category C experiencing the loudest baseline and A with the lowest. Where predicted construction noise levels are expected to exceed the relevant threshold this indicates a potentially significant effect could occur. Noise emission sources assessed included mobile and static plant to be used for the works on-site. This assessment also uses professional judgement which takes into consideration project-specific factors such as the number of receptors affected and the duration of the impact.

6.4 Assessment of Effects

6.4.1 The Proposed Development is not expected to have any significant effects on noise sensitive receptors .

[7] British Standards Institution (BSI) (2008). BS 5228-1 Code of practice for noise and vibration control on construction and open sites – Part 1. BSI; London, UK.

6.4.2 However, the closest residential receptors at Ty Gwyn Farm will experience slight increases in noise above background noise levels. In line with best practice, screening will be provided to minimise the impact of these increased noise levels to ensure the significance threshold is not exceeded.

6.4.3 If required, night-time works are not expected to result in any significant effects as less equipment is expected to be in use. Should night-time works be required a separate application under Section 61 of the Control of Pollution Act 1974[8] would be made to the Local Authority, addressing the potential for noise impacts and setting out any mitigation measures required to avoid significant effects.

6.4.4 Changes to basic noise levels as a result of noise generated from traffic and transport relating to the Proposed Development are expected to be negligible and therefore not significant.

[8] *Control of Pollution Act (1974).* [Online] Available at: https://www.legislation.gov.uk/ukpga/1974/40/section/61 [Accessed 25 July 2024].

7. Geoenvironmental Impacts and Surface Water Quality

7.1 Introduction

7.1.1 This section summarises the assessment methodology and findings for geoenvironmental impacts and surface water quality, based on **Chapter 7: Geoenvironmental Impacts and Surface Water Quality** of the **ES**.

7.1.2 To support the assessment a desk study review existing data collected[9] on site was undertaken.

7.2 Baseline

7.2.1 The geoenvironment comprises many factors including topography, soils, geology, man-made structures, drainage and surface waters.

7.2.2 There are no statutory designations associated with geological conservation or geological diversity in the locality of the Application Site.

7.2.3 The ground consists of glacial deposits and man-made ('made') ground overlying bedrock. The made ground ranges from large boulders to clay and includes ground that was excavated during the original construction of the Trawsfynydd Power Station. The in-situ bedrock has a low permeability which means it allows groundwater flow only where fractures are present, mainly near its surface. The made ground dominates on the site and has high permeability.

7.2.4 Groundwater flows through made ground travels across the site in an approximate west to east direction, as well as through the Trawsfynydd site's engineered groundwater and surface water drains. Currently groundwater captured by the drains system around the reactor buildings is transported and discharged, together with captured rainwater, via the "diversion culvert sump" into Llyn Trawsfynydd. Otherwise, groundwater that flows through the ground ultimately flows into the Nant Gwylan or the Afon Tafarn-helyg.

7.2.5 Surface water drainage systems at the Trawsfynydd site capture most of the rainfall, with as little as 10 percent entering the groundwater system. In these built-up areas a large portion of surface water is diverted to the surface water drainage system.

7.2.6 There is an area of radioactively contaminated ground on the east side of the ponds complex at depth, which originated with historical pond water leakages. This ground has been subject to borehole investigations over many years. Its presence means that the water captured by the "diversion culvert sump" is radioactively contaminated, and therefore the discharge of that water to Llyn Trawsfynydd is subject to an environmental permit and monitoring (weekly). There is also known oil contamination of the ground within and down-gradient of the former turbine hall footprint. There is also a previously licensed asbestos disposal area to the north of the Trawsfynydd site.

[9] Required as part of existing permitting regimes applicable on-site which includes site-wide hydrogeological interpretation, land quality risk assessment, ongoing groundwater and surface water monitoring and decommissioning technical reviews.

7.2.7 The current short-term risk to human health and groundwater from a source of contamination has been identified as low to very low.

7.2.8 The future baseline may see more frequent and higher-intensity rainfall events. This may increase the water balance across the Trawsfynydd site including flow through shallow groundwater.

7.3 How Geoenvironmental and Water Quality impacts have been assessed

7.3.1 The assessment of construction and demolition effects has been undertaken by considering the change in risk levels from baseline conditions compared with the expected risks during the works undertaken as part of the Proposed Development for the following activities/processes:

- the likelihood and consequences of spills or leaks of contaminating fluids, mainly oils, being used in plant or equipment during the works;
- the consequences of contaminated water running off piles of materials, mainly concrete and masonry rubble, into the ground or storm drains; and
- the consequences of increased movement of the existing radioactive contamination in the ground near the ponds complex if hardstanding that currently limits rainwater ingress directly into the ground is temporarily removed (e.g. to construct the proposed new drains).

7.3.2 The assessment has been based on the evaluation of risks of links being realised between a source of contamination in the land and a receptor. The assessment considers the severity of the consequence and the likelihood of this occurring.

7.4 Assessment of Effects

7.4.1 The Proposed Development is not expected to have any significant effects on the geoenvironment or surface water quality as a result of demolition activities. This is due to:

- the mitigation measures proposed to prevent or limit spills and to control contaminated rainwater run-off from any piles of materials; and
- proposed environmental monitoring to be undertaken during the works.

8. Flood Risk and Drainage

8.1 Introduction

8.1.1 This section summarises the assessment methodology and findings for flood risk and drainage, based on **Chapter 8: Flood Risk and Drainage** of the **ES**.

8.1.2 The baseline conditions have been identified using available sources of information such as Ordnance Survey mapping, and Natural Resource Wales (NRW) Flood Map for Planning[10] and Flood Risk Assessment Wales[11]. A site visit was also undertaken by a hydrologist to understand key features related to flood risk and drainage.

8.2 Baseline

8.2.1 The Trawsfynydd site is in an area of very low risk from fluvial and tidal flooding, with an area of low to high flood risk at the southern edge associated with Llyn Trawsfynydd.

8.2.2 The main areas of flood risk are located in the low-lying areas along minor watercourses adjacent to the Trawsfynydd site. Historic flood events have been reported at the site following very heavy rainfall exceeding the current drainage capacity, leading to an accumulation of surface water in the lowest lying areas, generally the surrounding road network.

8.2.3 The Trawsfynydd site would be affected should the dams retaining Llyn Trawsfynydd fail. However, given the existing inspection/maintenance regime, failure of the dams in a manner that could result in flooding of the Proposed Development is an extremely unlikely event.

8.2.4 The future baseline at the Trawsfynydd site is likely to change due to factors external to the works related to the Proposed Development such as climate change and tree-felling in the wider catchment. As part of the Proposed Development a new drainage system will be implemented, which will marginally improve the existing drainage capacity.

8.3 How Flood Risk and Drainage effects have been assessed

8.3.1 Flood risk was considered from tidal, fluvial, groundwater sources and changes to fluvial flood risk downgradient. Flooding from these sources was scoped out from further assessment due to the site elevation, a lack of deep excavations and the Proposed Development does not propose to store significant volumes of water on site for discharge via storm drains.

8.3.2 The assessment of effects of the Proposed Development on Flood Risk and Drainage has considered the existing sources of flood risk and environmental drainage characteristics at

[10] Natural Resources Wales (no date). *Flood Map for Planning* [online]. Available at: https://flood-map-for-planning.naturalresources.wales/ [Accessed 09 November 2023]
[11] Natural Resources Wales (no date). *Flood Risk Assessment Wales* [online]. Available from: https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtualdirectory/Resources/Config/Default&layerTheme=1 [Accessed 09 November 2023].

the site and considers this against the changes proposed as part of the Proposed Development.

8.4 Assessment of Effects

8.4.1 During the Works Phase there is negligible potential for groundwater and rainwater to enter the ponds complex voids.

8.4.2 During the Post-Works Phase, the new impermeable capping slab will not change the overall extent of low permeability surfaces. The final design of the Proposed Development ensures there will be negligible changes to the existing level of flood risk receptors.

8.4.3 The Proposed Development is not expected to change the current flood risk or drainage pathways at the Trawsfynydd site. Therefore, no significant effects for Flood Risk and Drainage have been identified as a result of the Proposed Development.

9. Long-term Radiological and Non-Radiological Impacts

9.1 Introduction

9.1.1 This section summarises the assessment methodology and findings for long-term radiological and non-radiological impacts, based on **Chapter 9: Long-term Radiological and Non-Radiological Impacts** of the **ES**.

9.1.2 This chapter of the ES considers the potential impacts of the proposed development far in the future, after the Trawsfynydd site has ceased to be licensed and permitted, and not to be subject to any of the regulatory controls in the ways that it is today. It considers the long-term radiological and non-radiological impacts through the movement of pollutants into groundwater and onward transport in the environment. This includes impacts on people, plants and animals, and controlled waters (groundwater, streams etc.).

9.1.3 The chapter also looks at the potential radiation doses to people in the unlikely event that people were to dig into the disposals, and potential doses to people if excavated materials were to be taken away and used elsewhere, as well as potential doses to people who may occupy the land directly on top of the disposals at some point in the future.

9.2 Baseline

9.2.1 Radioactivity is present in the wider environment around the Trawsfynydd site as a consequence of historical and current site operations (e.g. due to permitted radioactive discharges to Llyn Trawsfynydd), radioactivity fall-out due to the Chernobyl nuclear reactor accident, and as a consequence of historical atmospheric weapons testing (before it was banned internationally).

9.2.2 The ponds complex footprint is the location of most of the proposed on-site disposals of radioactive waste. As a result of historic leakages from the cooling ponds, along a substantial portion of its length, the east side of the ponds complex is in contact with radioactively contaminated ground.

9.2.3 Potential radiation doses received by people in the area, because of the past and current operation of Trawsfynydd site, is a very small fraction of the typical radiation exposure experienced by people in the UK arising from natural sources as well as from medical procedures, air travel and so on. The average UK individual annual public exposure to radiation is about 2.7 mSv (including all radiation sources), or 2.8 mSv for Gwynedd (natural background only).

9.3 How Long-term Radiological and Non-Radiological impacts have been assessed

9.3.1 The radiological impacts on people and on non-human plants and animals has been assessed using industry-standard modelling approaches developed for the Applicant over several years in consultation with the UK's environment agencies.

9.3.2 The non-radiological impacts on groundwater have been assessed using standard tiered risk assessment methods, based on UK environment agencies guidance.

9.3.3 The radiological assessments are typical of those undertaken for radioactive waste disposals in the UK or abroad, and in general use conservative (meaning likely to over-estimate the consequences) data and assumptions.

9.4 Potential Impacts

9.4.1 This chapter of the Environmental Statement summarised assessments of the effects of the Proposed Development with respect to long-term radiological and non-radiological impacts via:

- "natural evolution" (meaning the gradual migration of pollutants from the disposals into groundwater and onward transport in the environment), and
- future site occupancy (meaning people residing or working above the disposals for significant periods of time).

Table 9-1 Summary of sections

Aspect	Impacts from the Proposed Disposals
Radiation doses to people	Estimated annual doses peak at a level less than the average individual radiation exposure in the UK.
Site occupancy, e.g. caravan dweller above the Proposed Disposals.	Estimated annual doses are less than the average individual radiation exposure in the UK.
Radiation doses to plants and animals	Estimated doses in the local stream network and in a hypothetical field in the location of the current switching compound are well below any recognised threshold for harm to non-human biota.
Intrusion doses: intruders (excavators), if this were to occur.	The estimated doses to persons carrying out excavations are all far below the regulatory guidance levels for this type of event, for all intrusion events considered.
Intrusion doses: use of radioactive materials removed from the site, if this were to occur.	Some of the estimated doses to persons exposed to radiation if materials were to be taken away from the site for other uses are around the regulatory guidance levels for this type of event. However, the calculations undertaken are likely to exaggerate possible dose levels. As the development takes place and if the assumptions used are more realistic estimates localised decontamination can be undertaken prior to demolition.
Non-radioactive pollutant effects on groundwater.	Previous experience of infilling large voids on the site with concrete demolition arisings indicates that the alkalinity will be within acceptable limits. Hazardous pollutants of interest will be within acceptable limits in groundwater.

10. Cumulative Effects

10.1.1 There are no known committed developments off-site; therefore no significant combined effects on biodiversity, noise and vibration or the geo-environment and surface waters are anticipated.

10.1.2 Decommissioning on the wider Trawsfynydd site is ongoing. Chapter 8 of the ES considers flood risk and drainage issues after completion of the works but prior to achievement of the site final end state. The area of the former ponds complex will have a new concrete cap with associated new drainage for rainwater. The new drains, which are essentially the same as the drains that they will replace in terms of catchment area and drains routing, may be subject to gradual changes in demand over the decades due to climate change (drier summers, wetter winters, and an increase in storminess), which has been taken into account in the design. However, the entire Trawsfynydd site drainage system will be maintained and its effectiveness subject to periodic review over the decades from around 2030 to the achievement of the final site end state.

10.1.3 For the period in-between the end of the Works Phase and achievement of the site final end state, the Trawsfynydd site will be an active decommissioning site, with many works going on including maintenance of the proposed concrete cap over the former ponds complex, and maintenance of the site drainage systems. However, during this intervening period, the Proposed Development will not be having any significant adverse impacts. This is because no processes associated with the Proposed Development that may lead to environmental changes are expected to occur to any significant degree during that period.

10.1.4 By the time the site is released from regulatory control, expected to be after around 2080, all physical works on the Trawsfynydd site will have ceased. For the long-term assessment, after the achievement of the site end state, all relevant likely or potential changes up to and after that time have been considered in the assessments, and the in-combination effects with radioactivity already in the environment due to past site operations and events have been considered.

10.1.5 The long-term assessments undertaken and reported in Chapter 9 of the ES have accounted for the expected site changes. The combined impacts of radioactivity migrating from the disposals, migrating from existing on-site radioactively contaminated land, and migrating from the lake, have been discussed in the ES in the long-term impacts chapter.

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