

**Consultation 1**  
**Paper A: Draft skeleton report**

**A report by Enviros Consulting Limited**

Report length: c. 45 pages plus figures and tables, and appendices.

**EXECUTIVE SUMMARY** – to be written as possible standalone summary document

**CONTENTS**

**GLOSSARY AND ABBREVIATIONS**

## **1 INTRODUCTION**

### **1.1 Objectives and scope (2 pages)**

Introduction to CIRIA, their corporate objectives and the wider SAFEGROUNDS project.

Background to the SD: SPUR project and previous work undertaken by CIRIA on the issue.

Brief mention of overarching Government environmental protection policy and principles of sustainable development. Lead to waste hierarchy and preference for reuse and recycle over disposal.

Objectives of the project.

- Development of sustainability guidance for the UK.
- Development of the Dounreay case study.

### **1.2 Nuclear sites in the UK and their decommissioning (2 pages)**

Introduction to the UK sites in the UK of interest to the project (BNFL, UKAEA, MOD and nuclear power plants). Where are they, how many are there, their key similarities and differences ?

Background to the decommissioning of these sites and the role of the LMU and NDA. Site decommissioning plans, timescales and site end-points.

Maps and tables.

### **1.3 Waste arisings (1 pages)**

Overview of waste arisings from these nuclear sites, and differentiation between the different solid radioactive wastes classes (High Level Waste, Intermediate Level Waste, Low Level Waste etc).

Introduction to the clean and low activity solid waste arisings of interest to this project. Simple description of what they are (activity and material), and how and when they arise [detail will be covered later].

Discussion of potential for changes to waste classification schemes and policy (e.g. formal acceptance of 0.4 – 4 Bq/g material as a separate class).

### **1.4 Construction industry materials (1 page)**

Context and background to the potential reuse options within the construction industry for the materials arising from the nuclear sites.

Introduction to high volume materials (e.g. aggregates) and current UK applications, demand and supply [detail will be covered later].

Maps and tables.

### **1.5 Regulatory framework (2 pages)**

Overview of the various current UK laws, international conventions, Government policy and guidelines that control the management of the wastes of interest to this project.

RSA, EPA, IPPC etc. Exemptions.

Potential for changes to regulatory framework and policy.

May need to be supported by more detailed appendix.

## **2 WASTE INVENTORY**

### **2.1 Methodology (1 page)**

Explanation of how the inventory for the project was derived. Sources of information used (e.g. site inventories, other compilations etc).

Uncertainties associated with the quality of information from different sites and how different sites record relevant information.

Uncertainties associated with the numerical information in terms of volumes/masses, timing of arisings, material compositions etc.

Explanation of the 3 categories of material considered in the report ('clean', 'exempt' and '0.4 – 4 Bq/g') and the derivation of the 4 Bq/g upper limit – coming from limit in RSA'93 for 'dustbin' disposal of small volumes of very low level radioactive material (VLLW).

### **2.2 UK inventory of clean and low activity materials (3 pages)**

Summary of the total UK inventory of clean and low activity materials of interest to the project, provided as [so far as primary data allow]:

- total mass (volume) from all sources and of all types,
- masses from different sites or types of sites (e.g. cumulative for all NPPs),
- masses of different material types (according to standard construction industry classification schemes),
- masses arising at different times according to decommissioning plans.

Discussion of uncertainties on data.

Discussion of how inventory could change if waste classification or waste management policy were to change (e.g. impact if 0.4 – 4 Bq/g material were not classed as a waste and could be reused rather than disposed).

Summary diagrams and tables.

Reference to appendices where main data are held.

### **2.3 UKAEA Dounreay inventory of clean and low activity materials (2 pages)**

Summary of the Dounreay inventory of clean and low activity materials of interest to the project, provided as [so far as primary data allow]:

- total mass (volume) from all sources and of all types,
- masses arising from different buildings and areas of the Dounreay site,
- masses of different material types (according to standard construction industry classification schemes),
- masses arising at different times according to the site decommissioning plan.

Discussion of uncertainties on data.

Discussion of how inventory could change if waste classification or waste management policy were to change (e.g. impact if 0.4 – 4 Bq/g material were not classed as a waste and could be reused rather than disposed).

Discussion of key similarities and differences between the site specific Dounreay inventory and general UK inventory, in terms of developing the sustainable guidance.

Summary diagrams and tables.

Reference to appendices where main data are held.

### **3 MATERIAL REUSE AND RECYCLE OPTIONS**

#### **3.1 Potential applications for the clean and low activity materials (2 pages)**

Potential construction industry applications for the various materials identified in the UK and Dounreay inventories in Section 2. Identification of different applications for high volume, low value materials (e.g. aggregates) and low-volume, high value materials (e.g. specialist metals). Consideration of potentially increased application for processed materials compared to raw (e.g. sorting, screening, segregation etc).

Commentary on expected or potential changes in these applications in next few decades (e.g. new developments that may require more or less of particular materials). Of necessity, this will be subjective. Consideration of which of these potential applications are likely to arise at the UK nuclear sites (including Dounreay) and which may only arise off site.

Reference to 'business as usual' scenario against which the advantages and disadvantages of other options can be compared, including the current costs of disposal of these materials.

Summary diagrams and tables.

#### **3.2 Construction industry demand (3 pages)**

Summary of the current total UK demand for each of the various materials identified in the inventory (quantitative), considering both raw and processed.

Overview of the historical and possible future trends in demand for these different materials. The identification of materials for which demand is likely to be greatest and least. Semi-quantitative assessment of the potential demand for each material, and how that may change over the next 50 years (so far as data allow)

Overview of the geographical variations in demand for the various materials to show if Dounreay context is similar or different to rest of UK.

Tables and figures.

#### **3.3 Factors controlling the potential for reuse of waste materials (2 pages)**

Overview of the factors that control the potential for reuse or recycle of waste materials. One short paragraph on each of:

- production costs,
- added value processing,
- transport costs and geographical controls on supply and demand,
- quality of product,
- non-radioactive contaminants (e.g. heavy metals)
- costs and availability of virgin material,
- legal constraints (exemptions),
- product acceptability (stigma associated with materials from nuclear sites),
- economics and practical issues of storage of processed construction materials,
- policy on the designation of waste (no longer part of the commercial chain of utility).

**3.4 Past and current strategy for reuse of materials from nuclear sites** (1 pages)

Brief discussion and analysis of the past and current strategies for material reuse. For example, there are a few cases of materials from Dounreay being used for road bases.

Assessment of the extent to which nuclear sites are currently meeting demand for the decommissioning materials they generate.

## **4 SUSTAINABILITY SCENARIOS AND THEIR ASSESSMENT**

### **4.1 Methodology** (2 pages)

Explanation of what sustainability scenarios are, how they are developed and assessed in the project using a modified BPEO approach.

### **4.2 Scenario development** (2 page)

Explanation of how sustainability scenarios are developed for the project to account for the different uncertainties and variabilities. These include:

- general strategic approach – preference for disposal v. reuse/recycle
- 0.4 – 4 Bq/g material – remains a waste and disposed or ‘released’ to allow for reuse/recycle
- arisings – variations in time and geography
- treatment – reuse in raw form or process for added value
- site end-points – green or brownfield
- non-active buildings – demolished or refurbished for alternative reuse

Development of a representative set of scenarios, possibly to include:

1. Maximum off site re-use scenario: 0.4 – 4 Bq/g material identified as resource and most material processed to maximise value and re-used off site.
2. Minimum off site re-use scenario: 0.4 – 4 Bq/g material identified as waste (so disposed) and majority of the remaining material re-used on site or disposed.
3. Intermediate: 0.4 – 4 Bq/g material identified as resource and some material re-used off site with minimum processing, the remainder re-used on site or disposed.

### **4.3 Scenario descriptions** (1 page for each scenario)

Common format descriptions in tabular form for of each of the scenarios, using a standard set of headings:

- Brief description
- Impact on management of materials of interest to the project (e.g. percentage disposed, reused on site and reused offsite)
- Technology requirements (e.g. to achieve processing and transport)
- Main applications for re-used materials and level of demand.
- Key issues: qualitative commentary on other environmental, programmatic, socio-political etc. issues that may arise from the scenario.

### **4.4 Sustainability indicators** (1 page)

Explanation of what sustainability indicators are, how they are derived (e.g. from stakeholder workshop), and applied to the assessment of the scenarios.

Tables and figures.

**4.5 Assessment of sustainability scenarios (3 pages)**

Assessment of the sustainability scenarios against the sustainability indicators, showing approach (scoring) and information derived [detail to go in an appendix].

Scoring approach and results.

Interpretation of the scores to evaluate the relative advantages and disadvantages of the different sustainability scenarios.

Tables and figures.

## **5 SUSTAINABILITY GUIDANCE FOR THE UK**

### **5.1 Objectives and approach (1 pages)**

Objective is to develop generalised guidance that can be used by the nuclear sites and the construction industry to help make strategic decisions regarding the management of the clean and low activity materials of interest to this project.

Specifically to help the nuclear site operators make decisions as to whether and how to release materials to the construction industry, and to help identify or create demand.

Specifically to help the construction industry to identify resources that may become available from nuclear sites (and when), and to help make suitable comparisons with alternative materials (e.g. virgin aggregate).

### **5.2 The guidance (5 pages)**

Systematic identification and discussion of the key issues arising from the project presented in a structured manner to support management decisions.

Summary diagrams and tables.

## **6 DOUNREAY PLANNING MODEL AND CASE STUDY**

### **6.1 Objectives and approach (1 pages)**

Objective is to develop a site specific case study and planning model for the Dounreay site.

This will apply the sustainability guidance from Section 5 to Dounreay as a demonstration of their application and to draw specific recommendations for the management of clean and low activity materials within the Dounreay site remediation plan.

Specifically to help the UKAEA Dounreay make decisions as to whether and how to release materials to the construction industry, and to help identify or create demand.

Specifically to help the construction industry in northern Scotland and elsewhere to identify resources that may become available from Dounreay (and when), and to help make suitable comparisons with alternative materials (e.g. virgin aggregate).

### **6.2 The planning model (5 pages)**

Systematic identification and discussion of the key issues arising from the project presented in a structured manner to support management decisions specifically for Dounreay.

Summary diagrams and tables.

**REFERENCES AND BIBLIOGRAPHY**

**APPENDICES**

Regulatory framework

Inventory data for UK

Inventory data for Dounreay

Detailed assessment of sustainability scenarios – supporting information and scoring schemes