



## Position Paper on Proposed Development Changes

### Introduction

Dounreay Site Restoration Limited (DSRL) is constructing new disposal facilities for low-level radioactive waste (LLW) at Dounreay. A planning application for these facilities (06/00373/FULCA) was submitted to Highland Council in 2006, with an updated application submitted in 2008. The nature of the development required a formal Environmental Impact Assessment (EIA) to be undertaken and the resultant Environmental Statement (ES) formed part of the supporting documents provided to the Council. Planning permission for these facilities was granted in April 2009.

During the planning process DSRL undertook a transparent and consultative site selection process resulting in the decision to submit the planning application for new LLW disposal facilities on a site adjacent to the eastern boundary of the existing Dounreay nuclear licensed site. The proposed facilities, see Figure 1, consist of a series of six below-ground concrete vaults, excavated in bedrock in phases, with a total of four vaults for LLW and two vaults for a particular low-activity group of LLW streams termed Demolition LLW.

The layout for facilities detailed in the 2008 planning application and subsequent planning permission is detailed in Figure 1. The key features are as follows:

- Six concrete vaults, to be constructed in three phases, with the requirement for the second and third phases to be confirmed as decommissioning of Dounreay progresses. Four Vaults for LLW are grouped together, with two vaults, for Demolition LLW, which contain lower levels of radioactivity, located separately to the east.
- Storage areas for excavated material, located to the west and east of the vaults,
- Water treatment area, located to the north of the vaults.
- Grout plant, located to the west of the vaults, within the Dounreay nuclear licensed site.
- Admin building, located to the west of the vaults, but outwith the Dounreay nuclear licensed site.

After obtaining financial sanction for this development to proceed from the Nuclear Decommissioning Authority (NDA), a design-and-build (D&B) contract was let for the New LLW Facilities in March 2011. As part of the normal stepwise design process in such a development, the D&B Contractor is currently reviewing and developing the design of the facilities in detail.

This ongoing review has led to proposed refinements to the layout of the facilities and the excavation methodology from that set out in the 2008 planning application. This paper outlines the reasons for these potential changes and discusses them within the context of the planning submission and subsequent grant of planning permission.

## Proposed Changes to the Development

The proposed changes to the development fall into two categories, changes to the layout and changes to the excavation method to incorporate the use of blasting.

## Proposed Changes to the Layout

Slight changes to the layout of the vaults from that set out in the 2008 planning application have been proposed (Figure 2):

- Pairing of each phase of LLW and Demolition LLW vaults together, side by side, rather than a grouping of LLW vaults separate from a grouping of Demolition LLW vaults.
- Adjustment of the length of the Demolition LLW vaults to match the length of the adjacent LLW vault.
- Spacing out of the excavations for each phase of the vaults to allow excavation of each phase of vaults by blasting without disruption to adjacent vaults resulting in a spread of the vaults over a slightly larger total footprint.
- Realignment of vault footprints to ensure excavation faces are better aligned with dominant fracture sets in the host rock.
- Keeping LLW vaults and Demolition LLW vaults in separate excavations resulting in five separate excavated holes rather than two.
- Utilising excavated material to landscape the area to the north of the vaults and blend the area in with the adjacent landfill, with a resultant change to the footprint of the excavated material area.
- The removal of the swale drainage system

This series of refinements to the layout of the facilities has been proposed to realise a series of benefits:

- Pairing of each of the vault phases. This re-ordering improves constructability, by allowing the use of blasting during the construction of each of the phases (should blasting be permitted see paragraphs 11-16) and by allowing the construction of each phase to be conducted outwith the operating site. This will result in reduced interaction between site operations and facility construction and help minimise safety risks during construction of the facilities. It will also lead to a reduction in project costs and a reduction in the construction timescales for future phases. In addition, it allows the option of capping individual phases after they are filled, rather than keeping all vaults open until closure before capping operations can begin.
- Adjustment of the length of the Demolition LLW vaults to match the length of the adjacent LLW vault allowing the upper gravity drainage system around the vaults to work more easily. It also fits better with the natural fractures in the rock and helps reduce the overall spread of the vaults eastwards.
- Spacing out of the excavations for each phase of the vaults to allow excavation of each phase of vaults by blasting. The reason for this is given in paragraph 15 below.
- Realignment of vault footprints to ensure excavation faces are better aligned with dominant fracture sets within the host rock. This will ensure more efficient excavation and will help minimise potential issues associated with excavation slope stability.

- Keeping LLW vaults and Demolition LLW vaults in separate excavations facilitates closure of the vaults using different closure designs for the different type of waste in the vaults.
- Utilising excavated material to landscape the area to the north of the vaults and blend the area in with the adjacent landfill. This landscaping will also reduce further the potential long-term radiological doses arising from the facilities, by minimising future groundwater discharge to the surface environment. This landscaped area has been termed the “enhanced geosphere” as it improves the function of the geosphere (rock) barrier surrounding the facilities. It will also minimise the amount of excavated material that has to be temporarily stored. The footprint of the excavated material storage area has been changed to one location to cater for the reduced volume of material and the requirement to have a landfill permit for the stored rock. The layout has also tried to accommodate stakeholder feedback that it would be preferable to have a strip of undeveloped ground for foreshore access by minimising its footprint towards the east of the site.
- The removal of the swale drainage system and adoption of a more diffuse drainage system through the enhanced geosphere, in response to ongoing dialogue with SEPA on best practice in drainage systems.

The layout for facilities detailed in the 2008 planning application and subsequent planning permission is detailed in Figure 1 below. The proposed revised layout is shown in Figure 2. Figure 3 is a simplified diagram showing the revised vault layout and the 2008 planning application vault layout together, in order to aid comparison. The development area boundary is not affected by these refinements.

The implications of these refinements on the planning permission have been assessed by DSRL and its planning consultant by reviewing them against the assessments detailed within the approved ES document. This review concludes that the proposed refinements do not materially alter the assessments within the ES and do not constitute a material variation to the planning permission for the facilities.

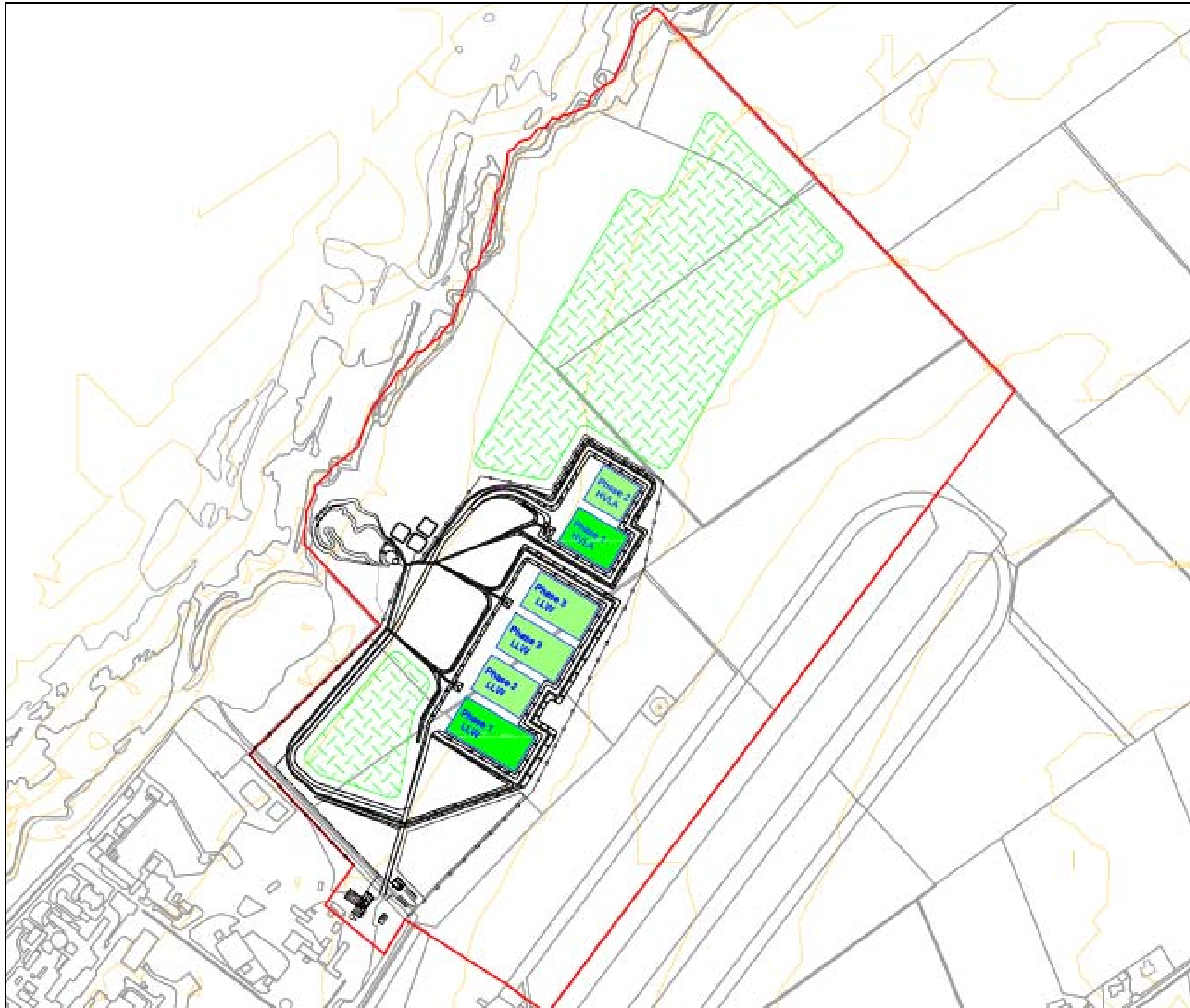


Figure 1 Indicative layout of the New LLW Facilities presented in the 2008 planning application [3]. HVLA = Demolition LLW. Red line shows site development boundary. Green hatched areas show temporary storage areas for excavated material. Figure is around 1,350m across; north is to the top of the page.



Figure 2 Refined layout plan for the New LLW Facilities currently being considered for the scheme design [extracted from Drawing Z266590]. Red line shows site development boundary. Note that the drawing is orientated to Dounreay site grid north.



Figure 3 2008 Planning application vault layout (blue) overlain with refined layout (green) for comparison.

For Issue

**Dounreay New Low Level Waste Facilities  
Proposed Development Changes  
NLLWF/3/REP/DSR/0707/IS/01**

**Proposed Changes to the Excavation Method**

Blasting is the use of explosives to break up/loosen rock in order to ease excavation. Construction of the New LLW Facilities will involve the excavation of large quantities of rock.

During the planning process DSRL made its position clear that "Preliminary technical assessments have indicated that blasting can be avoided for removal of the rock." <sup>1</sup> However, it was also recognised that excavation methodology was the responsibility of the Design and Build contractor: "It is expected that the contract for construction of the LLW disposal facilities will be let on a Design & Build (D&B) basis. Specific construction methods will therefore be determined following the appointment of a contractor in agreement with the requirements of DSRL and contract documents." Planning condition 14 provides that blasting is not permitted "unless otherwise agreed in writing by the Council..." A request to allow blasting in terms of this condition was made to the Council on the 6<sup>th</sup> of June. The Council's decision is awaited.

Detailed site specific geotechnical studies undertaken during 2009 have identified that excavation using only ripping may not be effective below 5m and additional breaking techniques may need to be used. The most likely technique would be the use of rock breakers (hydraulic rock hammers) to break out the rock which would be relatively slow and noisy and would lead a less efficient excavation rate. There would also be an increased risk that there could be areas of rock that are particularly difficult to break out and the rate of excavation would prohibitively inefficient. The use of blasting would mitigate this risk, provide programme surety and ensure the work can be delivered efficiently.

Blasting during excavation would have significant potential benefits compared to breaking out the rock using just industrial plant and equipment. Efficient programme delivery has benefits for DSRL but will also minimise the longevity of any impact on adjacent properties and neighbours.

Blasting during the excavation of the New LLW Facilities could bring a number of benefits, including:

- Shorter timescales for excavation
- A reduction in the duration of impacts associated with the excavation, e.g. traffic
- A reduction in the use of rock-breaking breaking equipment and associated noise
- A reduction in the costs associated with excavation
- A reduction in the likelihood of unforeseen ground conditions impacting on the project; increasing excavation timescales and costs

DSRL has awarded the contract to Graham Construction to undertake the detailed design and construction of Phase 1 of the NLLWF. The use of blasting will reduce the cost of Phase 1 by over £1.5 million. Similar savings could also be achieved for Phases 2 and 3 of the NLLWF if they are constructed. These are direct savings to the taxpayer and translate into funding that can be made available for other decommissioning and hazard reduction activities within the Dounreay site.

---

<sup>1</sup> ENVIRONMENTAL STATEMENT ADDENDUM for the New LLW Disposal Facilities

**For Issue**

**Dounreay New Low Level Waste Facilities  
Proposed Development Changes  
NLLWF/3/REP/DSR/0707/IS/01**

**Summary**

The D&B Contractor for the first phase of the New LLW Disposal facilities is currently reviewing and developing the design for facilities in detail. This ongoing review has led to proposed refinements to the layout of the facilities from that set out in the 2008 planning application and a proposal to utilise blasting during the excavation works.

These refinements provide a series of benefits, including:

- Improved constructability
- Reduced future interfaces between construction and operational activities
- Reduced future construction costs
- Enhanced slope stability
- Further reduction in potential future radiological dose to humans and biota
- Reduced quantities of temporarily stored material
- More diffuse drainage system, in line with best practice
- Shorter timescales for excavation
- A reduction in the duration of impacts associated with the excavation, e.g. traffic
- A reduction in the use of rock-breaking equipment and associated noise
- A reduction in the costs associated with excavation
- A reduction in the likelihood of unforeseen ground conditions impacting on the project; increasing excavation timescales and costs

A review has concluded that the proposed refinements do not materially alter the assessments made during the planning process and do not constitute a material variation to the development in planning terms.