Magnox

Magnox Limited

Bradwell Site

Environmental Management Plan

2020/2021

Executive Summary

In April 2002 Magnox Electric plc (now Magnox Limited) applied for consent to decommission Bradwell Nuclear Power Station under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (as amended).

Consent was granted by the Health and Safety Executive (HSE) (now Office for Nuclear Regulation (ONR)) in December 2003. There were six conditions attached to the consent, most of which relate to the preparation and maintenance of an Environmental Management Plan.

This document is the seventeenth issue of the Bradwell Environmental Management Plan. It provides an update on the details of the agreed mitigation measures to prevent, reduce and, if possible, offset any significant adverse environmental effects of the decommissioning work. A revised version of this document will be re-issued annually, or within such longer time as agreed with the Office for Nuclear Regulation.

As Closure Director for Bradwell Site, I look forward to the continuing successful decommissioning project and on behalf of Magnox Ltd, I give my commitment to minimising any adverse effect on the environment as a consequence of our decommissioning operations.

Ian Cuthbert, Closure Director, Bradwell

February 2020

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Published in the United Kingdom on behalf of Bradwell Site by Sizewell A Site, Leiston, Suffolk, IP16 4UE.

1. Introduction

Bradwell Site (hereafter referred to as 'Bradwell') ceased power generation on 31 March 2002. Under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (as amended) consent to carry out any dismantling or decommissioning work at Bradwell had to be granted before any work commenced. Therefore, in April 2002, the then holders of the Bradwell Nuclear Site Licence (Magnox Electric plc) applied to the Health and Safety Executive (HSE) (now Office for Nuclear Regulation (ONR)) for the consent to decommission Bradwell. The application was accompanied by an environmental statement as required by the Regulations.

Following a public consultation on the environmental statement, the HSE requested further information which was subsequently provided by the licensee. The consent to decommission Bradwell was granted in December 2003, subject to six conditions. The conditions attached to the consent relate to mitigation measures to prevent, reduce, and if possible offset significant adverse environmental effects of the decommissioning project. Implementation and the effectiveness of these measures is reported through issue of an Environmental Management Plan (EMP). This issue of the EMP is structured in a way to clearly demonstrate how Bradwell meets the requirements of those conditions (listed in Appendix A). Other supporting information which may be of interest to the public, but is not directly required by the consent conditions, is located in the other Appendices (e.g. stakeholder engagement, principles for a travel plan etc).

A detailed decision report was prepared by the HSE in 2003, describing the content of the conditions attached to the consent, the main reasons and considerations for the decision. The report can be accessed at the ONR website:

www.onr.org.uk/bradwell.pdf

or write to : -

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Requests for copies of this EMP should be addressed to:

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2. Scope of the Environmental Management Plan

The EMP details Bradwell's environmental performance and provides examples of mitigation measures demonstrated over the past year. It also determines potential future environmental impacts and ensures that mitigation measures are identified, amended and implemented as necessary.

Geographical Scope

The project area at Bradwell is contained within the Nuclear Licensed Site boundary covering approximately 20 hectares. In addition to this the project area includes the barrier wall structure marking the cooling water inlet and outlet points. The site lies approximately 30 km due East of Chelmsford and 2.5km from the Northeast corner of the Dengie peninsula (Figure 1).

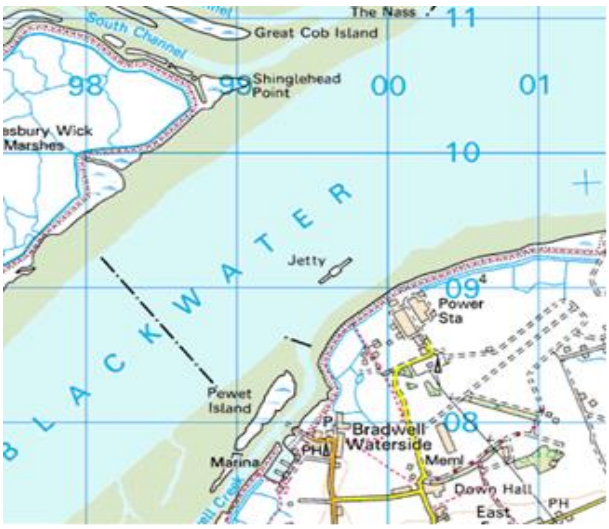

Figure 1: Location of Bradwell Site

Duration

Magnox has adopted a generic decommissioning strategy, the Magnox Optimised Decommissioning Programme (MODP), which is being applied at Bradwell. This deferred site clearance strategy, or 'Safestore' strategy as it is sometimes called, consists of three main phases; Care and Maintenance Preparations, Care and Maintenance and Final Site Clearance. A summary of each phase for Bradwell is provided below.

Note: The transition between these phases is not immediate. Bradwell entered the Care & Maintenance (C&M) phase officially in November 2018; however, final backout activities were completed in August 2019.

Care and Maintenance Preparations (C&MP)

This phase, consisted of the non-radioactive plant and buildings on the Site being dismantled; the only buildings to be left into C&M being the Reactor Buildings, ILW Store and the Ponds and Vaults complex weather envelopes. Intermediate level radioactive waste (ILW) has been retrieved from storage locations, processed and then placed into a new purpose-built store (until a suitable geological disposal facility becomes available). As a result of changes to the decommissioning scope, the Site's substation has been left in place, together with portacabin offices and welfare facilities for security personnel. In addition, foundations and bases of structures are to remain in situ. Changes against the consented decommissioning scope have been assessed to determine their significance and mitigations put in place where required.

Note: As Bradwell has formally completed the C&MP phase of the work, the mitigation measures specific for that phase have been removed from the mitigation measures listed in section 3.1 of this EMP. However, any relevant mitigations which were assessed as required for the completion of the 'residual works' have been included in the C&M section.

Care and Maintenance (C&M)

This is a mainly quiescent phase, lasting approximately 85-105 years after cessation of generation, during which no dismantling is carried out but the Site continues to be managed, monitored and maintained to ensure it is kept in a passively safe and secure state. The Site continues to be the subject of a Nuclear Site Licence during this period. It is during these periodic maintenance activities where mitigation measures may be required.

The ILW Store will receive packages from other Sites within the region during the C&M period in line with other Site's Lifetime Plan activities. Packaged ILW will be removed as and when a disposal route becomes available to receive the waste.

During the last year Bradwell entered the C&M phase of the lifecycle following completion of residual works to demobilise and withdraw from the Site. These demobilisation works included demolition of remaining buildings (which were used to process the last items of waste), processing of residual waste, and demobilisation of personnel facilities and office accomodation. The relevant mitigation measures detailed within the C&MP phase were carried forward into the early C&M phase of the plan and continued to be adhered to.

In addition to full consultation with the Regulators where required, any further changes throughout the C&M Phase will be managed in accordance with the Site's management control process that ensures the provisions of Regulation 13 of the EIADR99 (as amended) are met (see Appendix B). This EMP will be updated and re-issued to incorporate any major changes as required, and submitted at such timescales as agreed with the Regulator.

Final Site Clearance (FSC)

The final phase of decommissioning is expected to last about 10 years. It involves dismantling of the remaining structures on the Site, including the reactors; the clearance of any residual radioactivity to the applicable standards; and de-licensing of the Site so that it can be made available for alternative use, as appropriate.

Mitigation measures may change in the future in light of experience and developing technologies. The impacts of the later phases of work have been documented in the original Environmental Statement, but due to the difficulty in predicting the nature of environmental and regulatory regimes over long periods, more confidence should be attached to the assessment related to the earlier phases. Consequently, mitigation measures for activities during FSC will be refined, based on technologies available at that time.

Topics

Beneficial or adverse environmental impacts were divided into nine topic areas within the original application to decommission Bradwell in April 2002. These topic areas are continued within the EMP and are:

- **Air Quality and Climatic Factors**
- **Archaeology and Cultural Heritage**
- **Ecology**
- **Geology, Hydrology and Soils**
- **Landscape and Visual**
- **Noise and Vibration**
- **Socio-Economic**
- **Surface Water Quality and Drainage**
- **Traffic and Transport**

3. The Site and Surrounding Area

Site Description

Bradwell is a Magnox Nuclear Reactor Site and is one of twelve sites currently managed by Magnox Ltd. The Nuclear Decommissioning Authority (NDA) gained ownership of the Bradwell site on 1st April 2005.

The Site in its current state comprises four large structures, the Site Security Lodge, and some small storage/office units, within a high metal fence which will remain for the duration of the C&M phase. The large structures are the Reactor Buildings, Pond Complex and ILW Store. These large buildings are similarly constructed of brick/concrete and are overclad in a corrugated metal. There is also a road network serving the Site.

A large void exists in the north western part of the Site created by the demolition of the Turbine Hall. This void has been partially filled through the re-use of suitable demolition material under a Material Management Plan following the Contaminated Land: Applications In Real Environments (CL:AIRE) Code of Practice. The remainder of the Turbine Hall void is expected to be filled during C&M. The remaining areas of Site consist of hardstandings from foundations or bases of removed structures, and managed grassland and scrubland which is generally of low floristic diversity.

Surrounding Landscape

Habitats present outside the Site include shrub, unmanaged grassland, ditches, plantation woodland and amenity grassland. To the east of the Site is an area of amenity grassland that is managed as a hay meadow. The section of the Borrow Dyke (see Figure 2) to the west of the site is characterised by periodically having open water within its central area that is fringed by common reed. In contrast, the section of the Dyke that lies immediately to the north of the Site supports dense common reed with little surface water at all. The section to the east of the Site also holds little or no water and supports a mosaic of dense reed habitat and grassland dominated by sea couch.

Figure 2: The Borrow Dyke

Transport Infrastructure

The main vehicular access to the Bradwell Site is from the A414 at Maldon, then via the B1018 to Latchingdon, followed by the unclassified road C111 through the settlements of Mayland and Steeple, and then the B1021 to the Bradwell Site. An alternative but less direct route using B class roads is available by continuing on the B1018 to Southminster and then travelling north on the B1021, passing through Asheldham and Tillingham.

Sensitivity of the Receiving Environment

The Blackwater Estuary, the Dengie Flats and the Colne Estuary are all Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNRs). The boundaries of the Blackwater Estuary and Dengie Flats SSSIs meet on the shore adjacent to the Site, and the Colne Estuary designation lies off the north shore of the channel opposite the Site. All three form the majority of the Mid Essex Ramsar site complex and lie within the Mid Essex Coast Special Protection Area (SPA) and the Essex Estuaries marine Special Area of Conservation (SAC)[1]. The Blackwater also forms part of the Blackwater, Crouch, Roach and Colne Marine Conservation Zone which was designated in December 2013. These designations recognise the importance of the area for its estuarine habitats in general, as well as for certain specified plant communities, habitat features, and the wide range of species dependent upon them. The SPA and Ramsar designations relate to various wintering and breeding bird species.

[1] Where a SPA or SAC is continuously or intermittently covered by tidal waters or includes any part of the sea adjacent to the UK, the site is referred to as a European Marine Site. The marine components of the Essex SPAs and SACs are treated as a single European marine site called the Essex Estuaries European Marine Site (EEEMS).

3.1 Identified Impacts and Mitigation Measures

In support of the application to decommission under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (EIADR99) and the Town and Country Planning (Environmental Impact Assessment) Regulations (TCP(EIA)), Environmental Statements (ES) were compiled in which potential impacts and key mitigation measures were identified for the three stages of decommissioning.

As the Site has formally completed the C&MP phase of the work, only the mitigation measures for the C&M and FSC phases are included in the plan.

Table 1: Care & Maintenance Phase (including residual works)

Mitigation measures already identified (Condition 3a)

Topic	Nature of impact	Mitigation Measures Proposed
Air Quality and Dust	Dust emissions during excavation, demolition and construction activities, including storage and handling of soil and material.	• Dust generation from demolition and construction activities would have been completed.
	Dust emissions during movement of vehicles.	• Few vehicles would be operating in and around site; a few vehicles may be involved in ILW removal from site however the contribution to air quality would be negligible.
Ecology	Disturbance to birds from traffic noise during removal of ILW.	• Removal operations will be programmed sensitively.
	Increased road mortality for great crested newts during removal of ILW.	• The presence or otherwise of great crested newts could be monitored as part of site management during C&M phase; • A detailed mitigation plan will be developed.
Geology, Hydrogeology and Soils	Changes to groundwater quality through disturbance of contaminated soils from excavation of subsurface structures and/or services.	• Management of contaminated soils to avoid leaching into previously clean soils and groundwater; • Groundwater monitoring to provide assurance for water quality during C&M phase.
Landscape and Visual	Visual impact from the constructed Interim Storage Facility (ISF).	• The planting management regime (e.g. replacing of trees and scrubs, thinning) would be agreed with the local planning authority, as relevant and appropriate.
Surface Water	Avoidance of localised flooding.	• Drainage facilities in place during and after C&M period to avoid localised flooding.

Table 2: Final Site Clearance Phase

Mitigation measures already identified (Condition 3a)

Topic	Nature of impact	Mitigation Measures Proposed
All topic areas	It is predicted that the impact may be as those identified for the Care & Maintenance Preparations phase but these will be determined based on the proposals at the time.	• Mitigation measures proposed for this section are likely to be similar to those utilised during the Care & Maintenance Preparations phase of the decommissioning programme.

3.2 Future mitigation measures (Condition 3b and 3c)

Work activities beyond final site clearance phase have not yet been identified. As a result a list of mitigation measures required during any future phases cannot yet be identified.

3.3 Activities where mitigation measures may be required but cannot yet be identified and assessed (Condition 3c).

Currently no such work activities have been identified.

4. Implementation of the Environmental Management Plan

It is a requirement of the conditions attached to the consent (Appendix A), to implement the mitigation measures and describe their effectiveness. This chapter lists the mitigation measures implemented, explains how the Site evaluates their effectiveness in reducing environmental impacts, and describes their use in some relevant examples on Site.

Process for Implementation of Mitigation Measures

Magnox Company and Site procedures ensure that decommissioning activities are carried out in accordance with the mitigation measures set out in this EMP. Any decommissioning work or modifications on the Site are assessed during the proposal stage (see Appendix B) in accordance with robust company management control procedures.

There are a number of tools used on Site to ensure that all environmental impacts are minimised. The Company has an Integrated Management System, which covers the requirements of ISO9001 (Quality Assurance), ISO14001 (Environmental Management System) and ISO45001 (Occupational Health and Safety Management System).

Bradwell also undertakes Best Available Techniques (BAT) studies for any work where it is deemed there is a potential for significant radioactive and non-radioactive discharges and disposals from the site. E.g. site waste management, decommissioning or restoration projects, and where it is required to demonstrate that these impacts are minimised through evaluation by a clear, systematic process.

Processes for Determining Effectiveness of Mitigation Measures

The Site aims to monitor the effectiveness of any mitigation measures employed and, where necessary, review these in order to ensure successful reduction of significant environmental impacts. The Environment Department works closely with other departments during periods of maintenance during C&M. This ensures mitigation measures are considered, applied and reviewed, where relevant, throughout the lifecycle of each maintenance period, from conception to completion. It also allows supervision and practical evaluation of the effectiveness of the mitigation measures. Evaluations can provide valuable feedback on any difficulties encountered, changes required or highlight further mitigation requirements.

The Site measures the effectiveness of mitigations in a variety of ways outlined below.

i) Environmental Performance Monitoring

Environmental performance monitoring (e.g. groundwater monitoring), using specialist equipment, allows us to assess environmental impacts post-mitigation (as well as baseline). The effectiveness of radiological mitigations are monitored via the Site's Environmental Monitoring Programme.

ii) Visual evidence

Site walkdowns and photographs of areas where work is planned help to identify potential environmental receptors in the vicinity (e.g. surface water drains) and hence highlight mitigation measures that need to be implemented. Visual inspections and photographs during work can also provide an indication of effectiveness of mitigation measures. For example, presence of mud on roads can be an indication of insufficient wheel washing of heavy goods vehicles.

iii) Review of Regulatory Action, Complaints and Internal Event Reporting

Review of regulatory actions, complaints and internal event reporting is a form of reactive monitoring which can provide valuable information. For example, where mitigations may not be effective or where further mitigations are required. The company operates a robust system of internal event reporting, where workers are encouraged to report conditions which are unsafe or pose a threat to the environment. As part of this system, events are investigated and, where necessary, remedial actions are put in place.

Examples of Mitigation Measures Implemented on Project Activities at Bradwell

Air Quality and Climatic Factors

Fuel Element Debris (FED) Treatment

The dissolution of FED was completed in June 2017. No further FED effluent was then created or discharged and NOx emissions also ceased. The Fuel Element Debris Dissolution (FEDD) plant along with the NOx scrubber columns have been deplanted and the buildings demolished.

Figure 3: NOx Scrubber Tower area (now dismantled and demolished)

Ecology

During the C&M preparations phase, a reptile fence was maintained to prevent reptile ingress and any injury or death to protected species from the decommissioning works.

Tree and shrub landscape planting is taking place in accordance with the 'Bradwell Site Landscaping Scheme'. This has the combined benefit of providing additional or enhanced foraging habitat (specifically beneficial in relation to the loss of habitat of the great crested newt) and reducing the visial impact of the site.

To further maintain and increase biodiversity on-site, two peregrine falcon nesting boxes have been mounted, one on each of the newly clad reactor buildings. A pair of peregrine falcons have successfully fledged chicks from their home in the nesting box on Reactor 1. The Site is hopeful that this indicates they are likely to return each year.

Figure 4: Fully mounted nesting box on the Reactor Building

Geology, Hydrology and Soils

Sampling of soils prior to excavations was undertaken and this information used to advise projects of any known or potential land contamination. Concrete, demolition material and other excavation spoil was subject to testing to determine whether it met the inert waste acceptance criteria, and this material was re-used on Site wherever possible.

The CL:AIRE Code of Practice (Contaminated Land: Applications in Real Environments) was implemented on Site to manage excavation and demolition materials.

A Materials Management Plan (MMP) was written under the protocol allowing source segregated aggregate arising from demolition activities, such as crushed brick and concrete, to be reused on-site as fill material for on-site voids. Material generated from excavation works such as the cess pit (for use through C&MP) has also been used for infilling of voids on Site under the CL:AIRE protocol. The re-use of excavated material has reduced the quantity of resources required to be imported as fill material. Approximately 14000m^3 of material has been re-used on Site (approximately 5,000m^3 added in 2018). This has reduced the cost of waste disposal and negated costs resulting from importation of in-fill material. Re-using site material has also significantly reduced the CO_2 emissions which would have resulted from the transport of all materials.

Use of the CL:AIRE protocol therefore helped to ensure that the Site used spoil and concrete in a sustainable manner, whilst adhering to environmental best practice.

The Materials Management Plan for the Turbine Hall void was closed out through the production of a verification report. Any future infilling of the Turbine Hall void would require additional provision of 'consent' following all applicable regulatory requirements at the time.

Land Remediation and Land Quality

Borehole and ground water sampling continues to be carried out to monitor for the presence of radionuclides and/or hydrocarbons. It aims to ensure any migration of

contaminants is detected and managed in accordance with a remediation strategy, where applicable.

Landscape and Visual

The Reactor Buildings weather envelopes are the most visually dominant structures at Bradwell as well as in the surrounding area. The potential visual impact was taken into consideration at the design stage and as a result the cladding material was chosen to be sympathetic to the surrounding environment. The cladding is designed to safely encompass the reactors throughout the C&M phase.

Following demolition of some of the redundant buildings within the Ponds Complex, the Ponds Complex weather envelope has also been completed (Figure 5). The weather envelope over the ponds and vaults is sympathetic to the other remaining structures, i.e. the reactor weather envelopes (Figure 6) and the ILW Store.

Figure 5: Image of the Ponds Building Complex Weather Envelope (foreground)

Figure 6: Image of the Reactor Safestore Weather Envelopes

A landscaping programme of tree planting has been implemented to help minimise the visual impact of the Site from local viewpoints. The landscaping plan forms part of the consent from the local planning authorities.

A second area outside of the perimeter fence which had been utilised as a car park has now been returned to its original state as required by the planning consent.

Figure 7: Remediation of the additional office and car park area used during C&MP

Noise and vibration

Intrinsically noisy work activities are limited to standard working hours. Noisy work activities are not expected during the C&M phase.

Socio-Economic

The Socio-economic scheme is managed by Magnox on behalf of the NDA and has a funding portfolio of up to £1million each financial year across the 12 Magnox sites. £6,000 per year is allocated for 'Good Neighbour' applications of up to £1,000 each for each site.

Since the last report, the scheme has supported a number of projects in the district, the most notable being £120,000 for a Sense of Place Coordinator which also includes a small bursary for the Group's Chairman. This is the next step in supporting local businesses, continuing the work of the Bradwell Legacy Partnership which is now officially closed. The three year project is due to start in earnest in April 2020.

Another initiative supported through the Magnox Socio-economic Scheme alongside the Maldon District Council and ECL Sensory Service was the Maldon Town Sensory Charter and Guide. This provides a visitor itinerary and guide to Maldon for people with sensory or physical disabilities. This project will provide training for staff at specially chosen attractions and venues to support people with additional needs. This project attracted over £5,000 of Magnox funding.

Under the Good Neighbourhood scheme, Tillingham Tigers have received £800 towards new equipment and training kits. A number of other Good Neighbour applications are being progressed.

This support will be on-going for the foreseeable future. For further information or to apply go to: www.magnoxsocioeconomic.com

Surface Water Quality and Drainage

Prior to C&M entry, a programme of drainage inspections and repairs was completed. Smaller diameter drains were replaced with larger ones to manage drainage during heavy rainfall events. In addition the Main Drains Pit was emptied and a build up of silt was removed to maximise the available ullage.

The Site completed installation and commissioning of four new pipelines within the existing east outlet culvert (Figure 8). The pipelines now discharge all on Site aqueous arisings. This discharge route has been granted an environmental permit by the Environment Agency (EA).

Figure 8: The four pipelines inside the East outlet culvert

Traffic and Transport

Transport Plans are produced for individual projects where significant traffic movements are expected (for example importation of packaged ILW from Dungeness and Sizewell A Sites). The plans detail the preferred road routes and transport options. When waste is expected to be generated, disposal Sites within close proximity are favoured, and skips are double loaded to reduce the number of journeys needed.

Movements of HGVs are planned, where possible, to minimise the impact to the local communities and to avoid local peak traffic times, i.e. 06:30 – 07:30 and 17:00 - 18:00. Significant HGV movements are not expected during the majority of the C&M period (there may be movements if the Turbine Hall void were to be filled during this time).

5. Changes to the Environmental Management Plan

Since the start of decommissioning works on Site, a number of changes have been made to the consented Environmental Statement. The Environmental Statement provides the description of works proposed for the decommissioning activities. Below are some of the key changes to the consented activities proposed in the Environmental Statement.

FED Dissolution and Treatment of Resulting Effluent (Completed)

The FED dissolution plant was fully commissioned in 2015. This option was used for treatment of FED instead of encapsulation in cementitious grout proposed in the original Environmental Statement issued in 2002. The process generated radioactive aqueous and gaseous discharges. The resulting aqueous effluent was treated in an aqueous discharge abatement plant which reduced the radioactivity to within permitted limits, achieving on average 90% reductions in levels of radioactivity. Heavy metals were also significantly reduced during the treatment process. Treated effluent from this highly efficient and innovative process was carefully analysed and monitored at the Site's laboratory. This ensured it met all the EA's permitted criteria before discharge.

Dissolution of FED was completed in June 2017, no further FED effluent will be created or discharged and NOx emissions have also ceased. The FED dissolution plant, aqueous discharge abatement plant, and NOx scrubbers have now been deplanted and the buildings demolished.

Importation of ILW from Sizewell and Dungeness to Bradwell Interim Storage Facility

The waste strategy for the company has been reviewed and endorsed by the Nuclear Decommissioning Authority (NDA). The new strategy includes importing packaged ILW from Sizewell A and Dungeness A to Bradwell for storage in the Interim Storage Facility (ISF) until a geological disposal facility becomes available.

The spare storage capacity is as a result of contingency space built into the Bradwell ISF that has not been used, and through reductions achieved in the volume of ILW through waste processing efficiencies. Storage of imported ILW packages in the Bradwell ISF will avoid the construction of two additional ILW Stores in the south east, delivering significant safety, environmental and cost benefits, and reducing costs to the UK taxpayer by approximately £30 million.

ILW package transfers from Dungeness A have commenced and are anticipated to continue in early C&M. The proposed work period may change depending on the NDA funding availability.

Leaving Foundations and Slabs of Buildings On Site During C&M

Foundations and slabs of buildings/structures demolished/removed as part of the decommissioning activities will be left on Site during C&M. This is part of a revised Licence Condition (LC)35 assessment for proposed changes to Bradwell Site Decommissioning Strategy. The previous strategy stated that redundant facilities (primary non-contaminated structures) would be deplanted and demolished to below ground level. Slabs/foundations were to be removed or made safe.

It is now proposed to leave materials that do not present an immediate hazard to the environment and people, in-situ until FSC. The slabs and foundations have been assessed not to pose any immediate hazard. Therefore removing them would not provide any environmental or cost benefits or detriments. This revision of the decommissioning strategy will not result in a change in duration of the decommissioning works.

Leaving the Turbine Hall Void Unfilled Going into C&M

As part of a revised strategy for C&M, the Turbine Hall void will be left partially filled at C&M entry. This contradicts the original Environmental Statement which states that all voids on Site are to be filled at C&M entry. The ES states that voids will be back filled with inert material once structures have been demolished.

The Turbine Hall void is approximately 41,000m^3 and at C&M entry not enough material had been generated through decommissioning activities to fulfil the commitment. The deferral of infilling activities has presented two different scenarios which require an environmental impact assessment to be carried out:

1) Fill the void throughout C&M as and when material in the local area becomes available; or
2) Fill the void at FSC.

Change of Welfare Facility Requirements for C&M

It was intended that no permanently installed welfare facilities would remain on Site in C&M. However, due to a change in security strategy, facilties will be required for the early years of C&M. Welfare facilities comprise two portacabins with hygiene and mess services. A cess pit has been installed which is emptied by tanker on a regular basis and does not discharge to the environment.

Residual works and Demobilisation Activities in C&M (Completed)

The Site received the C&M Licence Instrument from the ONR in November 2018. Whilst this event signalled the start of C&M, the definition of C&M in the ES did not provide for a period of transition and demobilisation from C&MP. Whilst the majority of the Site was in a passive and quiescent state, some residual work remained and there was the requirement to demobilise personnel, facilities and accommodation remaining from C&MP. Work included processing of residual wastes, installation and operation of new main drains pumping system, demolition of remaining buildings (including waste processing facilities), other minor works and final demobilisation of personnel accommodation and facilities.

Potential Changes During C&M

Throughout C&M there is the potential that material will become available from local earthworks which could provide a source of aggregate to fill the Turbine Hall void. For example, a significant volume of material could be generated through the excavation earthworks from EDF's proposed civil nuclear new build which may be located adjacent to the current Bradwell Site. The impact of importing materials from the potential works has not been assessed in the current ES and it is likely that a new transport plan would have to be implemented.

Summary of Changes to the Environmental Management Plan

Change of scope environmental impact assessments for all the above changes have been carried out and the effects were found not to be significant. They have therefore been recorded as 'Findings of No Significant Effect' as prescribed in the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations, 1999, as amended (EIADR).

Some changes to mitigation measures may be required as a result of changes to decommissioning and waste management strategies (e.g. acceleration of decommissioning, changes to ILW processing and storage arrangements).

Changes to Site strategy will be assessed by following appropriate company procedures to fulfil the compliance requirements. If assessments indicates a need for mitigation measures in the EMP to be significantly changed, then Bradwell site will notify the ONR of such change no less than 30 days before the change is made, or within such shorter time as the ONR may agree.

The EMP will also be updated at appropriate intervals and re-issued in the timescales agreed with the regulator.

6. Distribution of the Environmental Management Plan

In addition to the submission of this EMP to the ONR, Magnox Ltd will make the document publicly available via the Magnox website.

Copies of this EMP can be viewed at the following locations:

Burnham On Crouch Library
103 Station Road
Burnham-On-Crouch
CM0 8HQ
Tel: 01621 782006

Maldon Library
Carmelite House
White Horse Lane
Maldon
CM9 5FW
Tel: 01621 853556

Chelmsford Library
Market Road
Chelmsford
Essex
CM1 1LH
Tel: 0845 603 7628

Appendix A: Decommissioning Consent

Decommissioning Project Consent No.1 December 2003

NUCLEAR REACTORS (ENVIRONMENTAL IMPACT ASSESSMENT FOR DECOMMISSIONING) REGULATIONS 1999

CONSENT

granted under regulation 4(b)

in accordance with regulation 8(3)

with conditions attached under regulation 8(4)

BRADWELL POWER STATION

The Health and Safety Executive, for the purposes of regulation 4(b) in accordance with regulation 8(3), hereby grants consent for carrying out the project[1] applied for under regulation 4(a), in particular, to remove all buildings except the reactor buildings, alter the reactor buildings for a period of deferment, retrieve and package operational intermediate level waste, store the intermediate level waste until it can be removed from the site, and clear the site, subject to the conditions under regulation 8(4) attached.

Dated: 5th December 2003

For and on behalf of the
Health and Safety Executive

Signed

M W Weightman
A person authorised to act in
that behalf

[1]Project as defined in regulation 2

NUCLEAR REACTORS (ENVIRONMENTAL IMPACT ASSESSMENT FOR DECOMMISSIONING) REGULATIONS 1999

CONDITIONS

Attached under regulation 8(4)
To Decommissioning Project Consent No. 1 granted under regulation 4(b)

BRADWELL POWER STATION

Condition 1

The project[2] shall commence before the expiration of 5 years from the date of this Consent.

Condition 2

(1)The licensee is required to prepare and implement an environmental management plan to cover mitigation measures to prevent, reduce and where possible offset any significant adverse effects on the environment.

(2)The project shall not be carried out except in accordance with the environmental management plan.

Condition 3

Within 90 days of the date of this Consent, with reference to the environmental statement provided under regulation 5(1) and further information provided under regulation 10(1), the environmental management plan shall:

a. list the mitigation measures that are already identified;

b. list the options to implement work activities where mitigation measures may be required but where selection of an option will only be possible in the future;

c. list the work activities were mitigation measures may be required but where assessments to identify mitigation measures will only be possible in the future;

Condition 4

Subsequent to condition 3, the environmental management plan shall:

a. with reference to condition 3b, identify the mitigation measures for options that have been selected, giving reasons for their selection;

[2] Project as defined in regulation 2

b. with reference to condition 3c, identify the mitigation measures from assessments carried out, giving reasons for their selection;

c. describe the effectiveness of the mitigation measures over time;

d. describe significant changes to the mitigation measures in light of experience, giving reasons for such changes.

Condition 5

The licensee is required to:

a. provide the environmental management plan to the Health and Safety Executive within 90 days of the date of this consent and every year thereafter, or within such longer time as the Executive may agree;

b. make the environmental management plan available to the public within 30 days of the plan being sent to the Health and Safety Executive, or within such longer time as the Executive may agree; the plan may replace earlier versions.

Condition 6

The licensee is required to provide notice to the Health and Safety Executive of any significant change to a mitigation measure to prevent, reduce and where possible offset any major adverse effects on the environment no less than 30 days before the change is made, or within such shorter time as the Executive may agree.

Dated: 5th December 2003

For and on behalf of the
Health and Safety Executive

Signed

M W Weightman
A person authorised to act in that behalf

Appendix B: Site Procedures for Reducing Impact

Minimising Environmental Impacts — Decommissioning Proposal Approval Form

PART 5 – ENVIRONMENTAL SAFETY ASSESSMENT

Both 5.1 and 5.2 are to be categorised individually before an overall environmental category is assigned in 5.3.

5.2 EIADR 99, ENVIRONMENTAL IMPACT AND OTHER REGULATORY COMPLIANCE

The following checklist must be completed by an **Environmental SQEP** (with LQ/planning consultation as required). The assessment is for compliance with the EIADR99 Regulations, Planning requirements, non-rad. permits/consents, other relevant legislation and environmental issues including management of land quality.

	PARAMETER	CONSIDER POTENTIAL FOR:	NO	YES
5.2.1	Decommissioning Baseline	Does this proposed modification represent a change from the Decommissioning Project baseline as described in the EIADR 99 Environmental Impact Assessment Baseline document (in particular, is it sufficient to trigger Regulation 13 determination)? If 'YES', (F-871 and F-872, as necessary) in accordance with S-159.	☐	☐
5.2.2	Planning	Does the proposal involve building or structures construction, external modification or demolition (planning permission)? Does the proposal involve on-site/inter-site disposal/transfer of waste (including stockpiling) in any form? If 'YES' confirm if permissions have been agreed, or identify how this will be addressed prior to implementation of proposal.	☐	☐
5.2.3	Non-radioactive Discharges & Waste	Could the proposal, if inadequately conceived or executed, lead to a breach of an existing Environmental Permit/consent, or other environmental licence/regulatory requirement (e.g. controlled activities reg.s, pollution control permit, wildlife management license, PCB registration, marine consent, waste management exemption)?	☐	☐
5.2.4	Non-radioactive Discharges & Waste	Is a change to an existing Environmental/PPC Permit, Licence or Consent or new Environmental Permit or registered waste management licence or exemption required for this proposal?	☐	☐
5.2.5	Land Quality	Will the proposed work involve 'breaking ground' or otherwise have the potential to affect the sub-surface or controlled waters? If 'YES', complete form F-158 in accordance with S-154, and ensure that any required mitigation measures are included in this DPAF.	☐	☐
5.2.6	Other Environmental Impacts	Could the proposal, if inadequately conceived or executed, lead to an unacceptable environmental impact? (Consider relevant legislation and formal guidance). If so, appropriate controls/ mitigation must be specified.	☐	☐

5.2.7 If all answers are 'NO' then the proposal is Category E3.
If 'YES' is answered to any questions above, then assess the environmental impacts and provide further information below.

5.2.8 CONTROL MEASURES AND COMMENTS

Describe the control measures that will be used to ensure that environmental risks are adequately managed. Refer to environmental assessments and BAT studies where appropriate.

5.2.9 Potential Environmental Category with respect to EIADR 99 Compliance and all other environmental aspects:

E1 ☐	E2 ☐	E3 ☐
Name: ***Environment SQEP***	Signature:	Date:

Appendix B – Continued

Minimising Environmental Impacts — Decommissioning Proposal Approval Form

PART 5 – ENVIRONMENTAL SAFETY ASSESSMENT

Both 5.1 and 5.2 are to be categorised individually before an overall environmental category is assigned below.

5.3 OVERALL ENVIRONMENTAL ASSESSMENT

To be completed by the **NRE**, with signatures from **Environmental SQEP/PRSLA** and **EHSS&Q Manager** as appropriate.

5.3.1 ENVIRONMENTAL JUSTIFICATION / MITIGATION

Refer to control measures under 5.1 and 5.2, make a summary statement. Also consider if there is any conflict between mitigations that need to be addressed or if additional mitigations are required overall.

5.3.2 OVERALL ENVIRONMENTAL CATEGORY

The environmental category is determined by reviewing the adequacy of the environmental hazard identification and assessment carried out and consider whether any other relevant aspects of the category definitions given in MCP-099 Appendix 1 are relevant. Select the relevant box below.

Environmental control and mitigation measures required have been identified above and will be incorporated in the design or working methods. Any further Environmental Justifications (e.g. BAT / BPM) should be attached.

RECOMMENDED ENVIRONMENTAL CATEGORY:

E1 ☐	E2 ☐	E3 ☐
Name: ***Environment SQEP/PRSLA***	Signature:	Date:

For category E1 modifications, two additional signatures are required:

1) Confirm awareness of the modification proposal.

Name: ***EHSS&Q Manager***	Signature:	Date:

2) Confirm that the modification proposal has been reviewed by Head of Profession – Environment and that comments / recommendations have been addressed.

Name: ***NRE***	Signature:	Date:

Appendix C: Stakeholder Engagement

Whilst each step of decommissioning represents a new phase in the lifecycle of the site, Magnox Ltd remains committed to engaging with stakeholders during all phases in the process.

Meetings are held with the Local Community Liaison Council (LCLC). This includes elected local Parish and District Councilors, representatives from the EA and the ONR, as well as members of the general public.

Throughout the last year the Local Community Liaison Council (LCLC) has continued to be the primary communication tool to engage the local community. Magnox continues to support the local area through the Socio-Economic Scheme which provides funding for projects in the area surrounding the Site.

Following entry into C&M, the management of Bradwell Site is being undertaken by Sizewell A staff. Periodic meetings with the regulators (EA & ONR) are held regarding the management of Bradwell Site. These meetings take place both at Bradwell Site and during 'dual visits' at Sizewell A Site.

The role of the Nuclear Decommissioning Authority (NDA)

The Energy Act (2004) (as amended) requires that the NDA must prepare a strategy for carrying out its functions and from time to time to revise that strategy. This strategy must set out the steps that the NDA proposes to take for:

- *giving appropriate publicity to its responsibilities and strategy;*
- *explaining them both to persons having a particular interest in matters relating to the carrying out by the NDA of its functions and to the general public;*
- *ensuring that the NDA is kept informed at all times of the opinions about such matters of persons having such a particular interest; and*
- *facilitating the communication by such persons of their opinions to the NDA*.

The NDA is also required to give encouragement and other support to activities that benefit the social or economic life of communities living near those sites for which it has responsibilities, including Bradwell.

The NDA's strategy requires the NDA to review Site End States in consultation with stakeholders. The process consists of various stages of stakeholder consultation aimed at arriving at Site End State Definitions that will be reconciled with national requirements before being incorporated into the revised NDA Strategy.

Appendix D: Land Quality Assessment Form

In considering proposals for work on Site, a number of questions relevant to land quality must be answered, as set out in this form.

1. Does the proposed work have any potential for disturbance / mobilisation of existing contaminated ground and/or groundwater?	
1a. Will the proposed work involve 'breaking ground' or otherwise have the potential to affect the sub-surface? Such work may involve excavations, advancing of boreholes or piles, changes in ground cover, changes to surface water drainage, groundwater abstraction, ground de-watering.	Yes/ No*
If the answer to 1a is Yes: 1b. Is there any existing known or suspected ***contamination*** of land (ground and/or groundwater) that could be affected significantly by the proposed work? The answer to this question shall be based on the ***Site Land Quality Interface*** person consulting the site's ***Land Quality Map*** and related ***Land Quality Register***, noting that indirect effects such as modification of groundwater pathways can mean that work in one area may affect contamination present in another area. If in doubt, consult the ***Land Quality Technical Lead*** for the site.	Yes/ No*
If the answer to 1b is Yes: Give details of the mitigation measures specified to eliminate / mitigate any potential impacts.	
Specified mitigation measures:	
Was specialist advice sought in answering Question 1?	Yes/ No*
Give details of who was consulted. Give name and role, e.g. ***Land Quality Technical Lead*** or Environmental SQEP:	
2. Does the proposed work have any potential to result in exposure of those undertaking the work to contaminants at levels that should be taken into account in the Method Statements and Risk assessments for the work?	Yes/ No*
This question should be answered with reference to the site's ***Land Quality Map*** and related ***Land Quality Register***. If yes, detail the measures to be put in place to provide adequate protection of the workers.	

Appendix D - Continued

Specified mitigation measures:	
Was specialist advice sought in answering Question 2?	Yes/ No*
Give details of who was consulted. Give name and role, e.g. COSHH Assessor / Accredited Health Physicist:	
Assessment prepared by (give name & role[2] and date):	
Assessment approved by (give name & role[3] and date):	
Completed form to be filed as appropriate - e.g. with relevant Decommissioning Proposal Approval Form (DPAF; F-142).	
Unexpected contamination: Any unexpected ***contamination*** identified during the works shall be reported to the Nominated Responsible Engineer, to the site's ***Site Land Quality Interface*** person and to the ***Land Quality Technical Lead*** for the site, who will provide initial advice on what action to take and whether to amend the ***Land Quality Map*** and ***Land Quality Register***.	

Note: * Delete as applicable

[2] This would normally be the Nominated Responsible Engineer for the relevant DPAF.
[3] This would normally be the ***Site Land Quality Interface*** persion, or the ***Land Quality Technical Lead*** if the answer to Question 1b is 'Yes'.

Appendix E: Principles for a Travel Plan

Objective

All decommissioning operations involving transport will be managed so as to minimise the environmental effects of these operations, as far as is reasonably practicable. The principles for achieving this are defined below.

Transport Management Principles

- The numbers of individual transport movements will be minimised as far as is reasonably practicable.
- Employees and contractors will be encouraged to use video and teleconferencing facilities as much as possible.
- Employees and contractors will be encouraged to share transport (or use public transport) when travelling to and from the Bradwell Site.
- Magnox Ltd and its contractors will be required to maintain their vehicles in a good standard of condition.
- When appropriate, vehicles leaving the Site will be subject to wheel wash and inspection to ensure that earth and other material is not unduly dispersed.
- On Site roads will be swept as necessary to minimise the spread of material off site and/or into drains or watercourses.
- Signage will be provided at Site exits to reinforce the contract requirements on vehicle drivers.
- Where practicable, transport distances will be minimised by the use of local disposal sites, recycling companies, etc.
- HGV transport movements will be undertaken during normal working hours.
- HGVs will be required to exit the Site through the Bradwell Site main gate and, where appropriate, to follow preferred routes to and from the strategic road network.
- In the event of the need for an abnormal load to be transported, a specific plan for this movement will be developed.

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