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<th>Issue No.</th>
<th>Reason for re-issue (include Section Numbers where applicable)</th>
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<td>1</td>
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1 INTRODUCTION

Imperial College Reactor Centre (ICRC) ceased operations at the end of December 2012 and has subsequently been fully defueled and decommissioning of the concrete bioshield is nearing completion.

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

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 project.

This fourth 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 erection of the bioshield containment tent to prevent the spread of dust and to dismantle the bioshield within. Towards the end of this work the soft strip, asbestos strip, will begin and lastly the demolition of the reactor buildings and remediation of the land. The project is expected to complete mid 2020.

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
- Geology, hydrology and soil
- Landscape
ENVIRONMENTAL MANAGEMENT PLAN

ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES

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- Noise and vibration
- Radioactive discharges
- Radioactive and non-radioactive waste
- Socio economic
- Surface water

3 STAKEHOLDER ENGAGEMENT

Whilst decommissioning represents a new phase in the lifecycle of the site, Imperial College remains committed to engaging with stakeholders at all 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

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 workshop area and associated hard standing areas for access.
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 17:00 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.
Lighting

The existing night-time illumination at the campus consists of low level ‘street’ lights and some externally visible security lights located outside the reactor building. 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. Existing levels of security lighting will be retained.

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 will be de-planted and demolished using standard construction industry methods, the exact methods to be employed will be detailed in method statements for individual projects. It is noted that there is a substantial quantity of asbestos present which will require appropriate precautions. The interior of buildings will be first de-planted and decontaminated if necessary prior to demolition of the buildings themselves. To facilitate this, large or heavy plant/equipment may be cut or split into components or sub-component parts prior to their removal. It is expected that after de-planting etc. is complete, demolition will be carried out using conventional methods. 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 campus gym and archive store.

Demolition of Radioactive Facilities

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

Contamination control provisions will be applied (eg work will be done within temporary enclosures) and working procedures will take account of the requirement to minimise workers exposure to radiation to as low as reasonably practicable (ALARP). Following decontamination and de-planting, buildings will be demolished, using conventional techniques. Monitoring checks will be made on the building as demolition proceeds and on the resulting demolished materials prior to disposal.

5.3 Examples of Decontamination Techniques

Selection of a suitable decontamination technique will depend on the levels of contamination present, the type of item and disposal options. Likely techniques include:
• Chemical decontamination which involves the use of chemicals to remove the surface contamination, such as use of strippable coatings or decontamination chemicals;

• Scabbling involves the physical removal of surface contamination, predominantly on concrete;

• Shot blasting uses high velocity shot to remove surface contamination;

• Water jetting involves the use of a pressurised water jet to remove surface contamination; and

• Wipe down involves the removal of contamination by wiping with a paper towing or cloth.

Wipe down, chemical decontamination and scabbling are the most likely techniques which will be used.

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 exist on site to process and package LLW before its transfer to the LLW Repository (LLWR) located near Drigg in Cumbria. During decommissioning the processing and disposal of such operational LLW to the LLWR will continue. Where possible the use of this route will be minimised.

All hazardous and radioactive wastes will 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 will be removed using specialist personnel working in tented areas subject to airlocks and a negative pressure air system. The tents will fully enclose the entire area being stripped of asbestos. Respiratory protective equipment, overalls and gloves will be required for the removal. Where possible asbestos areas will be damped down prior to removal to minimise release of fibres. The interior of the tented enclosure will be washed down to remove any fibres that have been released during the stripping process and this water will be filtered to remove any asbestos fibres. The filters will be disposed of along with the asbestos. Non-radioactive asbestos will be double bagged in its wet state after stripping, hence there will be no liquid waste to be processed from the removal operation itself. Non-radioactive asbestos will be sent to a licensed asbestos disposal site. 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 will aim to minimise the need to use landfill 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 will include 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 will be one of the last items of plant to be decommissioned. Approval to discharge its contents to the local water authority sewerage system is currently being sought. Waste water currently being produced by the contractor is collected in appropriate containers locally and shall be disposed of by incineration. Where necessary, buildings and work areas with the potential for airborne radioactive contamination will continue to have forced ventilation with exhaust air passing through high efficiency particulate filters.

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.
## 7 Mitigation Measures

### 7.1 Mitigation measures already identified (Condition 3a)

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<thead>
<tr>
<th>Receptor and Effect</th>
<th>Environmental Commitment</th>
<th>Timescale</th>
<th>Implementation and effectiveness</th>
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<tbody>
<tr>
<td><strong>Air Quality</strong></td>
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<tr>
<td><strong>Human and ecological receptors:</strong></td>
<td>Potential adverse environmental effects from exhaust emissions from site plant, equipment and vehicles, and fugitive dust emissions from site activities.</td>
<td>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.</td>
<td>Primarily during building demolition works (commencing spring 2020) and asbestos strip (commencing late 2019). There is minimal impact during bioshield decommissioning.</td>
</tr>
<tr>
<td>Ecology</td>
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<tr>
<td><strong>Silwood Park Local Wildlife Site:</strong></td>
<td>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.</td>
<td>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.</td>
<td>Beginning October 2019.</td>
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<td>Receptor and Effect</td>
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| **Broadleaved Woodland and Scattered Individual Trees**  
Vehicle movement or material storage in the root protection zones of individual trees or groups of trees.  
Potential for root damage and compaction. | 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. | To be considered prior to Reactor Centre site fence removal. | 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. |
| **Badgers**  
The disused badger setts may be re-occupied. | Pre-demolition badger survey carried out no more than two weeks prior to the demolition of the Reactor Centre | No more than 2 weeks prior to building demolition | Although the KDC EMP does not refer to badgers setts the works programme includes a pre-demolition badger survey. |
| **Nesting Birds**  
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). | 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. | Planning beginning in October 2019. | 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. |
| **Reptiles**  
Direct injury to common reptile species | Habitat management under an ecological watching brief may be required should demolition works extend into these areas. | Prior to site fence removal. | Considerations of reptile habitat shall be made prior to the site fence being disturbed. |
<table>
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<tbody>
<tr>
<td>Geology, Hydrology and Soils</td>
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<tr>
<td>Land and/or water quality effects</td>
<td><em>Intrusive Investigations</em></td>
<td>Prior to demolition and asbestos strip works</td>
<td>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. This includes drainage pattern and loads and prevention and mitigation of spillages and leaks. 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. ICRC/SD/909 Site Characterisation Plan provides a basis for radiation protection, identification of contamination, assessment of potential risks, planning and implementation of decommissioning. 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. Submissions to the RBWM EHO will be made prior to demolition commencing.</td>
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<td></td>
<td><em>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)).</em></td>
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<td><em>The contamination status of made ground beneath the site and potential leachability will be assessed.</em></td>
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<td><em>Options Appraisal and detailed Remediation Method Statement (RMS)</em></td>
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<td><em>Following the intrusive investigations, this will specify the mitigation measures necessary to break any identified pollutant linkages.</em></td>
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<td><em>Prior to demolition works commencing the RMS will be submitted to the RBWM EHO Environmental Health Officer and, if necessary, to the Environment Agency for approval.</em></td>
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<td></td>
<td><em>Asbestos Demolition Survey</em></td>
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<td></td>
<td><em>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.</em></td>
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# ENVIRONMENTAL MANAGEMENT PLAN

## ENVIRONMENTAL PROTECTION, WASTE & RAM DISCHARGES

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<tr>
<td>Neighbouring properties and residents</td>
<td>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.</td>
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<tr>
<td>Neighbouring properties and residents</td>
<td>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 contractor has been supplied with the current asbestos register.</td>
<td>Prior to demolition and asbestos strip works</td>
<td>KDC Air Quality Plan (KDC/01357/ICL/AQMP/01 Iss A2, Sept 2018) addresses this receptor. 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.</td>
</tr>
<tr>
<td>Neighbouring properties and residents</td>
<td>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</td>
<td>During decommissioning and demolition</td>
<td>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.</td>
</tr>
<tr>
<td>Neighbouring properties and residents</td>
<td>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</td>
<td>During demolition</td>
<td>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.</td>
</tr>
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</table>

### Neighbouring properties and residents

**Potential release of contaminated dust (including possible asbestos containing materials) during the demolition of structures and movement of construction vehicles.**

Surrounding soil and groundwater may be contaminated if there were to be an accidental spillage.

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.

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.

## Neighbouring properties and residents

**Potential release of contaminated dust (including possible asbestos containing materials) during the demolition of structures and movement of construction vehicles.**
## Receptor and Effect

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<tr>
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<tr>
<td>Surrounding soil and groundwater may be contaminated due to dewatering activities.</td>
<td>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.</td>
<td>During decommissioning and demolition</td>
<td>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.</td>
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## Landscape

<table>
<thead>
<tr>
<th>Root protection area of existing trees</th>
<th>Environmental Commitment</th>
<th>Timescale</th>
<th>Implementation and effectiveness</th>
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</thead>
<tbody>
<tr>
<td>Stored materials and access in root protection areas of existing trees may affect the trees and their contribution to screening mitigation.</td>
<td>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.</td>
<td>To be considered prior to Reactor Centre site fence removal.</td>
<td>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).</td>
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## Noise and Vibration

<table>
<thead>
<tr>
<th>The gymnasium and maintenance workshop will be subjected to a prolonged period of noise disturbance from demolition works.</th>
<th>Environmental Commitment</th>
<th>Timescale</th>
<th>Implementation and effectiveness</th>
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<tbody>
<tr>
<td>The gym and workshop will be closed during demolition. Alternative ventilation methods will be required in the gymnasium and maintenance workshop. Due consideration is to be given to sensitive activities on campus and key activities during the academic year, e.g. examination periods.</td>
<td></td>
<td>Gym relocated August 2019.</td>
<td>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.</td>
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### Receptor and Effect

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<tr>
<td>Demolition vibration may cause annoyance to users in adjacent buildings during the breaking of tarmac. Users will be informed of the times and duration of works adjacent to the buildings. Vibration monitoring is recommended beside the gymnasium during the removal of tarmac three metres from the building.</td>
<td>During demolition.</td>
<td>KDC’s Noise and Vibration Management Plan, November 2018, Ref: KDC/01357/ICL/NVMP/01 Issue A2 and the Risk Assessment and Method Statement for the Reactor Centre Demolition KDC/01357/ICL/REACTOR CENTRE DEMOLITION/001 A1 2nd July 2019 both provide details the mitigation and methods for reducing and monitoring vibration during demolition.</td>
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### Radioactive Discharges

<table>
<thead>
<tr>
<th>Neighbouring properties and residents Surrounding ecology</th>
<th>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. For discharges to water, the following BAT will be applied:</th>
<th>Prior to and during Decommissioning and demolition.</th>
<th>The contractors have included consideration of BAT within Decommissioning Best Available Techniques (BAT) Assessment 208165-0000-AA40-RPT-0001 9th July 2018. The techniques described have been implemented successfully to date. There have been no unusual occurrence reports (UNORs) regarding discharge threats to the environment. The Demolition Phase BAT Study KDC/01357/ICL/DEMO/BAT/ASSESSMENT/001/A1, 06/06/19 describes the techniques to be used during demolition.</th>
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<tr>
<td>- The volume of aqueous waste requiring disposal will be reduced by minimising water use in cutting and decontamination activities;</td>
<td>- Water clean-up systems, containing particulate filters and resins, will be used where appropriate. These will be determined as part of planning decommissioning activities;</td>
<td>- All radioactive liquid discharges will be monitored.</td>
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### Receptor and Effect

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<th>Timescale</th>
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<tr>
<td>For discharges to air, the following BAT will be applied:</td>
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<tr>
<td>• Local HEPA filtered contaminant modules will be used during significant dust-producing activities;</td>
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<td>• Confined enclosures and fixing solutions will be used when appropriate on contaminated surfaces. These controls will be determined as part of planning decommissioning activities;</td>
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<td>• All radioactive gaseous discharges will be monitored.</td>
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### Radioactive and Non-radioactive Waste

<p>| Neighbouring properties and residents | Surrounding ecology | Best Available Techniques Studies are used to minimise the impacts arising from waste. This includes details on: | During decommissioning and demolition. | The BATs as given above address the impacts arising from waste. 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>
<table>
<thead>
<tr>
<th>Receptor and Effect</th>
<th>Environmental Commitment</th>
<th>Timescale</th>
<th>Implementation and effectiveness</th>
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<tbody>
<tr>
<td></td>
<td>• Details of waste management sites and contractors for all wastes (including registration numbers). 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.</td>
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<td>Neighbouring properties and residents</td>
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<td>Surrounding ecology</td>
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<tr>
<td>The Nuclear Industry Code of Practice on Clearance and Exemption will be followed to ensure that radioactive and non-radioactive wastes are separated correctly. The following BPM will be adopted to minimise radioactive waste at the Reactor site: 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; 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; Cutting techniques such as diamond wire for precise cutting;</td>
<td>During decommissioning and demolition</td>
<td>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).</td>
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</table>
### Receptor and Effect

**Environmental Commitment**

- Radiochemical analysis and intrusive sampling of reactor components to confirm the expected waste inventory and to produce a set of “fingerprints” that can be used as part of the solid waste assay process;
- Size-reduction techniques and compacting waste where appropriate;
- Decontaminating to enable maximum clearance of material as nonradioactive;
- Reviewing practices and learning from best practice; and
- Training to increase awareness.

**Timescale**

**Implementation and effectiveness**

### Socio Economic

**ICRC Employees**

The proposed scheme will result in job changes for the current 12 staff working at the CONSORT Nuclear Reactor Centre.

- Current staff will support the decommissioning process before being redeployed, offered early retirement or redundancy.
- 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.

- During and after decommissioning

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<td></td>
<td>Staff levels have reduced due 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). Despite the project being extended, staff remain in position and no further redundancies are expected until the final stage of the decommissioning project.</td>
</tr>
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</table>
## Receptor and Effect

### Surface Water

Pollution of the water environment from the following sources:

- Alteration to overland flow routes and the site drainage pattern.
- Increase in drainage load during building demolition.
- Silt-laden run-off from HGVs and demolition/excavation work.
- Hydrocarbon-contaminated run-off from HGVs and demolition/excavation work.
- Accidental spillages or leaks of hazardous or radioactive substances during decommissioning and demolition.
- Contamination of groundwater through vertical migration of contaminated surface water run-off.

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:

- Appropriate storage and handling measures for all hydrocarbon fuels and lubricating oils;
- The use of drip trays for static plant and designated refuelling areas for mobile plant;
- The implementation of appropriate spillage contingency measures to mitigate the effect of such spillages on the surface water;
- Appropriate personnel awareness training of the potential environmental implications of all construction work on site;
- 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;
- The prevention of water entering excavated areas.

- Prior to and during decommissioning and demolition

### Implementation and effectiveness

Implemented by KDC Environmental Management Plan (KDC/01357/ICL/EMP/01 Issue A2, November 2018 which addressed all relevant pollution prevention guidelines and;


There have been no UNORs raised relevant to environmental protection during the decommissioning work.

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.
Good practice guidance should be based on EA Pollution Prevention Guidelines (PPG). The PPGs relevant to site decommissioning include the following:

- **PPG 1** – General guide to the prevention of pollution
- **PPG 2** – Above ground oil storage tanks
- **PPG 3** – Use and design of oil separators in surface water drainage systems
- **PPG 4** – Treatment and disposal of sewage where no foul sewer is available
- **PPG 5** – Works and maintenance in or near water
- **PPG 6** – Pollution prevention guidance for working at construction and demolition sites
- **PPG 7** – Refuelling facilities
- **PPG 8** – Safe storage and disposal of used oils
- **PPG 13** – Vehicle washing and cleaning
- **PPG 18** – Managing fire water and major spillages
- **PPG 20** – Dewatering underground ducts and chambers
<table>
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<tr>
<td></td>
<td>• PPG 21 – Pollution incident response planning</td>
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<td>• PPG 22 – Dealing with spills</td>
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<td></td>
<td>• Managing concrete wash waters on construction sites guidance</td>
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</table>

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.
APPENDIX 1 LETTER PROVIDING CONSENT TO DECOMMISSION AND ATTACHED CONDITIONS

i. Annex 1

Decommissioning Project Consent

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

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Printed on: 18 October 2019
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;
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