NRS
Nuclear Restoration Services

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Issue 1

Site Restoration Programme

Trawsfynydd Deposit for Recovery Permit Application

Environmental Risk Assessment

March 2025

Trawsfynydd Deposit for Recovery Permit Application - Environmental Risk Assessment

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Nuclear Restoration Services

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1 Introduction

Nuclear Restoration Services Ltd (NRS) is preparing a bespoke environmental permit application for a deposit for recovery operation within the former Trawsfynydd nuclear power station complex.

The laydown area (the site) extends to 12,260m^2. This includes a level plateau and embankments, which lie to the northern end of a Nuclear Licensed Site (NLS). The NLS consists of a former power station complex which includes two reactors and ancillary buildings that are currently undergoing decommissioning.

The permit application boundary for the Deposit for Recovery activity extends to an area of 12,260 m^2 creating a level plateau of 7,735 m^2 and is in the northern corner of the NLS. The extent of the permit boundary for the site is outlined in green, and the NLS is outlined in blue on location plan Appendix A1.

The Reactor Building Height Reduction (RBHR) Project is due to commence in 2025, with the first wastes being generated towards the end of the year. The total duration of the RBRH project is likely to span approx. 3.5 years, of which the demolition activities are likely to extend over approx. 2 years. Approx. 31,492 tonnes of inert waste will be required to extend and improve the laydown area, under a deposit for recovery permit.

Concrete blocks from the RBHR project will be crushed and screened for use in the recovery operation. Assuming that the mobile crushing and screening plant is operational 8hr day/4-day week and can process approx. 50 tonnes per hour, then the total duration of these activities is approx. 10-12 weeks (approx. 3-4 months). The total crushing duration will be carried out as several discrete campaigns during the two-three year demolition period.

The site is needed to facilitate reactor dismantling and it will be worked in several campaigns during a two-three year period using suitable wastes from the (RBHR) Project which have been crushed and screened on site. Figure 1 in the Non-Technical Summary describes the relationship between the deposit for recovery activity and the stockpiling, crushing and screening activities which will be regulated under a Part B mobile plant permit.

Once processed, the waste will be stockpiled within the permit application boundary until there is sufficient volume of material to create a lift of 100-125mm. Deposited waste will then be compacted within each lift. The specification and process for constructing the laydown area are described in section 5 of the Waste Recovery Plan (WRP).

This Environmental Risk Assessment (ERA) provides an assessment of the risks to the environment and the public from emissions that may be associated with waste operations at the facility. It has been completed in accordance with available guidance on Natural Resources Wales' (NRW's) website and gov.uk.

The aim of the assessment is to identify any significant risks and demonstrate that the risk of pollution or harm will be acceptable by taking the appropriate measures to manage the risks. The guidance requires that all receptors that are near the site and could reasonably be affected by the activities are identified and considered as part of the assessment.

2 Site Setting

The NLS covers 15.5-hectare (ha) within Eryri National Park and the Meirionnydd area of Gwynedd, North Wales LL41 4DT. The site is located 1.5km southwest of the small village of Gellilydan and approx. 3km northwest of the village of Trawsfynydd. It is centred on Grid Reference SH 690 382 and is accessed via the A470 trunk road which lies approx. 400m to the east and forms the main route between Dolgellau to the south and Ffestiniog to the north. The site is accessed via internal metalled roads within the NLS power station complex.

The two reactors and ancillary buildings within the complex were constructed between 1959 and 1964 and commissioned in 1965. The power station generated electricity until 1991, and de-fuelling was completed in 1995. Decommissioning activities commenced in the same year.

The site lies approx. 5 miles (8 km) southeast of Blaenau Ffestiniog, on the northern shore of Llyn Trawsfynydd and with the Afon Tafarn-Helyg running within 100 metres of the eastern boundary. Llyn Trawsfynydd is a reservoir that was created in 1928 to provide water for the Maentwrog hydro-electric power station. From 1965, the lake also provided cooling water for the nuclear power station. The site is located below the maximum level of the Llyn Trawsfynydd reservoir, which was raised to 198m AOD at the time of construction of the power station in 1959. The site is perched at the northern end of a wide valley now largely filled by Llyn Trawsfynydd.

The surrounding area is mountainous and the site has been built on the lower slopes of Craig Gyfynys (275m AOD). The land was reprofiled to create the site and the elevation falls from the lake in the south towards the northeast.

There is a closed/historic asbestos landfill within the site, the existing laydown area has been constructed on top of part of the landfill area. Further information on the nature and extent of the landfill is included within section 2.1 of the Environmental Setting and Site Design (ESSD).

The landscape is generally upland in character. The land surrounding the site includes Llyn Trawsfynydd, as well as semi-natural woodlands, some of which are ancient woodland, broadleaved and coniferous plantation, watercourses, upland habitats, farmland/pasture, and scattered residential properties and farmhouses. The nearest residential property is Ty Gwyn, which is situated approx. 500m to the north-east of the site.

The only vehicular access to the site is from the A470 trunk road. This road, which links Dolgellau (22km south) to Ffestiniog (10km north), runs immediately east of the Llyn Trawsfynydd. The Environmental Setting is illustrated in Appendix A.2.

The immediate surrounding land use:

- Northern boundary - NLS boundary, beyond this lies a small band of woodland and grassland used for grazing.
- Eastern boundary - A small band of woodland separates the application area from the site sewage treatment works and the NLS boundary, beyond which lies the Scottish Power and National Grid substation compound.

- Southern boundary - The main nuclear site (reactors, ponds, storage facilities, and ancillary equipment/buildings) lie to the south of the development site, beyond which is Llyn Trawsfynydd.
- Western boundary - The NLS boundary lies immediately to the west. There is a narrow band of woodland, where a public footpath runs through, and beyond this is the lower slopes of Craig Gyfynys.

3 Environmental Risk Assessment (ERA)

This ERA has been carried out in accordance with the guidance:

Natural Resources Wales / Carry out a risk assessment for a bespoke permit to deposit waste for recovery

Risk assessments for your environmental permit - GOV.UK (www.gov.uk)

The guidance identifies six steps which are needed to carry out a risk assessment:

- Step 1 Identify and consider risks for your site, and the sources of the risks
- Step 2 Identify the receptors (people, animals, property and anything else that could be affected by the hazard) at risk from your site
- Step 3 Identify the possible pathways from the sources of the risks to the receptors
- Step 4 Assess risks relevant to your specific activity and check they're acceptable and can be screened out
- Step 5 State what you'll do to control risks if they're too high
- Step 6 Present your assessment as part of your permit application.

3.1 Identify potential risks relevant to the site (step 1)

Identify whether any of the following risks could occur and what the environmental impact could be:

- any discharge, for example sewage or trade effluent to surface or groundwater
- accidents
- odour (not for standalone water discharge and groundwater activities)
- noise and vibration (not for standalone water discharge and groundwater activities
- uncontrolled or unintended ('fugitive') emissions, for which risks include dust, litter, pests and pollutants that shouldn't be in the discharge
- visible emissions, e.g. smoke or visible plumes
- release of bioaerosols, for example from shredding, screening and turning, or from stack or open point source release such as a biofilter.

In addition, the guidance identifies risks from specific activities for which additional risk assessments must be complete depending on the activity your bespoke permit relates to and where substances are released or discharged into the environment.

The guidance on risk assessment for installations, waste and mining waste operations and landfill sites indicates that the Environmental Setting and Site Design (ESSD) report should be used to consider the additional risks for deposit for recovery activities. Accordingly, an

assessment of those risks is provided within the summary. Conceptual site Model table within the ESSD and are not considered in this ERA.

Risks can be screened out if they are not relevant for the site or by carrying out tests to check whether they're within acceptable limits or environmental standards. If they are, any further assessment of the pollutant is not necessary because the risk to the environment is insignificant.

Risks relevant to the site

The waste arisings to be used in the deposit for recovery activity are inert as defined in the Landfill Directive. There will be no direct discharges to surface or groundwater from the activity. The materials being deposited to extend and improve the laydown area are inert demolition wastes, therefore it is highly unlikely that they would generate landfill gas or bioaerosols and therefore these risks are not considered further. There will also be no visible emissions from the proposed activities.

Therefore, only the following risks are required to be assessed for the recovery operation:

- Odour
- Fugitive Emissions (including dust, mud, litter and pests)
- Accidents
- Noise and vibration.

3.2 Identify potential receptors surrounding the site (step 2)

The receptors include people, animals, property and anything else that could be affected by the proposed activity.

For the purposes of this risk assessment, we are considering receptors within the following distances from the site's EP boundary (see Appendix A1):

2km radius for any Sites of Special Scientific Interest

1km radius for other potentially sensitive receptors of ecological importance along with features such as sites of cultural and natural heritage.

500m radius for all other potentially sensitive receptors (for example, residential, commercial, industrial, agricultural and surface water receptors).

Sensitive receptors of ecological importance

The key environmental/ecological receptors include several European designated sites[1] which lie within 2 km of the site:

- Migneint-Arenig-Ddualllt which is a SSSI, and SAC and a special protection area (SPA),

[1] Special Areas of Conservation (SAC) | DataMapWales
Sites of Special Scientific Interest (SSSI) | DataMapWales
Special Protection Areas (SPA) | DataMapWales

- Eryri National Park and its network of nationally and internationally important wildlife sites
- Coed Y Rhygen SSSI which is part of the wider network of sites comprising Meirionnydd Oakwoods Special Area of Conservation (SAC). The site is also a designated National Nature Reserve (NNR). It is an important area for birds and is located on the western shore of Llyn Trawsfynydd
- Coedydd Dyffryn Ffestiniog Deheuol SSSI which extends along the banks of the Afon Prysor down gradient of Llyn Trawsfynydd
- Ceunant Llennyrch (NNR) is a deep, wooded gorge with cliffs. It has a mild but wet climate with spray from waterfalls all year round. An oak woodland which collectively forms a dense canopy and thriving environment for damp-loving plants.

There are no Local Nature Reserves or Local Wildlife Sites within 1km of the application boundary. There is a Plantation on a former Ancient Woodland Site (PAWS), reference 47395[2], immediately adjacent to the western boundary of the application site. The wooded areas immediately adjacent to the DfR area are also likely to be considered a habitat of principal importance for the conservation of biodiversity as listed on Section 7 of the Environment (Wales) Act 2016 (Semi-natural broadleaved woodland)[3].

Agricultural

There are a variety of land uses in the area around the Trawsfynydd site, including forestry on Craig Gyfynys, marginal grassland in the region of the lake and site (grazed mainly by sheep) and dairy farming based at Ty Gwyn. Ty Gwyn is the closest farm and residential property which lies approx. 500m to the northeast of the site.

Commercial and Industrial

There are Scottish Power and National Grid electrical substations within 100m to the east of the site.

The nearest commercial properties are the Canolfan Prysor Centre which is an outdoor activity centre including a small number of meeting rooms and a café. It is approx 400m to the east of the site and adjacent to the A470.

Local Transport Network

The site lies approx 400m to the east of the A470 trunk road. There is also a minor road and public footpath approx 100m to the west of the site.

Cultural and National Heritage

The site is located within a Registered Historic Landscape, the Trawsfynydd Basin and Cwm Pry. There is an Enclosed Hut Group at Nurse Cae Du[4] 600m north of the site, and a medieval motte and ritual/funery area at Castell Tomen y Mur approx 1km east of the site.

[2] URL: Interactive Map Viewer, accessed 28 January 2025
[3] Arup (November 2023) Preliminary Ecological Appraisal
[4] Scheduled Monuments | DataMapWales

There are listed buildings[5], Coed Cae-du Farmhouse situated approx 850m to the southeast of the site and Creigiau Duon Farmhouse and Cartshed situated approx 800m to the northeast of the site. Utica (Welsh Congregational Chapel) lies approx. 800m to the northeast of the site.

Recreational

The closest recreational receptor is Llyn Trawsfynydd which is an artificial lake 5 miles long which is approx.100m to the south of the site. There are a range of activities taking place in and around the lake including fishing, walking, cycling and canoeing.

Residential

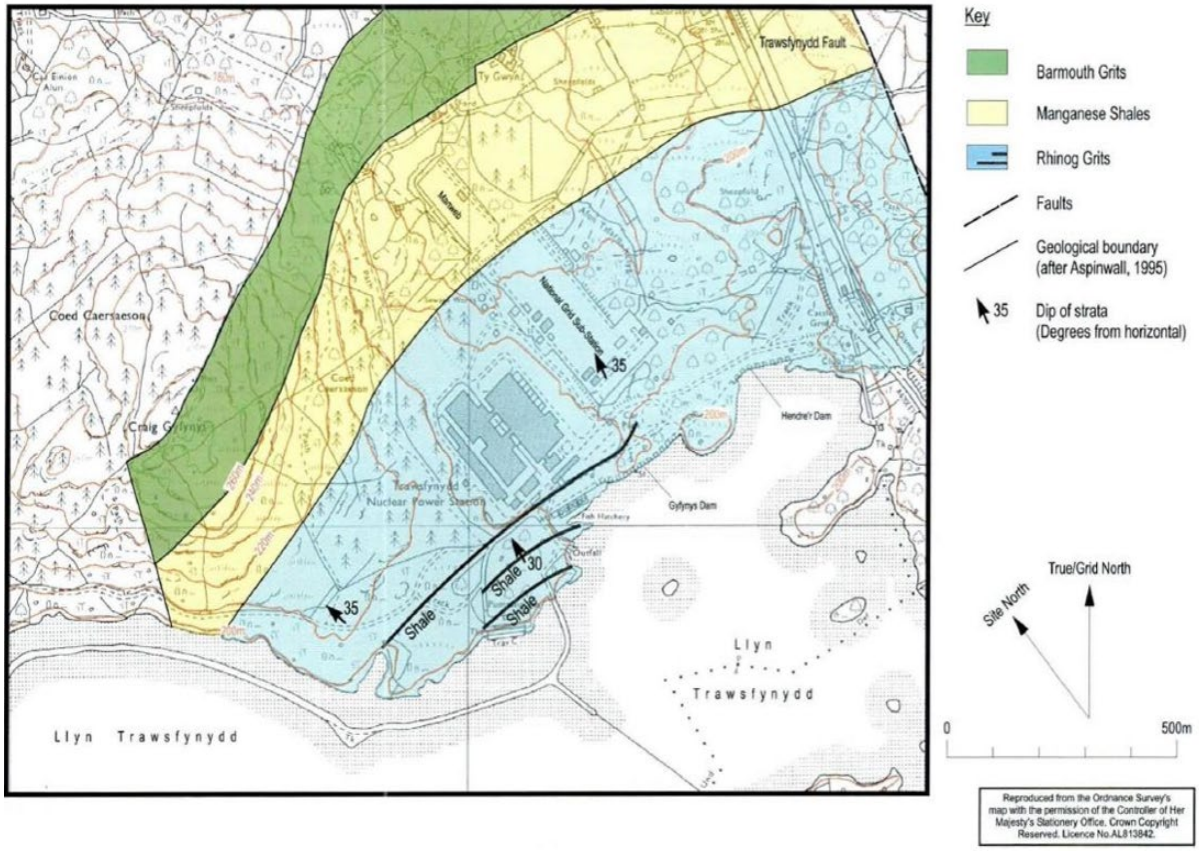
The only residential property within 500m of the site is the farm at Ty Gwyn which is located to the northeast.

Woodland and Open Land

The site is situated within Eryri National Park with both woodland and open land bordering the site. The woodland is predominantly described as acid oak woodland

Geology

The bedrock in the area around the Trawsfynydd site consists of a layered sedimentary sequence of Cambrian age (approximately 600 million years old). The bedrock geological map is shown in Figure 1.



[5] Listed Buildings | DataMapWales

Figure 1 Bedrock Geology

Most of the NLS was levelled off during construction and the superficial deposits (Quaternary Glacial Till) overlying the Rhinog Grits Formation in the excavated area of the power station, sub-stations, cooling water culverts and dams were removed. Where present, the superficial deposits extend, on average, to a depth of 4 m.

The drift deposits beyond the power station boundary to the north and east are classified as Secondary (undifferentiated) aquifers. Groundwater flow at the site is described in terms of a deep and shallow flow system.

The deep flow system comprises the Rhinog Grits Formation at depth with low matrix porosity and permeability and where flow is assumed to be predominantly via fractures. The fractures and joints are largely subvertical and are occasionally filled with clay. The major fault zone in the vicinity of the site is the Trawsfynydd Fault, which is one of several larger north-north-west trending faults in the wider region[6]. These faults commonly occur in association with doleritic dykes of Ordovician age. None of these larger structural or intrusive features are known to extend under the Trawsfynydd site.

The shallow flow system comprises the higher permeability superficial deposits and/or rockfill where flow is assumed to occur through the porous matrix. The general groundwater flow direction in the shallow system is from the west and the south towards the north-east.

Within the site, there are local influences on the shallow groundwater flow system due to below ground engineered structures and the groundwater drainage system present around the power station building basements which locally control the groundwater table. There is the potential for upward flow of groundwater in the bedrock in the vicinity of the site due to the topographic influence of Craig Gyfynys.

Shallow groundwater provides baseflow to the watercourses in the vicinity of the site, including the Afon Tafarn-helyg and its tributaries. NRW online mapping[7] indicates that the site is not within or close to a Source Protection Zone (SPZ). There are no private abstractions of surface water or groundwater within 2km of the site.

The thickness of the made ground backfill varies across the power station area (0 to >19.5 m) and is typically made up of large boulders and cobbles of the Rhinog Grits Formation with a sandy clayey matrix.

The nature of the rock fill varies greatly. Figure 2 shows very large angular boulders (presumably blasted/excavated bedrock material) placed around column bases of the northern end of the eastern Goliath Track. Materials encountered in boreholes and other excavations into the fill/made ground have been observed to range from large boulders to clayey material, occasionally accompanied by waste construction materials such as timber.

Soils in the Afon Tafarn-helyg catchment are stagnogley and brown podzolic soils. Soil properties vary across the catchment, with slowly permeable, seasonally wet, acid loamy and clayey soils mapped for the location of the site and much of the catchment (green in Figure 3).

[6] Smith, B. and Neville George, T. (1961), British Regional Geology - North Wales, (3rd Edition), HMSO, 96pp.
[7] Source Protection Zones (SPZ) Merged | DataMapWales

More freely draining acid loamy soils are mapped on the higher ground to the east and west of the site (brown in Figure 3). Peat and acid peaty soils (purple and yellow in Figure 3) are mapped west of Llyn Trawsfynydd[8].

Figure 2 Showing the construction of the power station

[8] Trawsfynydd site Characteristics Summary, Galson Sciences July 2018

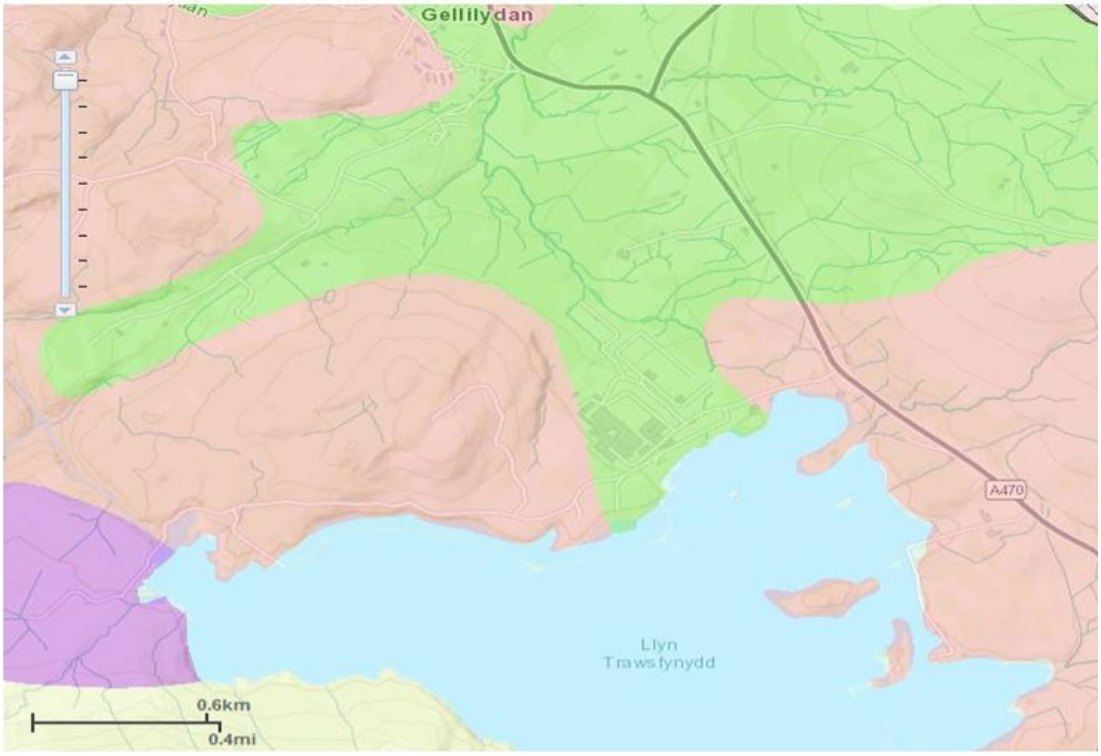


Figure 3 Soil types in the vicinity of the site (descriptions are within the text)

Hydrology

The site is in the catchment of the Afon Tafarn-helyg (Figure 4). Llyn Trawsfynydd adjoins the site, but the reservoir is within the catchment of the Afon Prysor, which enters the reservoir at its southeastern corner and leaves via the dam for Maentwrog Power Station, entering the Afon Dwyryd downstream of Maentwrog Power Station.

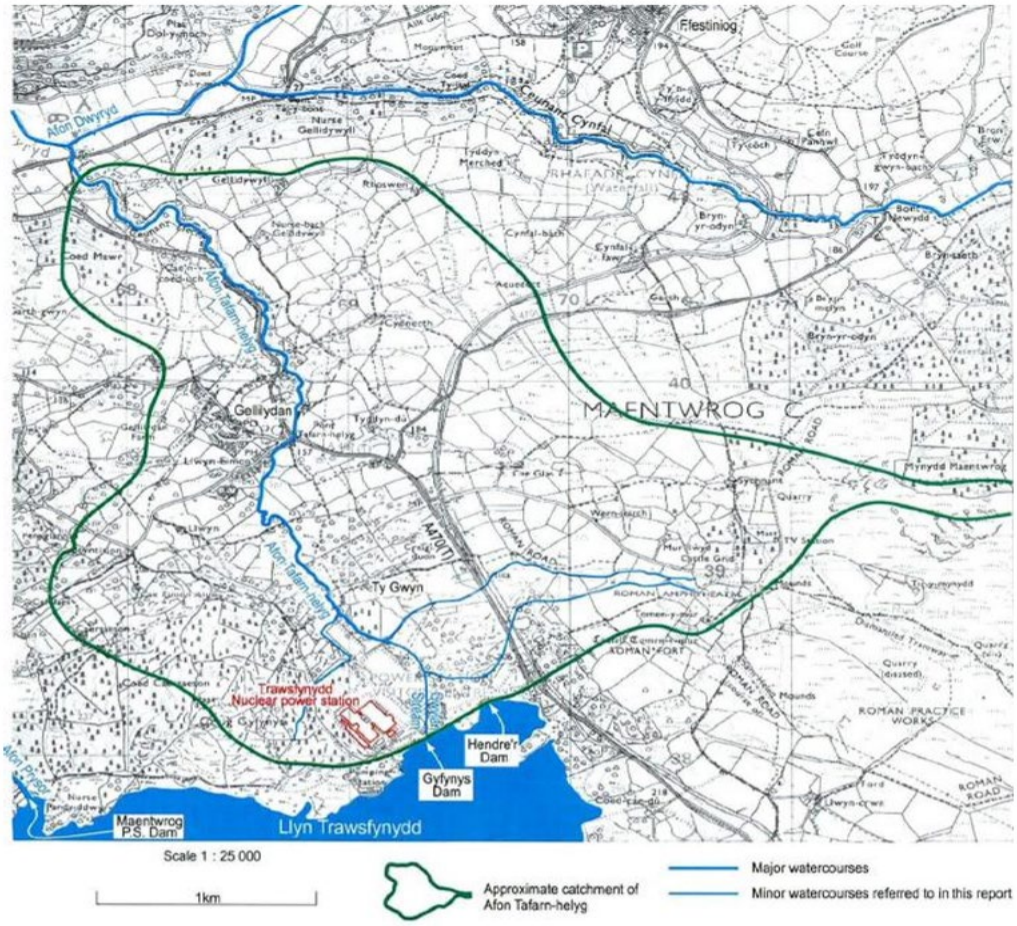


Figure 4 – Main hydrological features around the site

There are two water-courses immediately down-slope of the site:

- The 'Gwylan Stream', which issues from the Gyfynys Dam and feeds into the largest remaining headwater of the Afon Tafarn-helyg.
- An un-named stream that runs off the slopes of Craig Gyfynys and is diverted around the south-west and north-west sides of the 132kV sub-station before joining the Afon Tafarn-helyg.

The Gwylan Stream is mostly an engineered channel which flows below ground along part of its course. A valved pipe located within the Gyfynys Dam regulates flow into this stream, to maintain flows in the Afon Tafarn-helyg.

When the Power Station was constructed, the main storm water drainage system discharged directly to the Gwylan Stream, but it is now pumped up to the lake via the 'Diversion Culvert' pipeline indicatively shown in Figure 5.

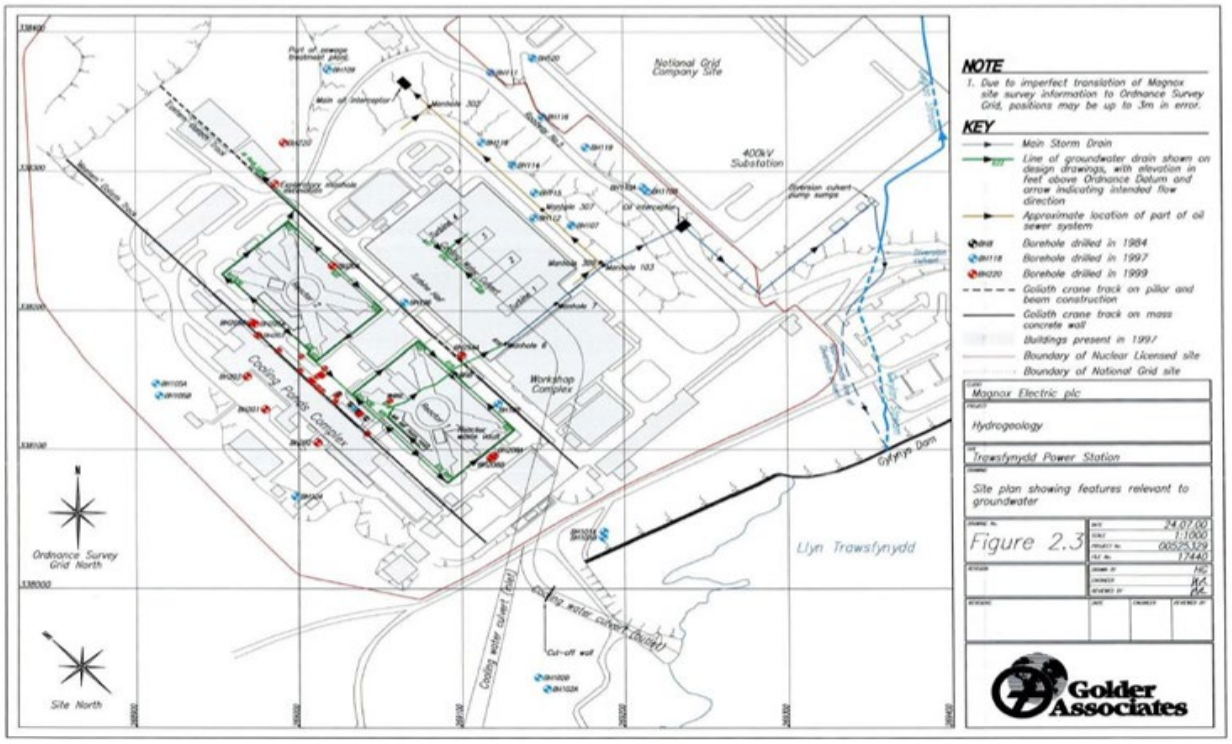


Figure 5 – Site location showing major hydrological features

The mean flow from the main Storm Drain into the Diversion Culvert pump sumps is about 4 litres/second (averaged over several years). This includes groundwater from the groundwater drains around the Reactor buildings (of the order of 1.5 litres/second, based on limited measurements[9]).

Flood Zone

There have been a few incidences of historical flooding within the power station complex and nearby village of Gellilydan which can be summarised as follows:

- Flooding in February 2004 of the lower area of the sewage works during a period of extreme wet weather. Major remedial work was undertaken to the power station complex's surface water drains (which also intercept shallow groundwater) which has successfully prevented further flooding.
- Flooding on several occasions following heavy rainfall slightly north-west of the ponds building within the power station complex. During flooding, water was observed to flow vigorously from the slope above the roadway. Flooding of this area has been less severe since Gwynedd Council improved drainage along the National Cycle Path Route 8, which is uphill from the nuclear licensed site.
- Flooding at property known as Tafarn-helyg, Gellilydan, in early 1998. The property lies upstream of the bridge crossing of the Afon Tafarn-helyg, approximately 1.4 km north (downstream) of the site. A tributary of the Afon Tafarn-helyg flows off Mynydd Maentwrog, crosses the property in a culvert and then discharges into Afon Tafarn-helyg. A study by Golder (2002) indicated that flooding at the property is unlikely to

[9] Golder Associates (2000), Groundwater Flow and Contamination Investigation, Trawsfynydd Power Station: Hydrogeological Interpretation, Contractor Document Number 00525329/1, Version A.0, September 2000.

have been caused by flooding from the Afon Tafarn-helyg (the catchment within which the power station complex is located) but instead by flooding from its tributary flowing off Mynydd Maentwrog.

Flood Risk from Rivers mapped layer[10] shows that the site is not within an area with risk of flooding from the sea or rivers. A small part of the existing laydown area is within an area described as having a high risk of flooding (each year this area has a chance of flooding of greater than 1 in 30 (3.3%)) from surface water and small watercourses[11].

However, it should be noted that this mapping uses broad-scale topographic data that will not pick up on minor local topographic detail such as kerbs, gullies and minor falls as well as not accounting for the site drainage system.

For this reason, the mapping should be taken as a guide to broad patterns of flood risk rather than confirmation of specific extents and levels of risk. Relatively recent improvements have been made to the drainage system to reduce the likelihood of further flooding. In addition, raising the plateau level of the laydown area will help to decrease the risk of flooding in the future and the increased porosity of the fill material being used to raise and extend the laydown area, will enable it to be free draining.

Hydrogeology

A more comprehensive description of the hydrogeology of the area is presented in Section 2.2.3 of the ESSD.

Upstream of the site, the hydrogeology is determined in part by the presence of Llyn Trawsfynydd. The hydrogeology of the Afon Tafarn-helyg catchment downstream of the site is relevant to the behaviour of water in the catchment.

Changes in climate are anticipated, and with this the potential increases in extreme rain rainfall events, which may affect the annual discharge from the catchment, and seasonal variations in discharge. However, no changes of sufficient magnitude to affect the overall hydrology or hydrogeology of the catchment are anticipated over the timescales relevant to the lifetime of the site.

Several series of boreholes have been drilled within the power station boundary throughout the construction, operation and decommissioning periods. These have been monitored to understand the response of the groundwater system to changes in precipitation and to generate groundwater contour maps. Groundwater heads in individual boreholes show fluctuations over days to weeks in response to episodes of drier and wetter weather. The response differs between boreholes, depending on the position of the water table in relation to rock head and the permeability of the bed rock.

Groundwater Vulnerability

The BGS mapping layer of groundwater vulnerability[12] shows that the Rhinog Grits Formation is classified as a Secondary A aquifer (permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers).

[10] Flood and Coastal Erosion Risk Maps
[11] M/EF/TRA/REP/0009/21 Surface Water and Flood Risk Baseline Appraisal, Wood July 2021
[12] Groundwater vulnerability data - British Geological Survey

The Hafotty Formation is classified as a Secondary B aquifer (predominantly lower permeability strata which may in part be able to store and yield limited amounts of groundwater by virtue of localised features such as fissures, thin permeable horizons and weathering).

Water Abstractions

There are several water abstraction licences held by NRS associated with activities within the power station.

There is also a licensed abstraction held by Trawsfynydd Lake Management Committee using up to 113 m^3 water for a fish farm throughflow which is approx 920m to the south of the site. The Pysgotfa Prysor Fishery at Nant Tyddyn-Yr-Yn has a licensed abstraction and is approx 950m to the southeast of the site. Except for the NRS licences, there are no recorded abstractions within 500m of the site.

Discharge consent

There are several discharge consents held by NRS for activities within the power station.

There is a discharge consent for the Prysor Hatchery Fish Farm which is approx 800m to the southeast of the site. The Welsh Office – Highways Group also have a discharge consent from the A470 trunk road which is approx 850m to the northeast of the site. Except for the NRS licences, there are no recorded discharge consents within 500m of the site.

Protected Species

There are 25 bird species present within 50m of the site that are protected under the relevant Biodiversity Action Plan, including bullfinch, cuckoo and dunnock[13]. There have been occasional sightings of badgers, bats and deer on land adjacent to the site.

Registered Parks and Gardens

There are no Registered Parks and Gardens are situated within 1km of the site.

[13] Biodiversity Action Plan Ref

3.3 Summary of receptors (step 3)

Local Receptors within 500m of the Site are identified in Table 1, along with heritage and cultural receptors within 1km and receptors with ecological significance within 2km.

Table 1 – Summary of local receptors

Name	Type	Direction from site	Approx distance from site boundary (m)
Local receptors within 500m of the site boundary			
Ty Gwyn	Residential	Northeast	500
Footpaths/trails	Public access	Northwest and south	100
Canolfan Prysor Centre (café and meeting room	Recreational	Southeast	400
A470	Road Network	East	400
Agricultural Land	Agriculture	North and East	50
Surface water drains	Surface water	West to East	50
Scottish Power and National Grid Substation	Industrial	East	100
Woodlands	Priority Woodlands	West, North and East	50
Heritage, cultural and ecological receptors within 1000m of the site boundary			
Eryri National Park	Ecological	All directions	0
Enclosed Hut Group at Nurse Cae Du	Scheduled Ancient Monument	North	600
Creigiau duon	Listed Building – farmhouse and cartshed	North	800
Coed Cae-du	Listed Building - farmhouse	Southeast	850
Tomen y Mur	Scheduled Ancient Monument	East	1,000
Birds	Protected species	In Woodland and habitats surrounding the site	50
Bats	Protected species	In Woodland and habitats surrounding the site	50
Badgers	Protected species	In Woodland and habitats surrounding the site	50
Deer	Protected species	In Woodland and habitats surrounding the site	50

Vegetation	Protected species	In Woodland and habitats surrounding the site	50
Sensitive ecological sites (including European sites) within 2000m of the site boundary			
Migneint-Arenig-Dduallt	SSSI, SAC and SPA	East	1,900
Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites	SAC	Northeast	1,200
Coed Y Rhygen - Meirionnydd Oakwoods	SSSI, SAC and NNR	Southwest	1,200
Coedydd De Dyffryn Maentwrog	SSSI, SAC SPA	West and North	1,500

The surface water drainage system drains the site plateau falling west to east. The discharge is then via the discharge culvert (figure 6). The drainage system runs through the site but does not serve the north end where the processing, stockpiling and deposit for recovery activity will occur. Road gulleys feed to the system on the site roadways (the majority of these are not present in the vicinity of the permit application boundary, except for a small section at the very southern tip of the permit boundary.)

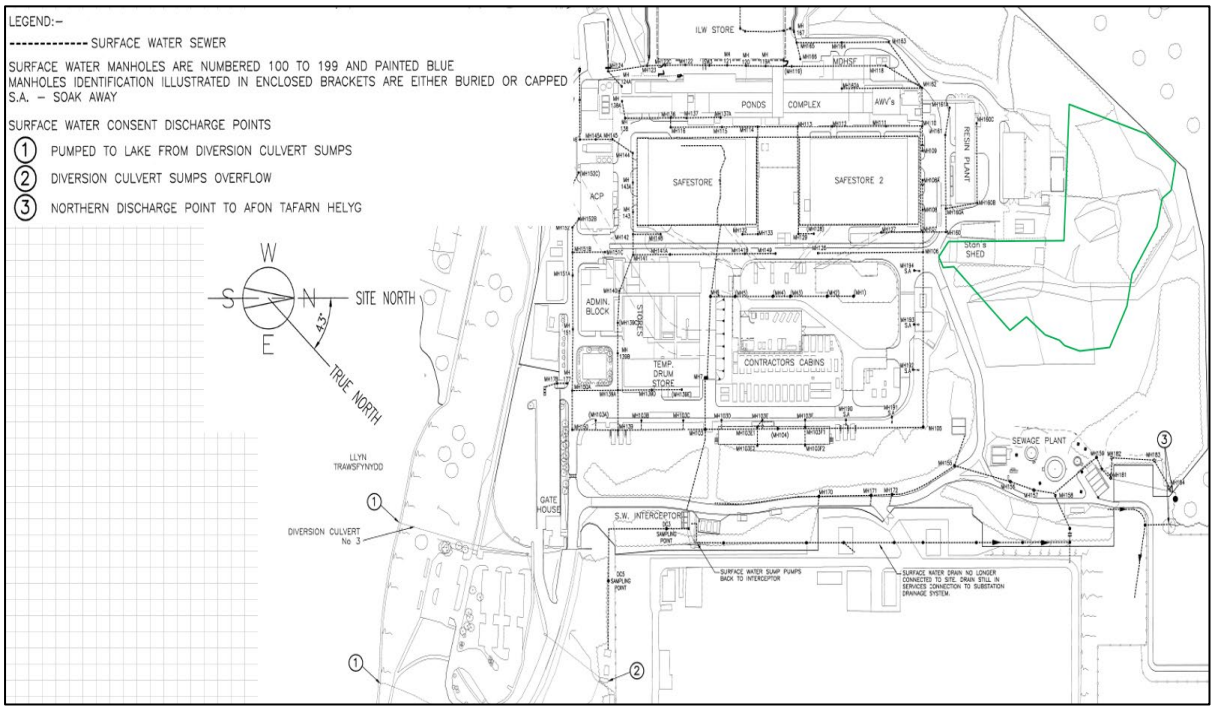


Figure 6 – Site drainage plan (DfR permit boundary is shown in green)

3.4 Potential risk to receptors based (step 4)

The following tables 2-5, present a summary of the potential risks to receptors based on an assessment of the hazard and the pathway (Step 4) for each of the following:

- Odour;
- Noise and Vibrations;
- Fugitive Emissions (including dust, mud, litter and pests); and
- Accidents.

In regards risks to ecological receptors, as part of the planning application a Preliminary Ecological Appraisal (PEA) was undertaken, which can be found in **Appendix A6**. This identified habitats which can support proximity within the site and the Ancient Woodland c.20m west of the DfR area. The PEA found that the scope of works are not expected to cause adverse to any SSSIs within the surrounding area (and it should be noted proximity to European Sites and SSSIs are within standard rules criteria), however on site/adjacent woodland required further assessment and surveys for potential bat roost features (PRFs) was recommended. This was subsequently undertaken on 7th August 2024 and the following conclusions reached:

- No mature trees are to be removed as a result of the proposals.
- There are no PRFs in any of the trees within the 30 meters radius survey area and as a result
- there is no potential for disturbance of bats or bat roosts as a result of noise/dust/vibrations during the course of the works.
- Due to the fact that no mature trees are to be removed, there will be no physical habitat fragmentation.
- Due to the fact that there will be no nighttime working, there will be no requirement for illumination of the working area and therefore no habitat fragmentation due to temporary lighting.
- There will be no permanent illumination installed which could result in habitat fragmentation.

The report concluded the proposed works were as having ‘No’ potential to have any negative impact on bat roosts or habitat connectivity and that no further bat survey work or mitigation measures will therefore be required. The full report is available in **Appendix A7**.

The PEA also recommended the following mitigation measures in respect of Protected Species/Habitats:

- Breeding birds: Pre-works checks for any works disturbing breeding bird habitat; any vegetation clearance to be supervised by a suitably qualified ecologist.
- Riparian mammals: Pre-works checks; otter survey up to 10 weeks prior to works.
- Badger: Pre-works checks; badger survey up to 10 weeks prior to works.

- Dormouse: Pre-works checks immediately prior to works and during vegetation clearance. Any vegetation clearance to be supervised by a SQE.
- Reptiles: Pre-works checks immediately prior to works and during vegetation clearance. Any vegetation/hibernacula clearance to be supervised by a suitably qualified ecologist (SQE).
- Invasive non-native species (INNS): Removal or avoidance of INNS present in site has been recommended. Any vegetation clearance to be supervised by a SQE.

Appropriate measures have been incorporated in the Construction Environment Management Plan (CEMP) which can be found in **Appendix 4** of the **EMS Summary**.

In addition to the measures listed above (which were identified in support of the planning application), a **Dust Management Plan** accompanies this application which will also ensure risks to sensitive receptors from dust are minimised.

The risks to sensitive ecological receptors with mitigation measures has therefore been determined to be low.

Table 2 – Odour risk assessment and mitigation plan

What activities can harm and what could be harmed			**Managing the risk**	**Assessing the risk**		
Hazard	**Receptor**	**Pathway**		**Probability of exposure**	**Consequences**	**Overall risk**
What has the potential to cause harm?	What needs protecting from harm?	How can the hazard get to the receptor?	What measures can reduce the risk? And who is responsible?	How likely is the contact?	What harm could be caused?	What risk remains after mitigation?
Odour from deposit of non-confirming waste	Sensitive receptors in Table 1 including residential and recreational receptors.	Air	Only uncontaminated inert materials sourced from the site will be used for recovery. No wastes will be imported, and the permitted waste types are non-odorous. Strict waste acceptance procedures will include but not limited to basic characterisation (WM3 assessment) and visual inspection. Site operatives will conduct daily inspection of the perimeter to identify any unacceptable odours. Site personnel will conduct informal olfactory monitoring throughout the working day and will report any odours they notice. If any odours are identified the cause will be investigated and odorous materials will be isolated in a sealed container before removal offsite to a suitably licensed facility. The results of inspections and investigations in response to complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing Risk Management measures in accordance with operational and management procedures	Low	Odour nuisance and loss of amenity	Low

Table 3 – Noise and vibration risk assessment and mitigation plan

What activities can harm and what could be harmed			**Managing the risk**	**Assessing the risk**		
Hazard	**Receptor**	**Pathway**		**Probability of exposure**	**Consequences**	**Overall risk**
What has the potential to cause harm?	What needs protecting from harm?	How can the hazard get to the receptor?	What measures can reduce the risk? And who is responsible?	How likely is the contact?	What harm could be caused?	What risk remains after mitigation?
Engine noise from vehicles moving in the recovery activity area	Sensitive receptors listed in Table 1 including residential, agricultural recreational and ecological receptors	Air	The following measures will be employed to minimise emissions of noise as far as possible for the sensitive receptors identified in Table 1: • Site operations will be restricted to 06:45 – 18:00 Mon-Fri as specified within the associated planning permission to minimise the impact of noise on receptors • Speed limits will be implemented for vehicles using the Site • All contractors will be made aware of NRS' commitment to minimising noise emissions at the site • Site surfacing will be maintained to minimise emissions of noise due to uneven and poor surfacing If any noise levels exceeding those within the planning permission are identified, the cause will be investigated. If a solution cannot be found within an appropriate timeframe, operations will cease (if required), until a solution can be implemented. Auditory inspections will be carried out daily and in response to complaints. A record of the inspection findings will be made in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low – vehicles only operating during weekday daylight hours and low vehicle numbers due to nature and scale of recovery activity	Noise disturbance	Low
Noise from on-site plant	Sensitive receptors	Air	The following measures will be employed to minimise emissions of noise as far as possible for the sensitive receptors identified in Table 1:	Low	Noise disturbance	Low

	listed in Table 1 including residential, agricultural recreational and ecological receptors		• Site operations will be 06:45 – 18:00 Mon-Fri and in accordance with conditions in the associated planning permission to minimise the impact of noise on receptors • All plant, equipment and machinery used in connection with the operation and maintenance of the site shall be equipped with effective silencing equipment or sound proofing equipment to the standard of design set out in the manufacturer's specification • All mobile plant used onsite will be fitted with and use the types of reversing alarms specified in the planning permission • All vehicles, plant and equipment will be maintained and operated in accordance with the manufacturer's recommendations to reduce unnecessary noise from engines or bodywork • Noise levels will be taken into consideration during the selection of site equipment, with quieter models being utilised where this is practical and economically viable • Enforcement of Site speed limits • Maintain site roads in a state of good repair to reduce noise from the passage of empty vehicles • Engines to be switched off when not in use • Deposit of material will not be undertaken from height to reduce noise / vibration. If any noise levels exceeding those within the planning permission are identified, the cause will be investigated. If a solution cannot be found within an appropriate timeframe, operations will cease (if required), until a solution can be implemented. Auditory inspections will be carried out daily and in response to complaints. A record of the inspection findings will be made in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			

Table 4 – Fugitive emissions risk assessment and mitigation plan

What activities can harm and what could be harmed			**Managing the risk**	**Assessing the risk**		
Hazard	**Receptor**	**Pathway**		**Probability of exposure**	**Consequences**	**Overall risk**
What has the potential to cause harm?	What needs protecting from harm?	How can the hazard get to the receptor?	What measures can reduce the risk? And who is responsible?	How likely is the contact?	What harm could be caused?	What risk remains after mitigation?
To Air						
Dust from emplacement of materials	Sensitive receptors listed in Table 1 including residential, agricultural recreational and ecological receptors	Air	The site will be operated in accordance with an approved Dust Management Plan. The following measures will be used to prevent mobilisation of dust from the emplacement of materials: • Monitoring of weather forecasts • Cessation of deposition of dusty waste during dry or windy weather conditions • Use of bowsers or sprays in dry conditions and where necessary • Drop heights will be minimised when depositing inert materials. • All contractors will be made aware of NRS' commitment to minimising dust and emissions at the site Visual inspections will be carried out daily and in response to complaints. The result of any inspections or investigations will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational management procedures.	Low – operational measures, distance and location of receptors. Intermittent activity due to nature and scale of recovery operation	Nuisance, harm to human health, and harm to ecological receptors	Low

Dust from vehicle movements	Sensitive receptors listed in Table 1 including residential, agricultural recreational and ecological receptors	Air	The site will be operated in accordance with an approved Dust Management Plan. The following measures will be used to prevent mobilisation of dust from vehicle movements: • Good housekeeping of roads and surfaces • Enforcement of a speed limit to prevent mobilisation of dust • Monitoring of weather forecasts • Cessation of deposition of dusty waste during dry or windy weather conditions if all other mitigation has proved unsuccessful • Use of bowsers or sprays in dry conditions and where necessary • All contractors will be made aware of NRS' commitment to minimising noise emissions at the site Visual inspections will be carried out daily and in response to complaints. The result of any inspections or investigations because of complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low – operational measures, distance and location of receptors. Intermittent activity due to nature and scale of recovery operation	Nuisance, harm to human health, and harm to ecological receptors	Low
Presence of ubiquitous asbestos fibres	Sensitive receptors listed in Table 1 including residential, agricultural recreational and ecological receptors	Air	Due to the nature and age of the reactor buildings, ubiquitous asbestos fibres will be present. The concentration of these fibres has been assessed as negligible (see below). The following measures will be used to minimise the transfer and mobilisation of fibres during construction and use of the laydown area: • RHBR project asbestos survey and strip in accordance with Control of Asbestos Regulations (2012)	Low	Harm to human health and animal receptors	Low

			• Bagwash[14] has been detected within the joint work of the structural blocks. This has been risk assessed and sampled (Appendix A3) • Waste arising from the RBHR project will be characterised and visual inspection will ensure that it is free from ACM. • A permeable barrier (HPS 3.3 or equal approved) will be placed during the construction of the laydown above the crushed concrete and capped with segregated at source non-cementitious masonry. The capping layer shall be of 150mm depth sized 40mm to dust in accordance with the Specification for Highway Works to prevent the potential mobilisation of any ubiquitous asbestos fibres by vehicles driving on the laydown area. Site personnel will carry out visual inspections to include the presence of asbestos. Should asbestos be detected then work will be suspended until an investigation and risk assessment has been carried out. The result of any inspections or investigations will be recorded in the Site Diary along with any necessary remedial actions. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			

[14] A bagwash product, containing low concentrations of chrysotile fibres, was used to remove imperfections in the reinforced concrete superstructure. The material which is bound within a matrix and not prone to fibre release, is not discernible from the reinforced concrete. Removal is not reasonably practicable. It is possible that the presence of bagwash will contribute to ubiquitous levels of asbestos in the crushed material, however calculations by NRS confirm that concentrations will be several orders of magnitude below hazardous waste limits (i.e. the crushed materials will be non-hazardous). Further information is provided in Appendix 3. Bagwash has not been identified on reinforced concrete cladding panels or non-cementitous masonry. To mitigate the potential mobilisation of ubiquitous asbestos fibres, a capping layer formed from crushed non-cementitious masonry and cladding panels (i.e. materials which do not contain bagwash) will be utilised. This will be delineated by a geotextile membrane separating the upper capping layer from the underlying fill material.

To Water						
Contaminated site run-off	Sensitive receptors listed in Table 1 including road network, residential, agricultural and recreational Groundwater	Land	The following measures will be used to prevent contaminated Site run off: • Strict waste acceptance procedures will ensure that no unauthorised materials are accepted into the permitted area. • Only uncontaminated inert materials from RBHR project will be deposited. • Accordingly, contaminated leachate and run-off will not be generated because of waste accepted • Vehicles will benefit from a schedule of preventative maintenance to prevent leaks • Spill kits will be provided on site appropriate absorbent materials for use in the event of a spillage • No fuels or chemicals will be stored on Site. The site's operational areas will be inspected twice-daily for signs of spillages. The result of any inspections or investigations because of complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Contamination	Low
Percolation of contaminated liquid into groundwater	Groundwater	Land	• Strict waste acceptance procedures will ensure that no unauthorised materials are accepted into the permitted area. • Only uncontaminated inert materials from the RBHR project will be stockpiled and deposited in the recovery area. • Alkaline (high pH) run-off when rainwater meets freshly crushed concrete will be reduced by carbonation. Estimated to take place at a rate of between 5-16mm/year[15].	Low	Contamination	Low

[15] hal.science/hal-03797104/document

			• Alkaline run-off generated during the first few years following placement will be attenuated by organic soils and made ground before it reaches the groundwater[16]. • Groundwater quality monitoring will be conducted regularly using monitoring boreholes as part of the ongoing Land Quality programme. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Pests						
Birds, insects and animals	Sensitive receptors listed in Table 1 including residential, agricultural, ecological and recreational receptors	Air, water and land	The inert waste types accepted at the Site are unlikely to attract birds, pests and insects. Strict waste acceptance procedures will ensure that no unauthorised wastes are accepted. If pests are identified at the site appropriate remedial action will be taken. Investigations will be conducted daily by competent site personnel of the operational areas to identify birds, animals and insects. To ensure that if identified, that any protected species are not disturbed. In such circumstances specialist ecological advisor will be employed. Whereas if pests are identified then a specialist pest control contractor will be employed (where necessary) to relocate the pests. The result of any inspections or investigations because of complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Nuisance and potential risk to health	Low

[16] pH attenuation by soils underlying recycled concrete aggregate road base - ScienceDirect

Mud/litter						
Litter from waste	Sensitive receptors listed in Table 1 including road network, industrial, residential, agricultural, ecological and recreational receptors	Air, water and land	Waste acceptance procedures will ensure that only authorised wastes are accepted. The waste types generated on site are unlikely to generate litter. The site will benefit from good housekeeping and daily sweeping or cleaning of operational areas/the site perimeter. The site and its immediate surrounding will be inspected daily and action will be taken to maintain the area free of accumulations of litter and debris. The result of any inspections or investigations because of complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Nuisance from litter and dangerous road conditions	Low
Mud on roads	Sensitive receptors listed in Table 1 including road network, industrial, residential, agricultural, ecological and recreational receptors	Air, water and land	The site will be operated in accordance with an approved Dust Management Plan. Site surfaces and haul roads will benefit from good housekeeping and maintenance to maintain the integrity of the surfacing. A road brush will be used (when necessary) to sweep the main access road. If mud, debris or waste arising from the site is deposited outside the permit boundary, the affected area will be cleaned, and traffic will be isolated from sources of mud and debris within the site. The site and its immediate surrounding will be inspected daily and action will be taken to maintain the area free of significant accumulations of mud. The result of any inspections or investigations because of complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Nuisance and mud and dangerous road conditions	Low

Table 5 – Accidents risk assessment and mitigation plan

What activities can harm and what could be harmed			**Managing the risk**	**Assessing the risk**		
Hazard	**Receptor**	**Pathway**		**Probability of exposure**	**Consequences**	**Overall risk**
What has the potential to cause harm?	What needs protecting from harm?	How can the hazard get to the receptor ?	What measures can reduce the risk? And who is responsible?	How likely is the contact?	What harm could be caused?	What risk remains after mitigation ?
Leakage of fuel and oils from site plant/equipment	Sensitive receptors listed in Table 1 including industrial, residential, agricultural, ecological and recreational receptors	Land and Water	The following measures will be implemented to manage leaks from Site plant: • No fuels or chemicals will be stored on site • Mobile plant will be monitored by site personnel or the contractor for quick identification of leaks • Spill kits will be provided on site containing appropriate absorbent materials for use in the event of a leakage • Mobile plant will benefit from preventative maintenance • Site staff will undertake daily visual monitoring for evidence of spillage and leakage. The result of any inspections or investigations because of complaints will be recorded in the Site Diary. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.	Low	Contamination of surrounding land	Low
Fire	Sensitive receptors listed in Table 1 including	Air, Land and Water	Only inert waste which will not burn will be accepted at the site. To minimise the occurrence of fire from other sources, and ensure site personnel are equipped to deal with any unlikely occurrences, the following measures will be implemented:	Low	Contamination of surrounding land and harmful smoke	Low

	industrial, residential, agricultural, ecological and recreational receptors		• No burning of other waste will take place on site • Smoking will not be permitted in the operational areas of the site • No flammable liquids will be stored on site • Firefighting equipment will be kept in the site office • Any fire on site will be treated as an emergency. Actions to be taken in the event of a fire: • Immediately notify the Fire and Rescue Service and NRW as soon as practicable • If safe to do so, isolate the burning area and attempt to extinguish the fire utilising the on-site fire extinguishers • Contain run-off using spill kit and soils to prevent leachate leaving the site of from entering surface or groundwater. • Evacuate the site if the fire is not containable The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Flooding	Sensitive receptors listed in Table 1 including industrial, residential, agricultural, ecological and recreational receptors	Land and Water	Flood Risk from Rivers mapped layer[17] shows that the site is not within an area with risk of flooding from the sea of rivers. A small part of the existing laydown area is within an area described as having a high risk of flooding (each year this area has a chance of flooding of greater than 1 in 30 (3.3%)) from surface water and small watercourses. An evacuation plan will be implemented in the unlikely event of flooding. The material being used to create the laydown area will be permeable and will not inhibit the passage of rainwater. The site will be designed so that infill is several metres above the water table and levels of the nearby small watercourses.	Low	Harm to human health and protected species, contamination of groundwater and surface water.	Low

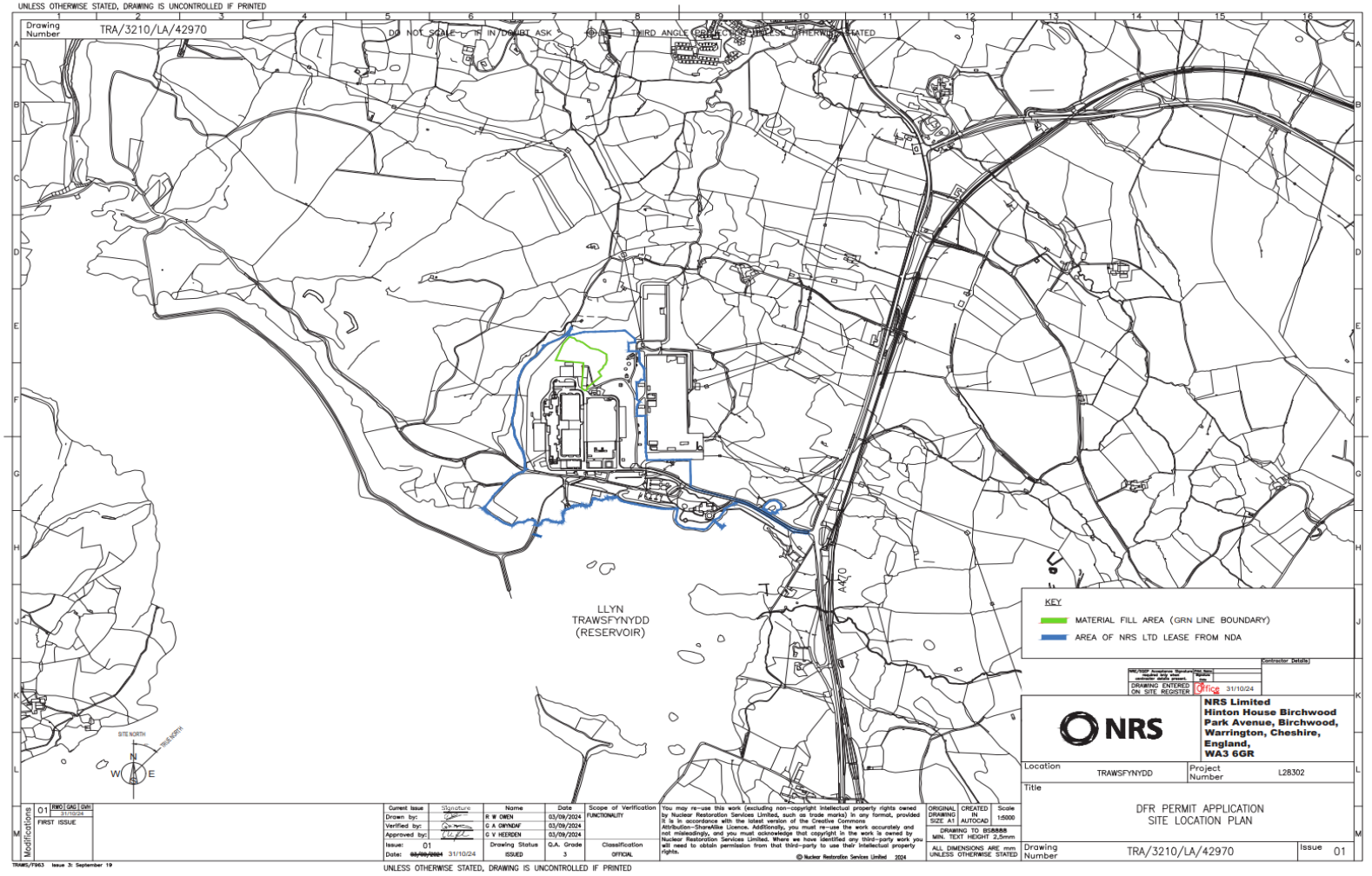
[17] Flood and Coastal Erosion Risk Maps

			The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.			
Contamination following receipt of unauthorised wastes	Sensitive receptors listed in Table 1 including industrial, residential, agricultural, ecological and recreational receptors	Air, land and water	Strict waste acceptance procedures will ensure only authorised inert materials will be accepted at the site. The waste arisings are coming from a sole source e.g. being generated from reactor building height reduction which is taking place adjacent to the permit boundary. Procedures include pre-acceptance checks, basic characterisation and visual checks. Any non-conforming or unauthorised waste will be rejected before tipping. If unsuitable waste is identified it will be isolated, before being removed off site to a suitably licenced facility for treatment and disposal.	Low	Nuisance, contamination and harm to human health and protected species	Low
Security and vandalism	Sensitive receptors listed in Table 1 including industrial, residential, agricultural, ecological and recreational receptors		The site benefits from a high degree of existing security afforded from compliance with conditions of the Nuclear Site Licence This includes extensive checks for all visitors arriving and leaving the site Perimeter fencing, turnstiles, road barriers and lockable gates. Extensive CCTV and 24/7 security presence patrolling the site Operational procedures, including regular inspections, ensure continual monitoring of security provision at the site. Site personnel will carry out daily inspections of the security infrastructure to ensure their continued integrity.	Low	Nuisance and contamination	Low
Slope stability	Sensitive receptors listed in Table 1 bordering the site including	Land	The design of the laydown area will build upon the existing angle of slope with a uniform gradient of no more than 30% (Appendix A4 and A5).	Low	Harm to human health and protected species, damage to	Low

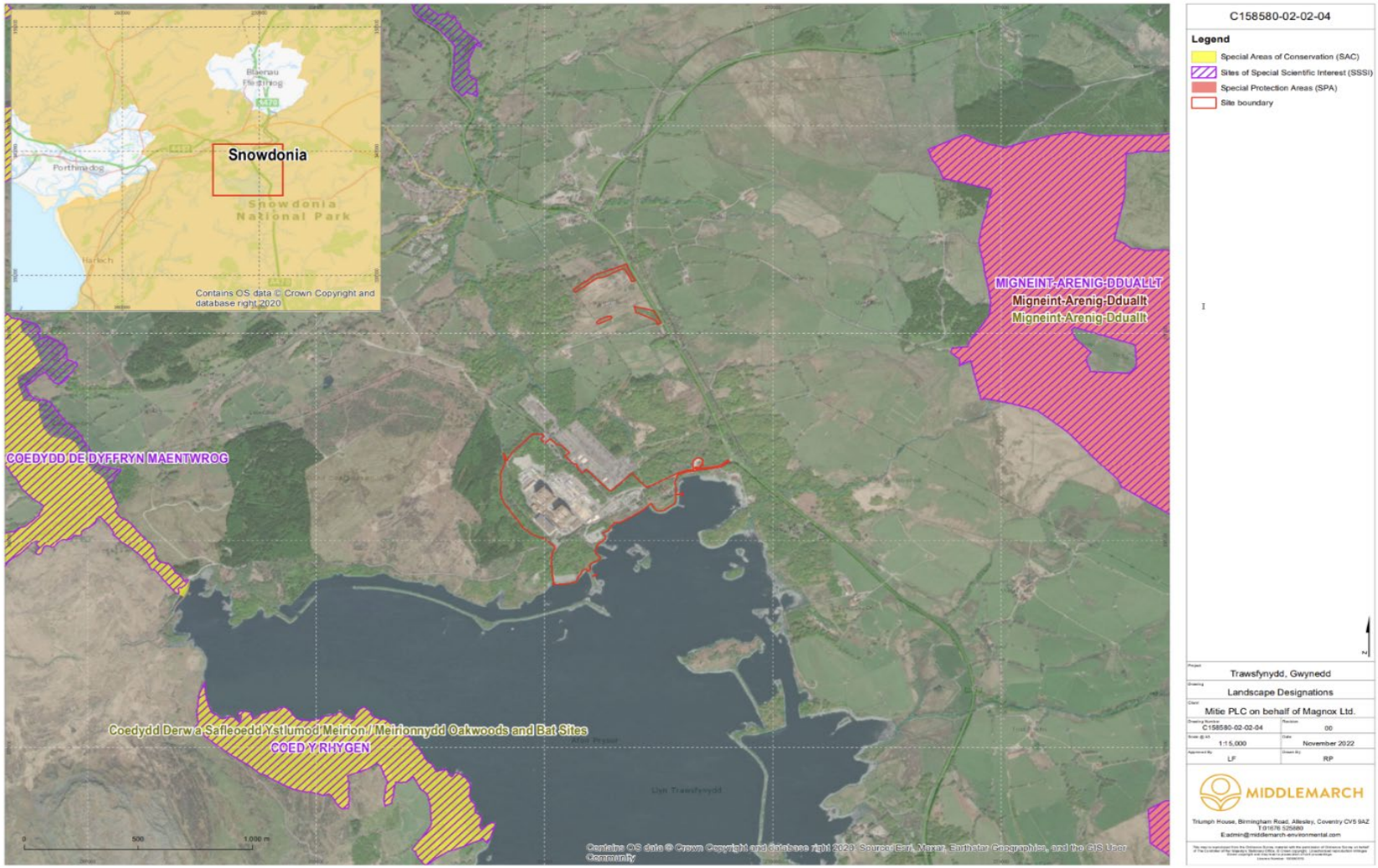
	industrial, agricultural, ecological receptors		The design of the laydown area will have a level plateau which is set-back some 5m from the slope edge to minimise the risk of instability The waste will be placed in lifts of 100-125mm over the whole of the site to avoid point loading in a single location. The surface will be prepared for infill and any vegetation or soil which may be present will be removed. The underlying made ground is inert and compacted and therefore unlikely to undergo settlement or movement. The slope face of the laydown area is maintained to prevent the growth of vegetation or burrowing of animals which could lead to localised slope instability. The Site Manager will be responsible for implementing risk management measures in accordance with operational and management procedures.		adjacent industrial sites	

Appendices

Appendix A1 – Location of the site (permit boundary in green)



Appendix A2 – Environmental Setting



Note – the site boundary outlined in red shows the NLS

Appendix A3 – Technical note on bagwash

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STAKEHOLDER BRIEFING NOTE ON MINIMALLY ASBESTOS CONTAMINATED REINFORCED CONCRETE FROM PLANNED BULK DEMOLITION

December 2020

1. The Trawsfynydd Site was constructed 1959-63, when the use of asbestos containing materials (ACMs) was prevalent.

2. The Ponds complex features various annexes added to the original structure during the Station lifecycle. As such, there is a mixture of ACMs present on site consistent with landmark legislative developments (bans for Amphibole 1985 and Serpentine 1999).

3. Outwith the conventional ACM products and applications, Trawsfynydd also features an asbestos constituent to some of the reinforced concrete (RC) elements. During construction a finishing technique known as 'bagwashing' was used to correct surface imperfections and pour irregularities. Whilst the finishing method is orthodox (still used today), the technique at that time included a small proportion of chrysotile in the generally cementitious mix ('bagwash').

4. The bagwash, which can vary in thickness (0-3mm) and composition, is considered to be homogeneous with the RC beneath and not discernible under examination as a separate layer. The material is stable, bound within a matrix and not prone to fibre release above the limit of quantification (LoQ) when disturbed or aggressively worked.

5. With regard to decommissioning strategy, it is proposed that the enabling projects will remove ACMs SFARP excluding components of the envelope / structure. During the subsequent demolition, the remaining ACMs will be removed SFARP using conventional recovery techniques.

6. We do not consider the removal of the RC surface 'bagwash' as being reasonably practical as this is not a bona fide product or differentiable from the structural concrete. It is currently envisaged that the RC will be remotely demolished and processed into graded material and in the case of the Ponds, utilised for filling below-ground voids in the complex itself.

7. In quantitative terms, assuming a pessimistic 1mm RC bagwash thickness with a chrysotile fibre concentration of 3% (taken from HSG248 for textured coating). This equates to 3% x 1mm thick = 0.03mm chrysotile faction.

8. Walls are the most common building type to contain asbestos and be demolished and so there are two faces to each and so 0.06mm of chrysotile for an internal wall (again pessimistic as not applied externally). For a concentration of 0.1% then the thickness has to be greater than 0.06/0.001 = 60mm, this figure being readily achieved so the concentration of asbestos is less than 0.1%, but as yet unverified through sampling, analysis and quantification.

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9. A preliminary calculation indicates that the area of the contaminated demolition arisings could be around 1,000 m2. The volume of asbestos, based on the above paragraph, is 1,000 x 0.03 x 0.001 = 0.03 cubic metres of asbestos. At a specific gravity of around 2.5 then the weight of the asbestos content of the demolished area could be 0.03 x 2.5 = 0.075 tons or 75kg.

10. With reference to the ponds complex, the total volume of material to be demolished is c.4,500 cubic metres or say 10,000 tons. The fraction of asbestos is then estimated at 75/ (10,000 x 1,000) or 0.0000075 or 0.001%.

11. With reference to the Reactor Safestore Buildings and applying the same logic to early calculation: the contaminated demolition arisings could be around 10,000m². The volume of asbestos, is 10,000 x 0.03 x 0.001 x 2.5 = 0.75 tons or 750kg.

12. The total volume of material to be demolished as part of the Height Reduction/Weather Envelope project is circa 11,500 cubic metres or say 27,000 tons. The fraction of asbestos is then estimated at 750/ (27,000 x 1,000) or 0.000028 or 0.003%.

13. Demolition and processing methodology will naturally be subject to risk assessment with appropriate mitigation / controls applied to limit risk SFARP. Equally material placement and long term management will be subjected to rigorous engineered / administrative controls.

14. These figures are indicative only at present, however they show the potential extent of the asbestos contamination. Associated studies are in progress to underpin the above figures and further substantiate the proposed management strategy.

15. Magnox is currently developing a draft recovery plan to support an application for 'deposit for recovery' for the potential re-use of this material on Site.

Authored by: J. Cowlishaw / G. Van Heerden
Dated: 14th December 2020

Note:- point 12 refers to volumes and tonnages which were an original estimate made in 2020. The current volume has been more accurately estimated as 31,492 tonnes (13,192 m^3)

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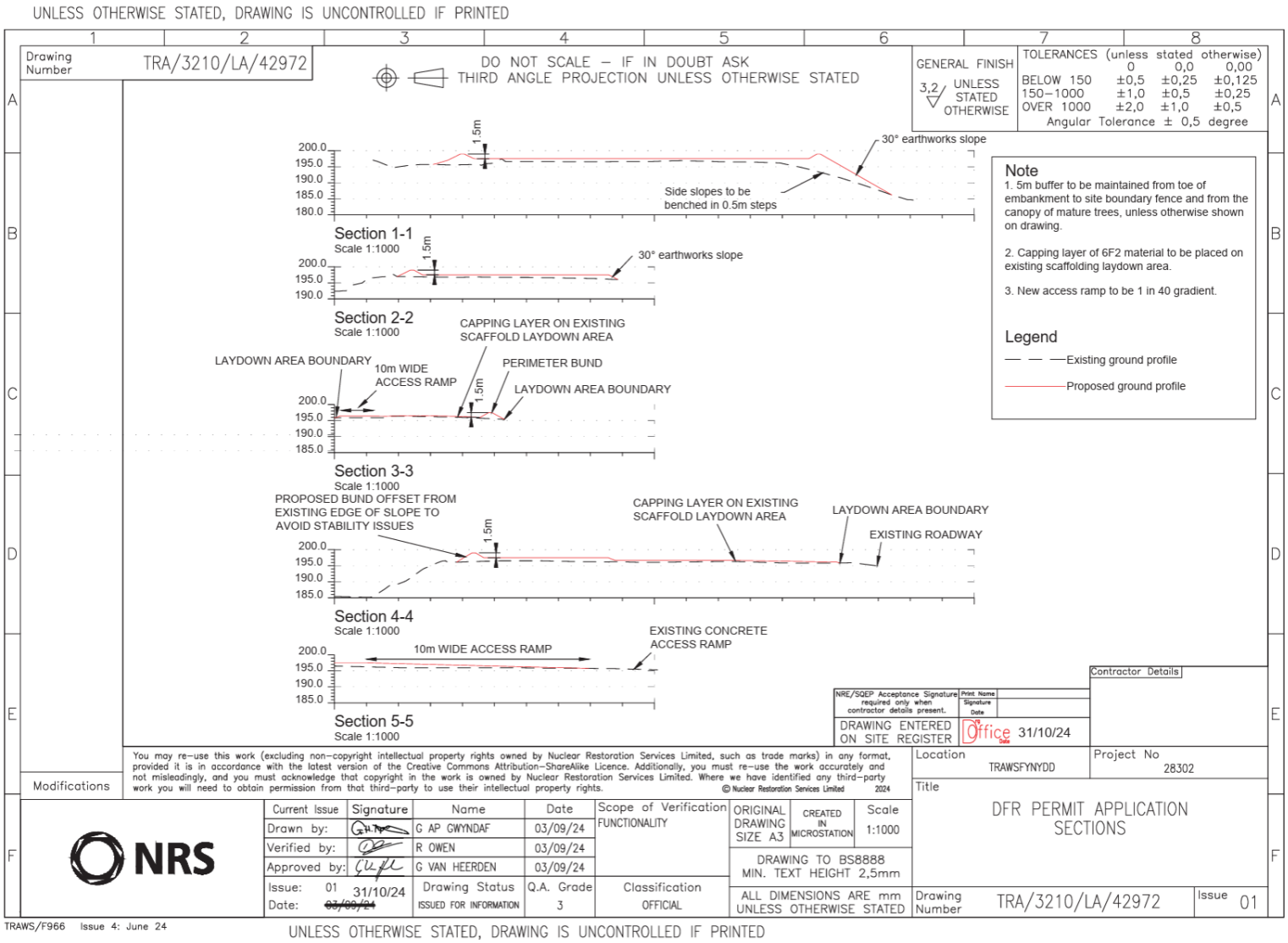
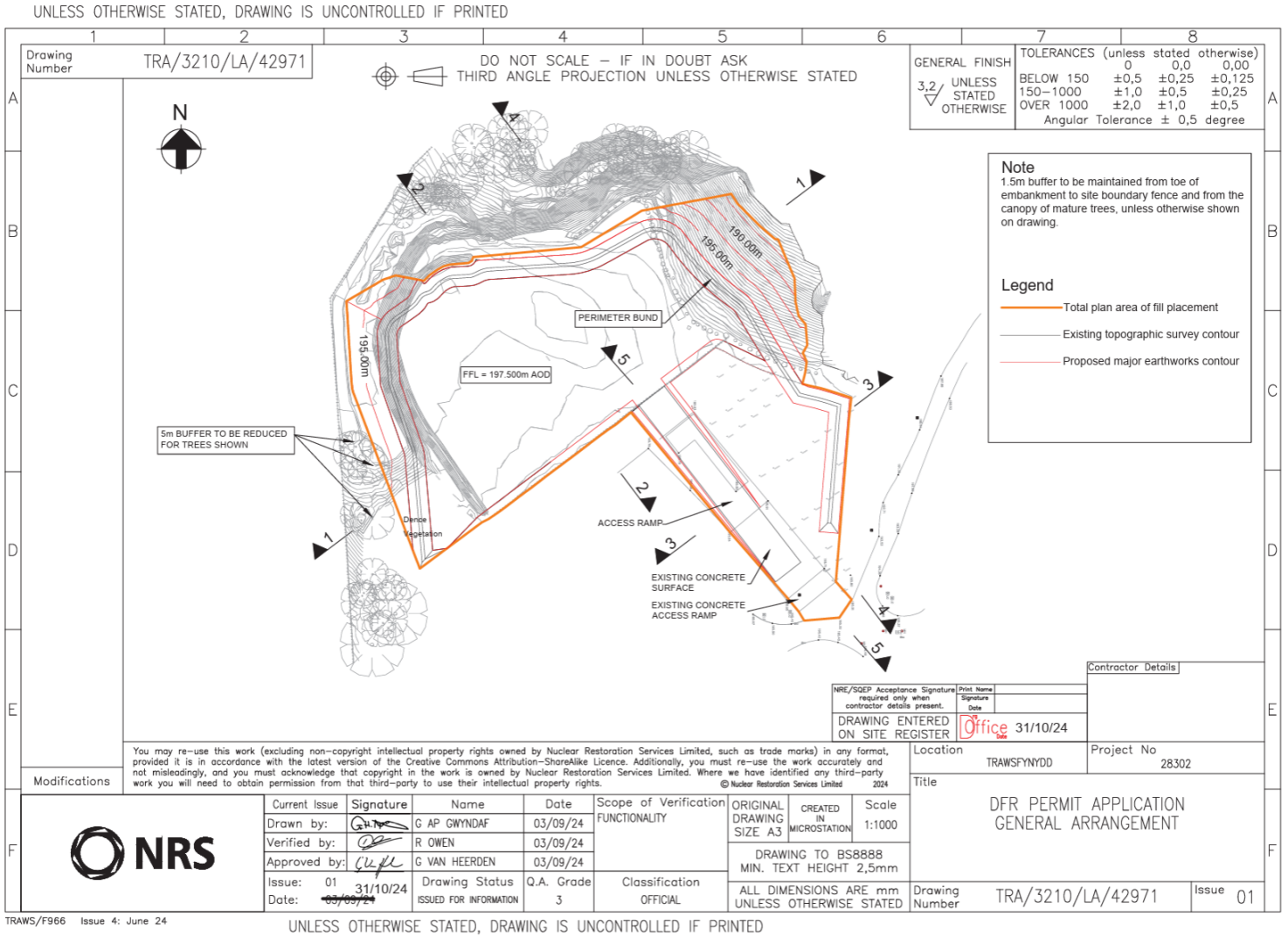
Appendix A4- Cross-sections across of the site showing existing and new levels



Appendix A5 – Site layout in detail



Appendix A6 – Preliminary Ecological Appraisal

Appendix A7 – Potential Bat Roost Tree Survey