

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5

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**1 INTRODUCTION**

Imperial College Reactor Centre (ICRC) ceased operations at the end of December 2012 and was subsequently fully defueled. Decommissioning of the reactor vessel and surrounding bioshield was completed in February 2020. During controlled soft strip at this time, asbestos-containing materials and other building fixtures were removed and disposed of. At issue 5 of this document demolition was set to commence.

Under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 (as amended) HSE consent to carry out any dismantling or decommissioning work at ICRC has to be granted before any decommissioning work commences. In January 2015, ICRC applied to the Health and Safety Executive (HSE) for the consent to decommission and the application was accompanied by an environmental statement as required by the Regulations.

Following a public consultation on the environmental statement consent to decommission was granted in July 2015 subject to the following six conditions.

**Condition 1**

*The project shall commence before the expiration of five years from the date of this Consent.*

**Condition 2**

- a) 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.
- b) 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) the environmental management plan shall:*

- a) list the mitigation measures that are already identified in the environmental statement;
- 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; and
- c) list the work activities where 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;
- 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 taken over time; and

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5**

---

- 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 Office for Nuclear Regulation within 90 days of the date of this Consent and on each anniversary of the expiry of this 90 day period or within such longer time as the Office for Nuclear Regulation may agree, the licensee shall provide an updated environmental management plan;
- b) make the environmental management plan available to the public within 30 days of the plan being sent to the Office for Nuclear Regulation, or within such longer time as the Office for Nuclear Regulation may agree; the plan may replace earlier versions.

**Condition 6**

*The licensee is required to provide notice to the Office for Nuclear Regulation 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 Office for Nuclear Regulation may agree.*

The ICRC Environmental Management Plan (EMP) is structured in a way to clearly demonstrate how ICRC plans to meet the requirements of these conditions and ensure that appropriate mitigation measures are employed during all phases of the decommissioning and demolition project.

This fifth issue of the EMP provides an update on the measures assumed in the original EMP, including implementation of many of the mitigation measures described in previous issues. It is noted that there are few changes compared to last year's EMP. Since the previous issue the main tasks of interest have been the cutting, removal and disposal of the concrete bioshield and the soft strip and asbestos strip. The demolition of the reactor buildings will commence in November 2020, followed by remediation of the land. The project is expected to complete mid 2021. This is a significant delay from the previously stated mid 2020 due to the Covid-19 restrictions and the badger habitat mitigations.

**2 SCOPE OF THE ENVIRONMENTAL MANAGEMENT PLAN**

The Environmental Management Plan (EMP) is an opportunity to update the decommissioning plan, communicate ICRC's environmental commitments and provide examples of mitigation measures that have been and will be implemented throughout the decommissioning project.

**2.1 Areas of Environmental Commitment**

The findings and recommendations from the Environmental Impact Assessment undertaken are presented in detail in the Environmental Statement, the following areas have environmental commitments identified:

- Air quality
- Ecology

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5**

---

- Geology, hydrology and soil
- Landscape
- Noise and vibration
- Radioactive discharges
- Radioactive and non-radioactive waste
- Socio economic
- Surface water

**3 STAKEHOLDER ENGAGEMENT**

Whilst decommissioning has represented a new phase in the lifecycle of the site, Imperial College remains committed to engaging with stakeholders through the remaining phases in the process. Regular meetings have been and will continue to be held with other organisations that will also be kept informed of activities at the site. The organisations listed below were involved in the public consultation process for the Environmental Statement.

Environment Agency  
 Natural England  
 Royal Borough of Windsor & Maidenhead  
 Berkshire East PCT  
 Berkshire Wildlife Trust  
 Campaign to Protect Rural England  
 Community and Local Government Country Land & Business Association  
 Crown Estates  
 DEFRA  
 English Heritage  
 Food Standards Agency  
 Friends of the Earth  
 Greenpeace  
 Highways Agency  
 National Farmers Union  
 National Trust  
 Public Health England  
 Nuclear Decommissioning Authority  
 Nuclear Free Local Authorities  
 Office for Nuclear Regulation  
 Nuclear Safety Advisory Committee  
 Railtrack Properties  
 Ramblers Association  
 Royal Berkshire Fire & Rescue Service  
 RSPB  
 Silwood Park Campus Committee  
 Silwood Park Campus Safety Committee  
 Sunningdale Parish Council  
 Sunninghill and Ascot Parish Council  
 Thames Valley Police

ENVIRONMENTAL MANAGEMENT PLAN

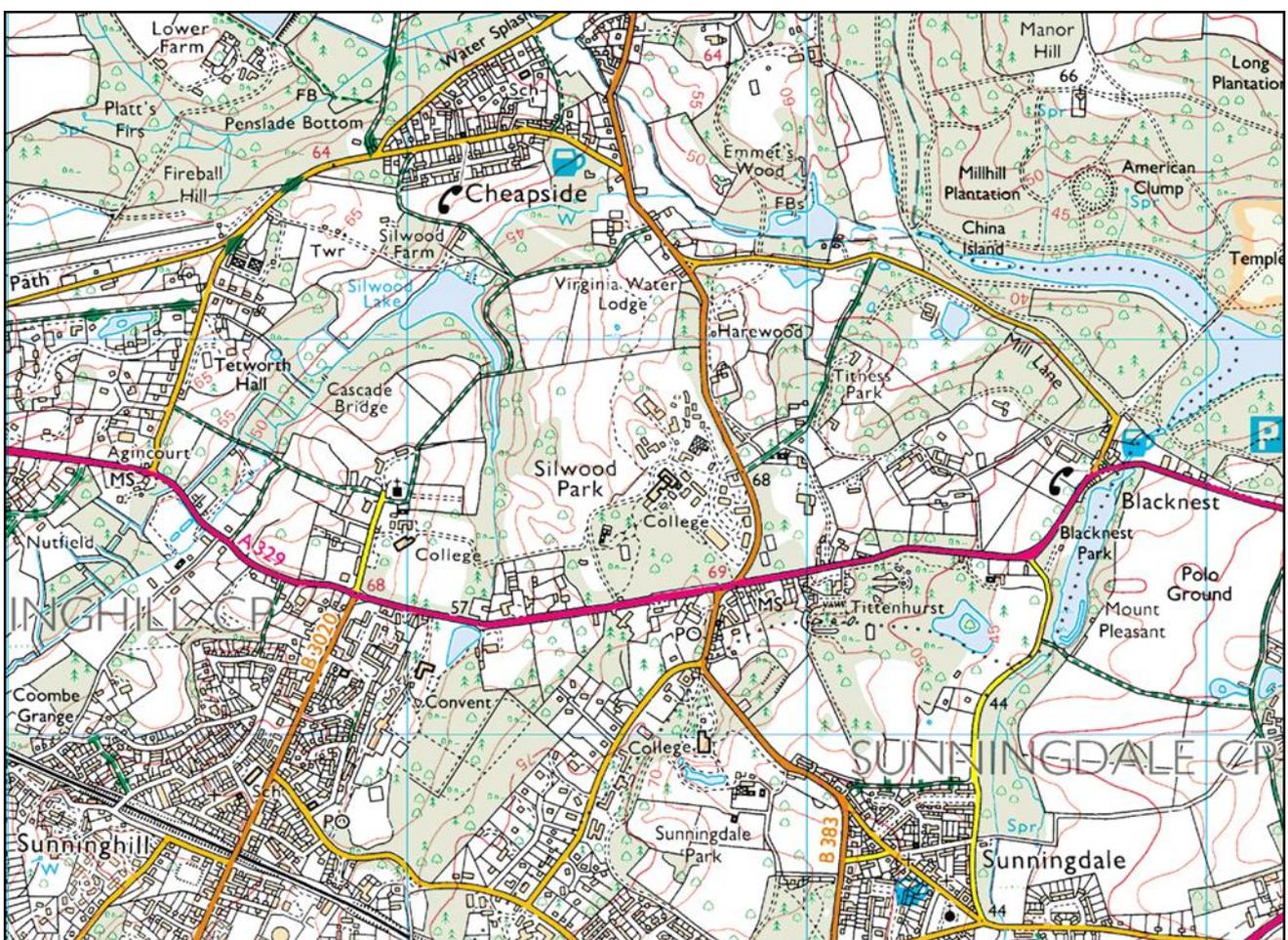
ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5

As well as regular meetings with key stakeholders, where appropriate, other interested parties will also be kept informed of specific decommissioning activities.

4 THE SITE AND SURROUNDING AREA

4.1 Site Description

The reactor site, which covers an area of 0.49 hectares, is located within the Imperial College London Silwood Park Campus near Ascot, Berkshire, in the Royal Borough of Windsor and Maidenhead. The site is approximately 40km west of London and 3.5km east of Ascot.

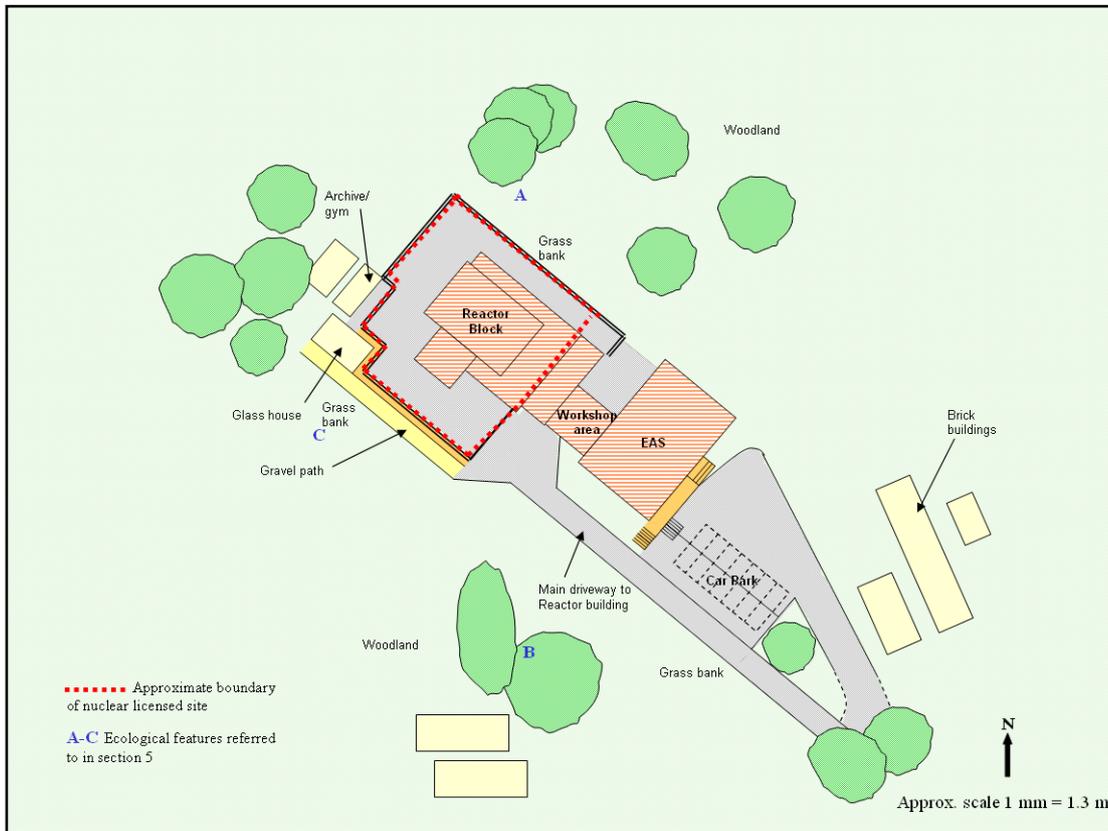


Silwood Park Campus is bounded by open land to the north and west, B383 Buckhurst Road to the east and by the A329 London Road to the South. An access road for the Reactor site runs west from Buckhurst Road and north from London Road.

The operational site consists of the Reactor Building, the EAS Laboratory building, interlinking work shop area and associated hard standing areas for access.

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5



## 5 SITE MANAGEMENT AND DECOMMISSIONING

### 5.1 General Site Management

#### Decommissioning and Demolition Contractor

KDC are the Principal Contractor under the Construction (Design and Management) Regulations 2015. They provide staff, plant and equipment to undertake all of the work associated with bioshield decommissioning, building soft strip, asbestos removal, building demolition and land remediation. They have issued an Environmental Management Plan, KDC/01357/ICL/EMP/01 Issue A2, November 2018, which sets out the mitigation methods in response to the identified receptors detailed below in Section 7.

#### Hours of Work

Current normal working hours are between 07:30 and 17:30 hours, Monday to Friday. Most work on site will also be undertaken during these hours under a single shift working arrangement, but this may need to be altered for certain activities. For example, from time to time the working day may be extended in order to allow transport during quieter times. Royal Borough of Windsor and Maidenhead Council will be notified in advance of any potentially significant work outside of the normal Monday to Friday working hours and will be provided with a site contact in the event of any queries or complaints.

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5

---

Lighting

The existing night-time illumination at the campus consists of low level 'street' lights. Further lighting may be necessary at times. Use of such lighting, which would only normally be used at the start and end of the working day during the winter months, will be at the discretion of the relevant Site Supervisor. Consideration will be given to the use of directional lighting to minimise any light spill.

Transport

Vehicle movements to and from Imperial College Reactor Centre are subject to the provisions of a Traffic Management Plan, KDC/01357/ICL/TMP/01.

**5.2 Decommissioning Methods**

Conventional Area Decommissioning

Conventional plant and buildings were de-planted using standard construction industry methods. There was a substantial quantity of asbestos present within the buildings which necessitated trained contractor staff using approved asbestos containment techniques and personnel protection for its safe removal. The interior of buildings were de-planted and decontaminated as necessary prior to the next stage of demolition of the buildings structures.

Remaining Asbestos wall cladding on the exterior of the Reactor Hall will be removed manually and roof sheets will be removed using an approved method by the grab attachment of a diesel-powered excavator. Following this, building demolition will be carried out using conventional methods, including use of the excavator. All buildings will be demolished in their entirety, the structures including any cabling removed to ground level and the voids backfilled with soil. All drains / foundations will be removed and all pipes and tunnels deeper than 1 metre will be backfilled with grout. However, the main road leading almost up to the reactor building will be maintained as it provides access to the now disused campus gym.

Demolition of Radioactive Facilities

Radioactive plant in the reactor building was decontaminated where necessary and dismantled. Other plant and equipment was decontaminated in situ and recycled where it was practicable to do so. Extensive decontamination was not required, only local decontamination of small items was necessary. Examples of these decontamination processes are shown in section 5.3.

Contamination control provisions were applied effectively, including work within temporary enclosures by operators wearing air-hoods. Working procedures successfully minimised workers exposure to radiation to as low as reasonably practicable (ALARP).

Monitoring checks will be made on the building structure and surrounding area as demolition proceeds and on the resulting demolished materials prior to disposal.

**5.3 Examples of Decontamination Techniques**

Selection of a suitable decontamination technique depended on the levels of contamination present, the type of item and disposal options. Techniques included:

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5**

---

- Scabbling involves the physical removal of surface contamination, predominantly on concrete and includes chipping and light abrasion;
- Shot blasting uses high velocity shot to remove surface contamination;
- Hosing with water to remove surface contamination;
- Quill water jet system to remove asbestos surface coatings; and
- Wipe down, involves the removal of contamination by wiping with a paper towelling or cloth.

**5.4 Waste Management**

Intermediate Level Radioactive Waste (ILW)

The operational ILW has now been removed. However, there is currently no disposal route for ILW in the UK. For ILW the strategy is one of retrieval and packaging, then transfer to Sellafield for storage on-site until such time as an off-site disposal route becomes available to receive it. The wastes have been transferred to Sellafield and no further ILW is expected.

Low Level Radioactive Waste (LLW)

LLW management facilities already existed on site to process and package LLW before its transfer to the LLW Repository (LLWR) located near Drigg in Cumbria however the LLW produced fell with the criteria for registered landfill or incineration so the LLWR was not used. Only very minor secondary wastes and potentially small volumes of waste composed of the base slab remain. Where possible the use of this route will be minimised.

All hazardous and radioactive wastes have been and will continue to be managed by authorised contractors who hold the appropriate Carrier's Licence, which is checked for current validity before a contract is placed and implemented. The specific contractor used will depend on the type of waste requiring disposal. All records are auditable and will be checked regularly. Asbestos safety during asbestos removal will focus on the hazards associated with manual handling and working at heights, in addition to the hazard of the asbestos itself, and there will be strict compliance with the Control of Asbestos Regulations 2012. There are different methods adopted in the removal of asbestos depending upon the type of asbestos being removed. Insulation containing asbestos have been removed using specialist personnel working in tented areas subject to airlocks and a negative pressure air system. The tents fully enclosed the entire areas being stripped of asbestos. Respiratory protective equipment, overalls and gloves were used for the removal. Where appropriate asbestos areas were damped down prior to removal to minimise release of fibres. The interior of the tented enclosures were washed down to remove any fibres that may have been released during the stripping process and the water was filtered to remove any asbestos fibres. The filters were disposed of along with the asbestos. Non-radioactive asbestos was double bagged in its wet state after stripping, hence there was no liquid waste to be processed from the removal operation itself. Non-radioactive asbestos has been sent to a licensed asbestos disposal site as will the asbestos cladding and roof panels. Radioactive asbestos is not expected but if discovered will be sent for disposal in the LLW repository near Drigg, after the removal of excess air from bags and appropriate monitoring.

Other Wastes

Non-radioactive waste materials have arisen throughout the operating life of the reactor. In general, the management of waste at ICRC has and will continue to aim to minimise the need to use landfill

**ENVIRONMENTAL MANAGEMENT PLAN****ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES ICRC MP 757 ISSUE: 5**

---

by reducing waste volumes wherever possible by following the hierarchy of waste management, i.e. eliminate, reduce, reuse, and recycle. Imperial College follows the Environmental Protection Act 1990 duty of care principles for all waste arisings and where waste is transferred, it is accompanied by a transfer note and a full written description of the wastes. Scrap metals, glass and other suitable materials will be sent to an appropriate contractor for recycling. A large quantity of lead, previously used as shielding was shipped to a specialist contractor for re-use, during 2018/19. If it is not practicable to reuse or recycle any scrap materials they will be disposed of via approved routes in accordance with the duty of care principles, principally landfill.

**5.5 Radioactive Discharges & Emissions**

Radioactive disposals controlled under EPR16 are subject to authorisations and limits set by the Environment Agency. As required by the authorisations best practicable means are used to minimise radioactive discharges. During decommissioning liquid radioactive waste sources included waste water from cutting operations and decontamination operations. Previously all waste water arising on site that had the potential to be radioactively contaminated was transferred to the delay tank, which is being decontaminated at the time of issue of this document. Approval to discharge its contents to the local water authority sewerage system was gained. Water mist will be sprayed during building demolition to suppress dust and potential asbestos fibres however this will not be in sufficient quantities to accumulate or constitute discharges or emissions.

**6 ENVIRONMENTAL PERFORMANCE MONITORING**

Future issues of this EMP will not only provide information on any decommissioning works that have been carried out since the previous submission of the EMP, but will also contain details of decommissioning works planned, the effectiveness of any mitigation employed to date and a review of any changes required to the mitigation measures in respect to ecological changes at the site and/or experience gained.

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

7 MITIGATION MEASURES

7.1 Mitigation measures already identified (Condition 3a)

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
Air Quality			
<p><i>Human and ecological receptors:</i></p> <p>Potential adverse environmental effects from exhaust emissions from site plant, equipment and vehicles, and fugitive dust emissions from site activities.</p>	<p>An Air Quality Management Plan (AQMP) will be implemented to reduce the impacts of the proposed scheme on Air Quality. The measures implemented, which will depend on the selection of decommissioning, demolition techniques and programme, will be specified in the AQMP.</p>	<p>Primarily during building demolition works (commencing Autumn 2020) and asbestos cladding and roof panel removal.</p>	<p>KDC Air Quality Plan (KDC/01357/ICL/AQMP/01, Issue A2, Sept 2018) addresses this receptor.</p> <p>The bioshield containment tent contained dust – although for radiological protection purposes it also adequately prevented non-radiological dust spreading.</p> <p>Asbestos dust control measures were successfully implemented in line with the approved risk assessment and method statement for the work during asbestos strip, with no breaches found.</p> <p>Environmental monitoring for asbestos will be done by a specialist analyst during cladding and roof panel removal.</p> <p>Monitoring for dust in air during demolition will be done using adhesive sample pads which will be analysed on a weekly basis.</p> <p>There was no dust released during bioshield decommissioning.</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
Ecology			
<p><i>Silwood Park Local Wildlife Site:</i> HGV access route runs close to a small section of the site.  Mature trees in this area could be affected if the existing access track is required to be widened or if facilitation pruning was necessary to allow large HGVs.</p>	<p>The area adjacent to the HGV route will be clearly signed as an area of ecological sensitivity.  Vehicles will be restricted to the existing tarmac route, which will not be widened at this point.  Facilitation pruning will be avoided as far as possible to any trees located within the LWS.</p>	<p>Beginning October 2019.</p>	<p>The minimum necessary facilitation pruning behind the refectory was done during October 2019 to facilitate the contractor porta-cabin installation.  Further pruning along the access route from the South Gate has been done by Estates Services.  A large Beech tree has been inspected with consideration of pruning to allow excavator access during mid 2020 however it was deemed unnecessary.</p>
<p><i>Broadleaved Woodland and Scattered Individual Trees</i>  Vehicle movement or material storage in the root protection zones of individual trees or groups of trees.  Potential for root damage and compaction.</p>	<p>Trees within the works area will be protected by the erection of temporary chestnut paling or chain link fencing to a minimum height of 1.2m on a scaffolding framework. The fencing will remain in place for the duration of the proposed scheme.  No materials will be stacked or mixed within 10m of any tree.</p>	<p>To be considered prior to Reactor Centre site fence removal.</p>	<p>Action 1: Consideration of root protection zones is not included in the KDC Environmental Management Plan (KDC/01357/ICL/EMP/01 Issue A2, November 2018, this will be flagged up with the contractors.</p>
<p><i>Badgers</i>  The disused badger setts may be re-occupied.</p>	<p>Pre-demolition badger survey carried out no more than two weeks prior to the demolition of the Reactor Centre</p>	<p>No more than 2 weeks prior to building demolition</p>	<p>A badger survey found snuffle hole evidence of current occupation of badger setts in July 2020. Licence 2020-49320-SPM-WLM valid from 30th September 2020 to 30th November 2020 was granted to allow temporary closure of the setts using mesh and one-way gates allowing badgers to leave the setts. After the specified ecologist confirmed the</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
			vacation of the badgers, demolition works have been allowed to commence.
<p><i>Nesting Birds</i></p> <p>Vegetation clearance required to allow the demolition of the Reactor Centre may have an effect on nesting birds in the bird breeding season (March – August).</p>	<p>Vegetation that could be used by nesting birds, will be removed outside of the bird-nesting season (March-August). Silwood Park Campus academic staff from the Natural Science Department can advise on bird nesting habits.</p>	<p>Planning beginning in October 2019.</p>	<p>The requirement for cutting back vegetation was being considered during October 2019 and a plan will be developed to do the necessary work over the winter.</p> <p>Work will commence during the Winter months and will therefore be out of the breeding season.</p>
<p><i>Reptiles</i></p> <p>Direct injury to common reptile species</p>	<p>Habitat management under an ecological watching brief may be required should demolition works extend into these areas.</p>	<p>Prior to site fence removal.</p>	<p>Considerations of reptile habitat shall be made prior to the site fence being disturbed.</p>
<p>Geology, Hydrology and Soils</p>			
<p>Land and/or water quality effects</p>	<p><i>Intrusive Investigations</i></p> <ul style="list-style-type: none"> <li>Baseline conditions will be determined based on the findings of intrusive investigation works (these will be in accordance with a scope agreed with the RBWM Environmental Health Officer (EHO)).</li> <li>The contamination status of made ground beneath the site and potential leachability will be assessed by chemical analysis of core samples taken from the base slab.</li> </ul>	<p>Prior to removal of concrete base slab and asbestos strip works.</p> <p>Core sample results expected before slab breaking and removal in January 2021. A suitable mitigation strategy will be put in place dependant on the results.</p>	<p>KDC's Surface Water Management Plan, (March 2019 KDC/01357/ICL/WMP/01 Iss. A2) sets out the measures to reduce the risk of environmental impacts upon any drainage or surface water receptors.</p> <p>This includes drainage pattern and loads and prevention and mitigation of spillages and leaks.</p> <p>KDC Environmental Management Plan (KDC/01357/ICL/EMP/01 Issue A2, November 2018 details the pollution prevention measures with regards to chemical storage and spillages.</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
	<p><i>Options Appraisal and detailed Remediation Method Statement (RMS)</i></p> <ul style="list-style-type: none"> <li>Following the intrusive investigations, this will specify the mitigation measures necessary to break any identified pollutant linkages.</li> <li>Prior to the concrete slab removal the RMS will be submitted to the RBWM EHO Environmental Health Officer and, if necessary, to the Environment Agency for approval.</li> </ul> <p><i>Asbestos Demolition Survey</i></p> <ul style="list-style-type: none"> <li>This will confirm the presence or absence of asbestos in any of the existing structures. Where asbestos is identified, the materials will be removed by a licensed asbestos contractor.</li> </ul> <p><i>Any fuels, oils and lubricants will be stored in a secure bunded area, with refuelling restricted to these areas. Spill kits will be available on site in case of accidental spillages.</i></p>		<p>ICRC/SD/909 Site Characterisation Plan provides a basis for radiation protection, identification of contamination, assessment of potential risks, planning and implementation of decommissioning.</p> <p>Asbestos Pre Demolition survey J644073 has detailed the baseline of asbestos materials and any contamination. The KDC Overarching Asbestos Plan of Works KDC/ASB/DC/01357/01 Issue 2 07/10/2019 provides the method for removal.</p> <p>Submissions to the RBWM EHO will be made prior to the concrete base slab removal commencing.</p>
<p><i>Neighbouring properties and residents</i></p> <p>Potential release of contaminated dust (including possible asbestos containing materials) during the demolition</p>	<p>An asbestos demolition survey will be undertaken to confirm the presence or absence of asbestos within any of the existing structures. Where asbestos containing materials are identified, these will be removed by a licensed asbestos contractor prior to demolition. The</p>	<p>Prior to demolition and asbestos strip works</p>	<p>KDC Air Quality Plan (KDC/01357/ICL/AQMP/01 Iss A2, Sept 2018) addresses this receptor.</p> <p>Asbestos Pre Demolition survey J644073 has detailed the baseline of asbestos materials and any contamination. The KDC Overarching Asbestos Plan</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
of structures and movement of construction vehicles	contractor has been supplied with the current asbestos register.		of Works KDC/ASB/DC/01357/01 Issue 2 07/10/2019 provides the method for removal.  No dust or asbestos releases occurred during the phases of work up to issue 5 of this EMP.
<i>Neighbouring properties and residents</i>  Surrounding soil and groundwater may be contaminated if there were to be an accidental spillage.	Any fuels, oils and lubricants will be stored in a secure bunded area, with refuelling restricted to these areas. Spill kits will be available on site in case of accidental spillages	During decommissioning and demolition	KDC Environmental Management Plan (KDC/01357/ICL/EMP/01 Issue A2, November 2018) details the pollution prevention measures with regards to chemical storage and spillages.  There have been no fuel / oil spillages or uncontrolled releases to the environment during the phases of work up to issue 5 of this EMP.
<i>Neighbouring properties and residents</i>  Potential release of contaminated dust (including possible asbestos containing materials) during the demolition of structures and movement of construction vehicles.	Should the presence of previously unidentified contaminated material be suspected during excavation works, work will cease until the material has been characterized and appropriate measures to treat or dispose of the contaminated materials have been identified	During demolition	Asbestos as above.  ICRC/SD/909 Site Characterisation Plan provides a basis for radiation protection, identification of contamination, assessment of potential risks, planning and implementation of decommissioning.  No dust or asbestos releases occurred during the phases of work up to issue 5 of this EMP.
<i>Neighbouring properties and residents</i>  Surrounding soil and groundwater may be contaminated due to dewatering activities.	The amount of water entering excavations will be minimised to reduce dewatering activities. Should dewatering be required, the EA will be consulted and appropriate abstraction and discharge licences will be obtained	During decommissioning and demolition	KDC's Surface Water Management Plan, (March 2019 KDC/01357/ICL/WMP/01, Issue A2) sets out the measures to reduce the risk of environmental impacts upon any drainage or surface water receptors.

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
			There have been no uncontrolled releases of water to the environment during the phases of work up to issue 5 of this EMP.
<b>Landscape</b>			
<p><i>Root protection area of existing trees</i></p> <p>Stored materials and access in root protection areas of existing trees may affect the trees and their contribution to screening mitigation.</p>	<p>If materials are stored or access is needed in the root protection area of existing trees, protective tree fencing in accordance with BS5837:2012 Trees in Relation to Design, Demolition and Construction will be erected.</p>	<p>To be considered prior to Reactor Centre site fence removal.</p>	<p>Action 1: Consideration of root protection zones is not included in the KDC EMP, this will be flagged up with the contractors on issue of this document (October 2019).</p>
<b>Noise and Vibration</b>			
<p>The gymnasium and maintenance workshop will be subjected to a prolonged period of noise disturbance from demolition works.</p>	<p>The gym and workshop will be closed during demolition.</p> <p>Alternative ventilation methods will be required in the gymnasium and maintenance workshop.</p> <p>Due consideration is to be given to sensitive activities on campus and key activities during the academic year, e.g. examination periods.</p>	<p>Gym relocated August 2019.</p>	<p>The gym was relocated for safety reasons – to avoid regular pedestrian access past the demolition site. Therefore noise and vibration are not of concern. The workshop is no longer used.</p> <p>In agreement with the Environmental Health Office notices shall be distributed to the immediately neighbouring properties warning that demolition sounds may be heard during working hours during certain periods of demolition.</p>
<p>Demolition vibration may cause annoyance to users in adjacent</p>	<p>Users will be informed of the times and duration of works adjacent to the buildings.</p>	<p>During demolition.</p>	<p>KDC's Noise and Vibration Management Plan, November 2018, Ref: KDC/01357/ICL/NVMP/01 Issue A2 and the Risk Assessment and Method</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
buildings during the breaking of tarmac.	Vibration monitoring is recommended beside the gymnasium during the removal of tarmac three metres from the building.		Statement for the Reactor Centre Demolition KDC/01357/ICL/REACTOR CENTRE DEMOLITION/001 A1 2 <sup>nd</sup> July 2019 both provide details the mitigation and methods for reducing and monitoring vibration during demolition.
Radioactive Discharges			
Neighbouring properties and residents Surrounding ecology	<p>To ensure that radioactive discharges are as low as reasonably practicable within the authorised limits, Best Available Techniques (BAT) will be applied and will be monitored prior to discharge.</p> <p>For discharges to water, the following BAT will be applied:</p> <ul style="list-style-type: none"> <li>The volume of aqueous waste requiring disposal will be reduced by minimising water use in cutting and decontamination activities;</li> <li>Water clean-up systems, containing particulate filters and resins, will be used where appropriate. These will be determined as part of planning decommissioning activities;</li> <li>All radioactive liquid discharges will be monitored.</li> </ul> <p>For discharges to air, the following BAT will be applied:</p>	Prior to and during Decommissioning and demolition.	<p>The contractors have included consideration of BAT within Decommissioning Best Available Techniques (BAT) Assessment 208165-0000-AA40-RPT-0001 9th July 2018.</p> <p>The techniques described have been implemented successfully to date. There have been no unusual occurrence reports (UNORs) regarding discharge threats to the environment.</p> <p>The Demolition Phase BAT Study KDC/01357/ICL/DEMO/BAT/ASSESSMENT/001/A1, 06/06/19 describes the techniques to be used during demolition.</p> <p>There have been no uncontrolled radioactive aqueous, gaseous or particulate releases to the environment during the phases of work up to issue 5 of this EMP.</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
	<ul style="list-style-type: none"> <li>Local HEPA filtered contaminant modules will be used during significant dust-producing activities;</li> <li>Confined enclosures and fixing solutions will be used when appropriate on contaminated surfaces. These controls will be determined as part of planning decommissioning activities;</li> <li>All radioactive gaseous discharges will be monitored.</li> </ul>		
Radioactive and Non-radioactive Waste			
<p>Neighbouring properties and residents</p> <p>Surrounding ecology</p>	<p>Best Available Techniques Studies are used to minimise the impacts arising from waste. This includes details on:</p> <ul style="list-style-type: none"> <li>The likely types and quantities of waste generated;</li> <li>The waste management options in consideration of the waste hierarchy (e.g. reuse, recycle, landfill);</li> <li>The methods for identifying and managing any hazardous wastes</li> <li>Details of waste management sites and contractors for all wastes (including registration numbers).</li> </ul>	<p>During decommissioning and demolition.</p>	<p>The BATs as given above address the impacts arising from waste.</p> <p>The KDC Site Waste Management Plans for Out of Scope waste (KDC/01357/ICL/SWMP/001, 10/12/18), and radioactive waste (Decommissioning SWMP, 208165-0000-AA20-PLN-0001, 01/03/2019, Wood) address the minimisation of impacts arising from wastes.</p> <p>Waste has been appropriately disposed of following the plans given above.</p>

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES

ICRC MP 757 ISSUE: 5

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
	<p>A waste hierarchy will be applied to radioactive and non-radioactive solid wastes. Where possible, waste will be reused or recycled. Where reuse and recycling is not possible, waste will be disposed of in accordance with relevant legislation.</p>		
<p>Neighbouring properties and residents Surrounding ecology</p>	<p>The Nuclear Industry Code of Practice on Clearance and Exemption will be followed to ensure that radioactive and non-radioactive wastes are separated correctly.</p> <p>The following BPM will be adopted to minimise radioactive waste at the Reactor site:</p> <p>Initial characterisation prior to the reactor shut-down has been carried out (to optimise waste segregation) using a combination of visual inspection, drawings, design specifications, operational histories and activation analysis modelling using the computer code FISPACT, or similar;</p> <p>Segregating wastes through continuous assay to avoid mixing of different waste types and to avoid the production of secondary wastes via the spread of radioactive contamination;</p> <p>Cutting techniques such as diamond wire for precise cutting;</p> <p>Radiochemical analysis and intrusive sampling of reactor components to confirm the expected</p>	<p>During decommissioning and demolition</p>	<p>The best practical means adopted to minimise radioactive waste are detailed in the KDC Site Waste Management Plan for radioactive waste (Decommissioning SWMP, 208165-0000-AA20-PLN-0001, 01/03/2019, Wood).</p> <p>Waste has been appropriately segregated and disposed of following the plans given above.</p>

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES**

**ICRC MP 757 ISSUE: 5**

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
	<p>waste inventory and to produce a set of “fingerprints” that can be used as part of the solid waste assay process;</p> <p>Size-reduction techniques and compacting waste where appropriate;</p> <p>Decontaminating to enable maximum clearance of material as nonradioactive;</p> <p>Reviewing practices and learning from best practice; and</p> <p>Training to increase awareness.</p>		
<b>Socio Economic</b>			
<p><b>ICRC Employees</b></p> <p>The proposed scheme will result in job changes for the current 12 staff working at the CONSORT Nuclear Reactor Centre.</p>	<p>Current staff will support the decommissioning process before being redeployed, offered early retirement or redundancy.</p> <p>Discussions have been carried out with staff to provide an indication of likely individual release dates thus allowing staff to plan accordingly. A small number of staff have already been released and feedback from this will aid the process for the remaining 12 members of staff.</p>	<p>During and after decommissioning</p>	<p>Staff levels have reduced by two people due to unforeseen circumstances. The remaining team are able to manage the workload (as assessed in the Nuclear Baseline and Management of Organisational Change assessments).</p> <p>Despite the project being extended, staff remain in position and no further redundancies are expected until the final stage of the decommissioning project.</p> <p>During the Covid-19 pandemic and further into the Winter of 2020 staff have been working remotely were possible and other staff and contractors have been working following strict guidelines set out by ICRC and KDC.</p>

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES**

**ICRC MP 757 ISSUE: 5**

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
Surface Water			
<p>Pollution of the water environment from the following sources:</p> <ul style="list-style-type: none"> <li>• Alteration to overland flow routes and the site drainage pattern.</li> <li>• Increase in drainage load during building demolition.</li> <li>• Silt-laden run-off from HGVs and demolition/excavation work.</li> <li>• Hydrocarbon-contaminated run-off from HGVs and demolition/excavation work.</li> <li>• Accidental spillages or leaks of hazardous or radioactive substances during decommissioning and demolition.</li> <li>• Contamination of groundwater through vertical migration of contaminated surface water run-off.</li> </ul>	<p>A site Construction Environmental Management Plan (CEMP) will be set out to prevent pollution of the water environment, including measures to control and manage silt-laden run-off and prevent spillages/leaks. It is recommended that the following measures are included:</p> <ul style="list-style-type: none"> <li>• Appropriate storage and handling measures for all hydrocarbon fuels and lubricating oils;</li> <li>• The use of drip trays for static plant and designated refuelling areas for mobile plant;</li> <li>• The implementation of appropriate spillage contingency measures to mitigate the effect of such spillages on the surface water;</li> <li>• Appropriate personnel awareness training of the potential environmental implications of all construction work on site;</li> <li>• The prevention of silt-laden run-off and mud entering the surrounding surface water drains and watercourses by timely site phasing and engineering, thus minimising un-surfaced and un-vegetated areas of the site</li> <li>• The prevention of water entering excavated areas.</li> </ul>	<p>Prior to and during decommissioning and demolition</p>	<p>Implemented by KDC Environmental Management Plan (KDC/01357/ICL/EMP/01 Issue A2, November 2018 which addressed all relevant pollution prevention guidelines and;</p> <p>Risk Assessment and Method Statement for the Reactor Centre Demolition KDC/01357/ICL/REACTOR CENTRE DEMOLITION/001 A1 2<sup>nd</sup> July 2019.</p> <p>There have been no UNORs raised relevant to environmental protection during the decommissioning work.</p> <p>Reactor Hall Demolition Works, Traffic Management Plan KDC/01357/ICL/TMP/01, details KDC's arrangements for vehicle management on site. There have been no incidents involving vehicles during the decommissioning phase.</p>

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES**

**ICRC MP 757 ISSUE: 5**

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
	<p>Good practice guidance should be based on EA Pollution Prevention Guidelines (PPG). The PPGs relevant to site decommissioning include the following:</p> <ul style="list-style-type: none"> <li>• PPG 1 – General guide to the prevention of pollution</li> <li>• PPG 2 – Above ground oil storage tanks</li> <li>• PPG 3 – Use and design of oil separators in surface water drainage systems</li> <li>• PPG 4 – Treatment and disposal of sewage where no foul sewer is available</li> <li>• PPG 5 – Works and maintenance in or near water</li> <li>• PPG 6 – Pollution prevention guidance for working at construction and demolition sites</li> <li>• PPG 7 – Refuelling facilities</li> <li>• PPG 8 – Safe storage and disposal of used oils</li> <li>• PPG 13 – Vehicle washing and cleaning</li> <li>• PPG 18 – Managing fire water and major spillages</li> <li>• PPG 20 – Dewatering underground ducts and chambers</li> </ul>		

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM  
DISCHARGES**

**ICRC MP 757 ISSUE: 5**

Receptor and Effect	Environmental Commitment	Timescale	Implementation and effectiveness
	<ul style="list-style-type: none"> <li>• PPG 21 – Pollution incident response planning</li> <li>• PPG 22 – Dealing with spills</li> <li>• Managing concrete wash waters on construction sites guidance</li> </ul>		

**7.2 Activities where mitigation may be required but specific measures cannot yet be selected (Condition 3b)**

None.

**7.3 Activities where mitigation may be required but it is not yet possible to identify possible mitigation measures (Condition 3c)**

None.

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGE: ICRC MP 757 ISSUE: 5

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APPENDIX 1 LETTER PROVIDING CONSENT TO DECOMMISSION AND ATTACHED CONDITIONS

i. Annex 1

Decommissioning Project Consent

July 2015

**NUCLEAR REACTORS (ENVIRONMENTAL IMPACT ASSESSMENT FOR DECOMMISSIONING)**  
**REGULATIONS 1999 (THE REGULATIONS)**

**CONSENT**

Granted under regulation 4(b) in accordance with regulation 8(3) with conditions attached under regulation 8(4)

**IMPERIAL COLLEGE REACTOR CENTRE – License Number 7b** The Office for Nuclear Regulation, pursuant to an application under the Regulations for consent to carry out the project\* under regulation 4(a) and in accordance with the requirements of regulation 8(3) and subject to conditions attached under regulation 8(4) grants consent for the project under regulation 4(b), as follows:

- ii. to retrieve, package and remove all radioactive and non-radioactive waste from the Imperial College Reactor Centre located at Silwood Park Campus;
- iii. to initiate the demolition phase of the project, only when a full investigation of the ground beneath the Consort Reactor been conducted and any required mitigation measures identified and appropriately implemented; and
- iv. achieve the expected end-state that allows Imperial College Reactor Centre to be delicensed.

**Dated: July 2015**

**Signed**

**For and on behalf of the Office for Nuclear  
Regulation**

**Dr Richard Savage**

**A person authorised to act in that behalf**

**Conditions attached to Decommissioning Project Consent**

**July 2015**

ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGE: ICRC MP 757 ISSUE: 5

---

**NUCLEAR REACTORS (ENVIRONMENTAL IMPACT ASSESSMENT FOR DECOMMISSIONING)**  
**REGULATIONS 1999 (THE REGULATIONS)**

**v.CONDITIONS**

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

**IMPERIAL COLLEGE REACTOR CENTRE – License Number 7b Condition 1**

The project\* shall commence before the expiration of five years from the date of this Consent.

**Condition 2**

- a. 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.
- b. 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) the environmental management plan shall:

- a. list the mitigation measures that are already identified in the environmental statement;
- 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; and
- c. list the work activities where 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;
- b. with reference to condition 3c, identify the mitigation measures from assessments carried out, giving reasons for their selection;

**ENVIRONMENTAL MANAGEMENT PLAN**

**ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGE**

**ICRC MP 757**

**ISSUE: 5**

---

- c. describe the effectiveness of the mitigation measures taken over time; and
- 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 Office for Nuclear Regulation within 90 days of the date of this Consent and on each anniversary of the of the expiry of this 90 day period or within such longer time as the Office for Nuclear Regulation may agree, the licensee shall provide an updated environmental management plan;
- b. make the environmental management plan available to the public within 30 days of the plan being sent to the Office for Nuclear Regulation, or within such longer time as the Office for Nuclear Regulation may agree; the plan may replace earlier versions.

**Condition 6**

The licensee is required to provide notice to the Office for Nuclear Regulation 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 Office for Nuclear Regulation may agree.

**Dated: July 2015**

**Signed**

**For and on behalf of the Office for Nuclear  
Regulation**

**Dr Richard Savage**

**A person authorised to act in that behalf**