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# **TRANSFUND DECOMMISSIONING SITE END STATE DEVELOPMENT REPORT**

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## **Executive Summary**

The current end state is to clear site of all buildings, landscape and release from license to be made available for recreational use. This assumes that radioactive material has been removed from site to the satisfaction of the regulators. It also assumes that asbestos disposed of on-site in accordance with authorisation from the former Meirionnydd District Council will remain.

The End State considers the Trawsfynydd site and not Maentwrog and Lake Trawsfynydd which come under Wylfa's Lifetime Plan. However Maentwrog and the Lake are very important to the future of the site so must still be considered for any future developments of the site.

After consultation with SSG further options were recommended for consideration:

End state for the site should be an area released from nuclear site license and made available for redevelopment for tourism, leisure, commercial or industrial use.

At the earliest opportunity, the NDA land holdings at Trawsfynydd should be made available for redevelopment. The licensed site only occupies 15.4 out of a total of 65 hectares of the land holdings. Development must be in keeping with long term plans for the area.

In addition it was noted that Final Site Clearance (FSC) within a generation was supported but that any kind of use as waste repository was not.

Development of the possible end states to accommodate the proposed end used found that they differ little from the current end state and are technically feasible and may offer an opportunity to reduced scope in achieving the end state. Partial delicensing of the site before Final Site Clearance was not favoured.

## **Introduction**

The Trawsfynydd Decommissioning site has a currently defined end state in its Life Cycle Baseline of the site cleared of all buildings, landscaped and released from its site license (Ref.1). This has been approved by the Government through the NDA strategy. However, following the Government's review of decommissioning strategy whereby it is not necessarily expected that sites should be restored to a natural state, other options may be possible. Therefore the site end state has been re-examined and in line with the NDA strategy, which seeks a consensus with stakeholders including local communities on site end state, includes input from the local Site Stakeholder Group (SSG).

The site end state development process is described in the NDA document EGR015 (Ref.2) and consists of four stages namely:

- Stakeholder consultation on end uses
- End State development
- Stakeholder consultation on end states
- Reconciliation.

The Stakeholder consultation is reported in the interim summary report and final report (Ref 3 & 4) and the views of the SSG formally reported to the NDA by letter (Ref.5). Briefly, the end state preferences expressed in the consultation reflected the desire for continuing employment at the site with the land around the licensed site being made available for use at the earliest opportunity. The detailed findings of the consultation process are given later but by far the most popular option was for use in tourism and leisure.

The second stage, end state development, is the subject of this report. Here the hierarchy of possible end states identified in the consultation process is considered and the technical feasibility of each option assessed. From this the consequences in terms of cost, schedule, environmental and social factors are compared with the current case.

In this report the options for possible end states are considered against that currently adopted and for each the feasibility discussed. The consequences of each possible end state are considered following the process described in the document NDA EGR56 (Ref. 6).

## **Site Description**

Before considering the feasibility of the possible end states it is important to have an understanding of the location of the site and its interactions with other facilities and features in the area.

The nuclear licensed site occupies an area of 15.4 hectares on an NDA owned estate of 65 hectares so that there is a large amount of land which may potentially be available in the near term and is not strongly affected by site delicensing. The site is situated in the Snowdonia National Park on the A487 eight miles from Porthmadog to the North West and fifteen miles from Dolgellau to the South. A consequence of being located in a National Park is the reactor building height reduction to reduce the visual impact of the site: this is unique to Magnox decommissioning. There is no reason to assume otherwise that the National Park will exert a strong influence on any future plans for the development of the site.

Llyn Trawsfynydd is adjacent to the site from which the operating station drew cooling water. The lake was originally formed in 1926 by the building of a dam for the Maentwrog hydroelectric station. Since then the dam has been replaced and Maentwrog is still generating electricity. The lake and Maentwrog are not part of Trawsfynydd's Detailed Volume (DV) but will affect the future of the site. The site made authorised effluent discharges to the lake during and after operations which contained low levels of radioactivity. The residual radioactivity remaining in the lake sediments have been studied and their consequences to man for a variety of future uses have been assessed. Both Magnox Electric (Ref.7) and the Environment Agency (EA) (Ref.8) commissioned reports on the consequences of the radioactivity in the lake sediments and both concluded that it presented a negligible radiological risk 40 years from the cessation of discharges.

There is a large 400 kV and 275 kV electricity switching station out side of the licensed site built on land owned by the NDA but leased to National Grid plc for 999 years. In addition to this there is a 132kV substation subleased to Scottish Power which receives electricity from Maentwrog and Ffestiniog hydroelectric stations and supplies the local area. The current intent is that all of these assets will remain in use during the Care and Maintenance period and that they would still be available for future developments at the site end point.

There are other assets on the estate but outside of the licensed site such as roads (including the access road to the dam), the cycle track "Sustrans Route 8", the former visitors centre and a mobile telephone mast. In the current plan all of these are to be demolished yet are at present assets. There is a wood which is a site of special scientific interest adjacent to the estate. The local infrastructure consists of the main road A487, an 11 kV electricity supply running along side, mains water and telecommunications including BT Megastream. There is no foul drainage connection as the site operates it's own sewage plant which is to be demolished at the end of the care and maintenance preparations.

Within the licensed site the end point of the care and maintenance preparations will be two reactor islands, an Intermediate Level Waste (ILW) store and an access and services building. The licensed site at the end of care and maintenance preparations will occupy the same area as it does at present although the security fence will be reduced in length to enclose only the remaining buildings. There is a quantity of buried asbestos within the new security fence, this was a disposal authorised by Meirionnydd District Council. There are no plans to reduce the area of the licensed site for two important reasons. Firstly the licensed site area as it is at present is

considered the minimum required for Final Site Clearance and there is radioactive contamination in the ground adjacent to where the ponds building currently stands. While members of the public would be discouraged from entering the licensed site outside of the security fence but no special efforts would be made for their exclusion.

A diversion culvert, outside of the licensed site, collects storm water run-off from the licensed site where it is pumped into the lake as an authorised discharge. Low levels of radioactive contamination have been detected around the diversion culvert which is why the pumped water is an authorised discharge. During care and maintenance it is intended that pumping will cease and the water would be allowed to run into Gwylan Stream subject to regulator approval.

The licensed site includes two items on the Cadw register which would probably mean that access would be required for their maintenance. These are Dragon Square and Sylvia Crowe's garden. Sylvia Crowe designed a garden at the southern edge of the licensed site between 1961 and 1962 to allow the man-made structures to blend in with the natural landscape beyond. Dragon Square is situated in front of the present administration building and has been in existence from the earliest days of the Station. The presence of both these features and the opinion of Cadw must be taken into account in any end state development.

### **Details of Review of End uses Versus End States**

The stakeholder consultations revealed that the overriding concern was that there will be continuing employment offered at site and that such development should take place at the earliest opportunity and not be constrained to post final site clearance. Various options were generated by the SSG and presented to the local population in accordance with the process described in Reference 2. Public consultation was by means of a road show and events at two local schools where responses were invited by means of feed back forms of which a total of 574 were collected (Ref.4). The options were ranked 1 to 10 where 1-4 was considered as acceptable, 5 to 6, neutral and 6 to 10, unacceptable and the details are given below.

Option	Acceptable	Neutral	Unacceptable
Industrial and Commercial	54%	19%	27%
Tourism and Leisure	75%	14%	11%
Environmental	53%	23%	24%
Research and Education	56%	25%	19%
Waste Management	17%	14%	69%

Of these tourism and leisure was the most popular with 75% of respondents finding this acceptable with the others achieving approximately 53-56% acceptability. Waste management was an option which was not considered acceptable by the majority 69% of respondents compared with 17.5% which did find it acceptable.

Details of the preferred end uses proposed by the respondents are given in Trawsfynydd Site End State Interim Report (Ref.3) but are briefly summarised below. No assessment of any proposed end use is made here only an assessment of the likely end states capable of accommodating them.

#### Industrial and Commercial:

*Power generation, industrial park, factory, re-use of buildings, film/ TV studio, fish farm, abattoir, incinerator, cemetery/ crematorium, hydroponics, shopping outlet, military base, prison, air ambulance, air/space port.*

#### Tourism and Leisure:

*Bird watching, botanical gardens, horse riding/ trekking, holiday village/ complex, hotel, adventure centre, outdoor pursuit/ youth activity centre caravan park, entertainment venue, paintballing, permanent site in the North for the National Eisteddfod, Zoo, safari park, museum/ heritage centre (including nuclear and power generation), monument, nuclear archive, sports centre of excellence, (cycle tracks, velodrome, mountain biking, football, athletics, ice skating, ski dome, climbing, walking,) auto test, motorbike trials, rally cross, go kart, extreme sports, develop lake (water sports centre including hotel, windsurfing, diving, nudist centre, marina, fishing centre of excellence with accommodation, model railway around lake).*

#### Environmental

*Nature reserve (fence off site and lake), greenfield as before construction, conservation/ biodiversity/ eco-centre, landscape with Blaenau slate, forestry*

#### Research and Education

*College of nuclear skills, science park, research centre for alternative energy  
Research e.g. robotics, Training centre, School of science, Training College facility for the Services/Forces.*

#### End States to Accommodate End Uses

For all desired end uses apart from perhaps environmental the end state would be similar with services such as electricity, mains water and drainage still required. The existing roads and car parks may or may not be required depending upon final use but the access road to the dam is assumed to be required.

Industrial and commercial uses include a power station for which the existing infrastructure especially the switching compound and the availability of condenser cooling water are obvious

assets but outside the control of the NDA. The other industrial and commercial end uses would also require the current infrastructure to a greater or lesser extent. In particular the current intent to remove structures to one meter below ground level may not be necessary with a subsequent cost saving. Use and access to the site could be restricted so that the extent of land remediation to satisfy the NII condition of no danger and to obtain a discharge authorisation from the EA may be less onerous than for uses where free access and use would be allowed.

Tourism and leisure may involve the development of a significant building complex where the existing services would be required although the presence of a large switching compound may not be viewed as an asset but an eyesore. Access to the site would be less easy to restrict and although development would be subject to control it is not likely that any change to the current plans for land remediation would be acceptable. Development for education and research reuse may not be any more extensive as for tourism and leisure and the consequences to the end state are likely to be similar.

Of all the preferred options environmental use is closest to the currently adopted end state as for many of the proposed uses the site would be cleared of all man made structures apart from the possible presence of a visitors centre which would require no more services than already exist.

There are no current plans for early partial delicensing to release land within the licensed site prior to Final Site Clearance (FSC) as the land is required for FSC and low level radioactively contaminated land would have to be remediated to satisfy the NII condition of no danger and to obtain a discharge authorisation from the EA. There would be a significant cost associated with the remediation. Should land outside of the licensed site be made available before FSC then approval would have to be sought for future uses from the NII. Intrusive activities and those which may impose constraint to decommissioning are unlikely to be approved. Any activity would have to be in keeping with the requirements of the National Park and therefore some restoration of the visual amenity would be required as would the assurance of continuing protection of the environment.

### **Statement on Current End State**

The Trawsfynydd licensed site is situated in Snowdonia National Park occupying an area of 15.4 hectares on an estate of 65 hectares. At the currently agreed end state (LTP 06) the Site will be cleared of all buildings, landscaped and released from its site license. A requirement of the site being released from its license is that there is no significant risk from radioactive materials remaining on site which in turn assumes that radiologically contaminated land has been remediated to the satisfaction of the regulators and has been authorised for discharge to the environment. The main source of known ground contamination is from a leak in the ponds and various ground contamination studies have given an indication of the extent of the spread of contamination. While the higher levels of the contamination is restricted to the area around the ponds there is a “plume” of lower level contamination extending beyond the immediate ponds area but remaining within the licensed site. It is expected that this lower level plume

will decay to levels below the Low Level Waste (LLW) exemption level by the time that final site clearance is due to be complete in 2098. The radioactive inventory in the ground adjacent to the ponds is not known for certain at present, however the characterisation is being addressed in year 2009/10 and subsequent years. It is expected that from current studies that the waste will be LLW and can be disposed of to LLWR near Drigg. A license will be required until it can be demonstrated that any remaining contaminated material will present no danger and that an authorisation for its discharge to the environment can be obtained. The LTP 2006 cost for final site clearance for land remediation and management is in excess of £25m. The main risk to the cost and schedule estimate is the volume of waste generated by the remediation of contaminated land is greater than anticipated and that not all of the waste is LLW. However for the end state the only cost involved is for clearance of roads and landscaping at a cost of £540k which is based on current values not subject to such uncertainties and risks.

### **Variance Analysis**

The proposed end states differ little from the current end state and would for all but for some environmental options require a reduced scope. For most options the removal of services would not be undertaken, roads may be left in place as required and landscaping sufficient to satisfy the National Park. Where future development of the site is considered it may not be necessary to clear the site to one meter below current ground level of man-made structures and redundant services. This could present an opportunity in reducing scope and cost.

For industrial and commercial use structures may be erected on the site which may involve deep foundations. This may have some bearing on the current end state in that any excavated land, such as that used for the asbestos disposal, may require controlled disposal when otherwise it would have been left in place. Building on land outside of the present licensed site is not likely to be affected in this way. Additional disposal costs for excavated spoil would increase scope, incur additional cost and may also adversely affect the schedule.

The road to the dam and the switching compound would not be removed in any end state and the mobile telephone mast although scheduled for demolition in the current DV may remain as an asset.

The main cost associated with the current end state is landscaping which would still be required to restore the visual amenity in an area of outstanding natural beauty. Therefore, apart from the potential to disturb the previously authorised asbestos disposal, the proposed end states will not significantly affect the scope, cost or schedule outlined in the current LTP.

Therefore for environmental end uses the end state will not be significantly different from that currently defined. For all other end uses the end states would in general reduce the scope to varying degrees dependent upon the end use. The exception to this is if the authorised asbestos disposal is disturbed due to deep excavation on the licensed site.

### **Financial Considerations**

Proposals for an environmental end state would not significantly differ from the current end state therefore any financial considerations can be discounted.

For the remaining options it is desirable to leave the remaining infrastructure in place. It can be assumed that the switching compound and the Scottish Power substation would be maintained and be available if required.

The access road to the dam would remain and be maintained. Electricity, water and telecommunications can be assumed to be required to the licensed site during care and maintenance and for FSC so would be available as would an access road to site. In the current plan these services and assets would be removed so that leaving them in place would be a reduction in scope albeit comparatively small. Assuming all of the services are adequately maintained during care and maintenance then there should be no additional cost associated with leaving them in place. If it was judged that the services were not in a suitable state for handing on for one of the proposed end states, the financial risk would be in renewing the services. However the cost of removing any unsuitable services is covered in the current LTP and therefore would not result in any change to the current cost estimate. Whether services were removed or replaced would depend upon undertakings given to any prospective future user.

The only scenario which could give rise to and significant increases in lifecycle cost would be where additional waste is created requiring controlled disposal. At present this confined to the authorised asbestos disposal as it is currently assumed that all radioactively contaminated land will be remediated to the satisfaction of the regulators. However at the time of FSC the conditions for delicensing may allow for more favourable conditions depending upon use of the land. Deep excavation may preclude this.

### **Technical Considerations**

There are no issues with feasibility or practicality as the scope will be similar to that currently adapted with possible scope reduction in some cases. The current end state can be achieved using mature and well understood processes

### **Environmental and Social Issues**

The factors affecting the above are dependent on final use.

#### **Industrial/ Commercial**

Compared with returning the site to brownfield, end use as industrial or commercial will have a potentially negative affect on air, water and land quality and on biodiversity, fauna and flora. Environmental damage would be caused by any construction during the development of the site and in its operation but as the site lies within a national park any end use would have to be

compatible with the National Park requirements thus mitigating the effects. There are no climatic factors to consider and none of the remaining buildings would be suitable for re use. Use of the land for industrial or commercial purposes would generate employment in the area with the consequential benefits to the local population in terms of income and health.

#### Tourism and Leisure

The negative effects in terms of air, water and land quality and on biodiversity, fauna and flora are probably less than for industrial and commercial in terms of disturbance and discharges to the environment apart from the effects of visitors to the area. The site is relatively remote with little public transport so that visitors would mostly use private vehicles to access the site with the consequential negative effects of pollution and disturbance. However as the site lies within a national park any end use would have to be compatible with the National Park requirements thus requiring a balance to mitigate the effects. The more visitors the worse the negative effects but also the greater the beneficial effects to the local population. The benefits to the local population would include employment, new amenities and inward investment into the area. There are no climatic factors to consider and none of the remaining buildings would be suitable for re use.

#### Research and Education

This would have the lowest impact of all options involving substantial building on site. Similar negative impacts would occur but to a lesser extent due to there being no significant process wastes created and discharges to the environment compared with industrial use and fewer journeys made by car than for recreational uses. Research and education would bring great benefit to the locality in terms of high quality employment and in attracting outside investment. There are no climatic factors to consider and none of the remaining buildings would be suitable for re use.

#### Environmental

This would be a similar end state to that currently approved. It is possible that there would be some building on the site such as a visitors centre but the site would largely be returned to nature. The impacts on the environment in terms of air, water and land quality and on biodiversity, fauna and flora are probably minimal but so too would the benefits gained by the local population. It is possible that there would be a similar drawback, due to car usage by visitors, as may be experienced for recreational use of the site although at a lower level. There are no climatic factors to consider and none of the remaining buildings would be suitable for re use.

### **Risks to Strategy Implementation**

For industrial and commercial uses there may be objections or constraints to any development from the EA, National Park, (who are the local planning authority) or local pressure groups due

to the location of the site in an area of outstanding natural beauty. However before any proposals can be developed there will have to be an economic justification without which they would not progress. The asbestos that was disposed of in accordance with authorisation from Meirionnydd DC may have to be recovered and disposed of by another route.

The location is quite remote in an area of low population density which will reduce the potential catchment for tourism and leisure and this factor may favour the building of accommodation to attract visitors from further a field. This may result in seasonal work which may be of less benefit to the local population, be less commercially viable and reduce its public support. There may also be objections or constraints to any development from the EA, National Park, Local Planning Authority or local pressure groups due to the location of the site in an area of outstanding natural beauty.

Educational and research end uses may attract fewer objections and constrains due to their potentially lower environmental impacts. Economic viability would depend on attracting investment and students and staff. The presence of the power station over the past four decades has demonstrated that good employment opportunities will attract and retain qualified staff.

The environmental objections are unlikely to give rise to many objections other than those voiced in the consultation exercise. This option would provide very little to the local population in terms of employment and economic benefit and may be seen as a waste of a potential amenity.

### **Schedule Impacts**

Superficially with potentially less work being done to achieve the end state the schedule should be unaffected or even shorten. If use was made of land as it became available, as is the desire of the SSG, then this will shorten the schedule. The only potential schedule impact is if the asbestos that was disposed of in accordance with authorisation from Meirionnydd DC may have to be recovered and disposed of by another route.

### **Impact on Current Integrated Waste Strategy (IWS)**

The proposed end states assume that all radioactive waste has left the site apart from that considered to present no danger to the public and can be authorised by the EA to be discharged to the environment. The asbestos that was disposed of in accordance with authorisation from Meirionnydd DC is assumed to remain on site as for the current end state. Therefore no impact on the IWS unless the asbestos has to be removed to accommodate and future building.

### **Inputs into Development from Others**

The Welsh Assembly Government, Gwynedd County Council, Snowdonia National Park, Local Community Councils, Community Groups NII, EA and OCNS were all consulted and represented in the SSG. Gwynedd County Council and Snowdonia National Park assisted in the production of the briefing pack (Ref.9) used in the consultation process. Generally all are supportive or declined to comment. The EA have requested dialogue with the site about future developments and want a BPEO produced in the short term on the future end states.

### **Interim End States**

As stated in the Site End State Final Report and in the SSG Chairman's letter to the NDA (Refs. 4 & 5), the view of the local communities was that they want development of the site in the near term and therefore before FSC. As the site is cleared and the site boundary retreats to the reactor islands and waste store there is the potential to progressively develop land as it becomes available. However the Site does not favour this as the land will be required for FSC and would require remediation to the satisfaction of the regulators before any partial delicensing increasing the scope and schedule at additional cost.

There is the estate which is outside of the licensed site and so would not require any delicensing although may require the agreement of the regulator to any development. This land is external to the current security fence and is unaffected by the current decommissioning operations and therefore is potentially available for development of intermediate end states. The greatest benefit to the local communities can be gained from early development rather than waiting until FSC and it makes the end state easier to achieve as site services will be maintained through usage. The presence of a decommissioning nuclear power station either in care and maintenance preparations or in care and maintenance may be an obstacle to development of the site.

### **Recommendations**

- 1 Following consultations with the SSG the following are recommended:
- 2 End States be considered which are compatible with end uses of Industrial Commercial, Tourism Leisure, Environmental, Research Education.
- 3 Use of the site for waste management is not considered.
- 4 Consideration should be given to releasing land outside of the licensed site for development as early as possible to maintain employment in the area.
- 5 Partial delicensing should be carried out.

### **Issues and Actions**

Issues which require further actions which impact LTP07:

- Feasibility studies of future developments to cover the non-technical aspects of development.
- Consultations with regulators and authorising bodies to discuss attitudes to future developments.
- The EA have requested a BPEO on future developments to be concluded in the near term.
- Underpinning of the estimates of the costs of contaminated land remediation. This is currently scheduled for 2009/10.
- Estimation and underpinning of the cost of remediation of the authorised asbestos disposal within the licensed site.

## References

- 1 Current site end state
- 2 NDA Report, "Site End State Definition Process", Engineering Directorate EGR015, Rev 0, July 2006.
- 3 Einir Pritchard, "Trawsfynydd Site End State Interim Summary Report", September 2006
- 4 Einir Pritchard, "Trawsfynydd Site End State Final Report", November 2006
- 5 Letter from J Isgoed Williams, Chairman of Trawsfynydd SSG, to Dr Sarah Johnston, NDA. 15, December 2006.
- 6 NDA Report, "End State Reconciliation Process", Engineering Directorate EGR56, Issue 1, January 2007.
- 7 A D Carey et.al, "Radiological Assessment of the Development of Trawsfynydd Lake for Leisure Activities", NRPB Report M755, December 1996.
- 8 Enviros Consulting Ltd., "Radiological Assessment of Future Changes to Llyn Trawsfynydd", May 2005.
- 9 Trawsfynydd Site Stakeholder Group, Briefing Pack for Site End State Project, April 2006.