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National Waste Programme

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Lower Activity Low Level Waste Capacity Assessment

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Lower Activity Low Level Waste Capacity Analysis

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Executive Summary

The United Kingdom (UK) Nuclear Industry Low Level Waste (LLW) Strategy[1], published in 2010, set out three themes which guided the development of the strategy:

- The application of the waste hierarchy;
- Best use of existing LLW management assets;
- The need for new fit-for-purpose waste management routes.

The application of these themes within the Strategy then translated into the need to preserve capacity at the national Low Level Waste Repository (LLWR) to ensure its longevity, noting that this would likely require the use of alternative disposal routes. Alternative routes could range from new on-site disposal facilities to existing commercial facilities.

In 2011 LLWR Ltd published an analysis of the 2010 UK Radioactive Waste Inventory (UKRWI) data[2] to establish the volumes of Low Activity Low Level Waste (LA-LLW) material that may be suitable for management through the application of the waste hierarchy via options such as metal recycling and incineration, and through controlled burial in permitted near surface disposal facilities. Within the report, the term LA-LLW refers to those wastes with a total radioactivity of less than 200Bq/g (Becquerels per gram) arising from within the nuclear industry (Naturally Occurring Radioactive Materials (NORM) and exempt wastes are excluded). This category includes wastes defined as High Volume Very Low Level Waste (VLLW) which have activity less than 4Bq/g.

This paper builds on that analysis, focussing specifically on consideration of those LA-LLW volumes suitable for disposal at near surface waste sites, in comparison to the capacity available at existing sites within the UK over the period 2012 – 2030. The report seeks to establish whether there is adequate capacity available in existing sites and where constraints may arise over the period. It considers both a national and a regional picture of arisings and capacity. The analysis has focussed on short to medium term arisings up to 2030; however it should be noted that significant volumes of VLLW/LA-LLW arise after this date up to 2120, which is the current end date for the UKRWI.

For the purposes of the analysis, a comparison is made between the predicted arisings and the available capacity at near surface waste sites. It should, however, be emphasised that the actual waste route will be decided by waste producers through their BAT/BPEO process to determine the best option. This means that, although the waste volumes will arise, they may not be disposed of to these sites. Since these determinations for future waste arisings have not yet been made, from a capacity analysis perspective this paper assumes that they will use these routes.

The paper uses three sources of inventory data: the 2010 UK Radioactive Waste Inventory, for the period 2012 – 2030; the March 2012 Joint Waste Management Plans (JWMPs) produce by SLCs, which predict waste arisings for a 5-year period commencing April 2012; and the 2012 NDA Waste Inventory Form (WIF), the annual waste inventory submission by NDA estate SLCs, for the period 2012 - 2030.

Within the UK there are five disposal sites for LA-LLW or VLLW: ENRMF (East Northants Resource Management Facility), Clifton Marsh, FCC Lillyhall, CLESA (Calder Landfill Extension Segregated Area, part of the Sellafield site) and a facility being constructed at Dounreay. The

[1] Nuclear Decommissioning Authority (NDA), 2010, UK Strategy for the Management of Solid Low Level Radioactive Waste from the Nuclear Industry

[2] Low Level Waste Repository (LLWR), 2011. UK Management of Solid Low Level Radioactive Waste from the Nuclear Industry: Analysis of Near-term Low Activity Low Level Waste Arisings within the UK Radioactive Waste Inventory 2010.

CLESA and Dounreay facilities have been excluded from this analysis since they are/will be permitted only to take suitable waste from Sellafield and Dounreay respectively. This leaves ENRMF, Clifton Marsh and Lillyhall as the three authorised sites that can receive waste. The capacity of these sites is influenced by limits set out within their environmental permits and planning permissions. Current planning permissions for these landfill facilities are due to expire in 2016, 2015, and 2014 respectively; although it is understood that these sites are likely to seek extensions to their current authorisations.

The analysis was completed on both a national and regional basis (the regions being designated as the North and South of the UK).

The key conclusions for the national assessment were:

- There is adequate capacity in the existing authorised sites until December 2016.
- If the extended authorisations are obtained for the sites, there is adequate capacity until 2026, after which further capacity would need to be identified and permissioned if disposal solutions were still required and demonstrated as BAT.

The conclusions from the regional analysis were:

- There is adequate capacity in the Southern region until December 2016 with the current authorisations; or until 2026 if ENRMF gain extended permissions. After 2026 more capacity would need to be identified and permissioned if disposal solutions were still required and demonstrated as BAT.
- In the Northern region, with the current permissions, there is adequate capacity until December 2015. If extended authorisations are obtained for the existing sites, there would be adequate capacity until 2020, after which more capacity would need to be identified and permissioned if disposal solutions were still required and demonstrated as BAT.

Because the actual categorisation of the waste only occurs when it arises (for example, waste that was predicted to be LA-LLW could be exempt, or waste that was predicted to be LLW could be LA-LLW) and because the sites will need to make a BAT/BPEO case for the wastes, flexibility and a degree of spare capacity in waste routes is valuable to support application of the waste hierarchy and to preserve repository capacity.

This analysis has only considered arisings from the nuclear industry. The capacity of these sites may also be required by the non-nuclear industries (for example, for NORM wastes from the oil and gas industry, although there are sites that are already authorised to accept NORM).

There is a potential opportunity for the use of suitable LA-LLW in the LLWR cap construction; although this proposal is still being technically investigated.

It should be recognised that there is a degree of conservatism within the inventory estimates and some disparity in volumes between the different data sources. The nearer term volume assumptions (contained in the JWMPs) are likely to be more accurate since, in the longer term, decommissioning plans are less mature and therefore hold a greater degree of uncertainty. In addition, recent work by some SLCs to reassess their waste inventories have evidenced that these new approaches give a lower estimate of future waste arisings. The differences in the data sets do, however, highlight the continuing need to improve the accuracy and quality of waste inventory data submitted by the waste producing organisations. This is an existing strand of work within the LLW National Programme.

Glossary

BAT	Best Available Technique
Bq/g	Becquerels per gram
BPEO	Best Practicable Environmental Option
CLESA	Calder Landfill Extension Segregated Area
EA	Environment Agency
ENRMF	East Northants Resource Management Facility
ESC	Environmental Safety Case
HLW	High Level Waste
HV-VLLW	High Volume Very Low Level Waste
ILW	Intermediate level Waste
JWMP	Joint Waste Management Plan
LA-LLW	Low Active Low Level Waste
LLW	Low Level Waste
LLWR Ltd	Low Level Waste Repository Ltd
LTP	Lifetime Plan
MOD	Ministry of Defence
NORM	Naturally Occurring Radioactive Materials
RSRL	Research Sites Restoration Ltd
SL	Sellafield Ltd
SLC	Site Licence Company
te	tonnes
UKRWI	UK Radioactive Waste Inventory
VLLW	Very Low Level Waste
WIF	Waste Inventory Form

Contents

1. Background

In 2011 LLWR Ltd published an analysis of the 2010 UK Radioactive Waste Inventory (UKRWI) data to establish the volumes of Low Activity Low Level Waste (LA-LLW) material that may be suitable for management through the application of the waste hierarchy via options such as metal recycling and incineration, and through controlled burial in permitted near surface disposal facilities.

This report builds on that original analysis by specifically considering the volume of those wastes suitable for disposal at near surface disposal sites (alternative to the LLWR) in comparison with the available capacity of such sites in the UK over the period 2012 - 2030. The report seeks to establish whether there is adequate capacity available in existing sites and where constraints may arise over that period. It considers both a national and a regional picture of arisings and capacity.

For the purposes of this report, the term LA-LLW refers to those wastes with a total radioactivity of less than 200Bq/g (Becquerels per gram) arising from within the nuclear industry[3] (NORM wastes (Naturally Occurring Radioactive Materials) and exempt wastes are excluded). This category includes wastes defined as High Volume Very Low Level Waste (VLLW) which have activity less than 4Bq/g. This is not the formal definition of LA-LLW, but has been used because it encompasses those wastes that have been demonstrated as able to be disposed of in facilities other than the LLW Repository.

Three sources of waste data are used:

- The 2010 UK Radioactive Waste Inventory (UKRWI)[4] for the period 2012 to 2030;
- The Joint Waste Management Plans (JWMPs) produced by the Site Licence Companies (SLCs), which predict the waste arisings in the 5-year period from April 2012 and align with existing site operating targets set by the NDA.
- The 2012 NDA Waste Inventory Form (WIF), the annual waste inventory submission by NDA estate SLCs, for the period 2012 – 2030.

The JWMPs and WIF are more up to date than the UKRWI and are intended to provide a more accurate near-term view of waste arisings; however, JWMPs only exist for some NDA estate SLCs and the WIF does not include any non NDA estate consignors; they therefore do not provide a complete picture of waste arisings during their respective time periods.

2. The Capacity Challenge

The 2010 UKRWI predicts a total of almost 5 million m^3 raw volume of radioactive waste within the UK, including High Level (HLW), Intermediate Level (ILW) and Low Level Waste (LLW). Approximately 0.16 million m^3 has already arisen and a further 4.55 million m^3 is foreseen to be generated between 2010 and 2120.

Of this total volume, 4.43 million m^3 is estimated to be LLW, including LA-LLW and VLLW. Once conditioned and packaged, this volume will increase considerably. These volumes exceed the capacity of the LLWR by a significant margin; and there is therefore a need to

[3] The definition for 'nuclear industry' is defined within the UK Strategy for the Management of Solid Low Level Radioactive Waste from the Nuclear Industry as sites that hold a nuclear site licence.
[4] Department of Energy and Climate Change (DECC), 2011. The 2010 UK Radioactive Waste Inventory: Main Report.

apply the waste hierarchy, as well as identifying alternate routes for waste, as outlined in the UK Nuclear Industry LLW Strategy.

Almost 4.0 million m^3, or 89%, of the total LLW inventory has an activity of <200 Bq/g (with VLLW accounting for 448,570 m^3 or 11% of the total) and therefore may be suitable for disposal at alternate permitted near surface disposal facilities.

It should be noted that the LLW element of the 2010 UKRWI does not include much of the potentially contaminated land at the Sellafield site; which is yet to be fully characterised. Current bounding estimates within the NDA's Site Restoration Strategy indicate that this could amount to a further 13 to 14 million m^3, although this is not well defined. No decision has been taken on the management of contaminated land; the SLCs are focussing on accelerating characterisation and developing robust management plans which may include leaving the contaminated land in place or adopting only limited remediation.

The UKRWI also does not include any waste arising from potential new nuclear power stations. None of the data sets include any waste arisings from non-nuclear industries, e.g. NORM.

3. Inventory Analysis

This section provides an overview of the LA-LLW waste inventory arisings from:

- 2010 UKRWI for the period 2012 – 2030;
- 31st March 2012 JWMP submissions;
- 2012 WIF for the period 2012 - 2030.

For the purposes of this analysis from this point forward, it is assumed that LA-LLW includes all VLLW.

For the 2010 UKRWI analysis, the approach involved examination of the 2010 UKRWI LLW inventory data-set on a site by site basis to consider those wastes considered LA–LLW, in order to assess the material volumes that could be sent to authorised disposal facilities. By considering the waste material composition, expected affects of implementation of volume reduction and segregation techniques, and the waste activity levels, assumptions can be made to provide a realistic estimate of the volumes that may be managed by this route.

Within both the JWMPs and the WIF waste producers categorise waste by its potential waste management route. Thus, for the JWMP analysis, the approach involved extracting all data which the waste producers had categorised as LA-LLW that was planned to be either 'disposed to landfill via LLWR Framework' or 'via direct contracts' over the 5-year period commencing April 2012.

For the WIF analysis, the approach involved extracting all waste volumes categorised by the waste producers in their submissions as VLLW going to 'landfill', 'specified landfill' or 'controlled burial'.

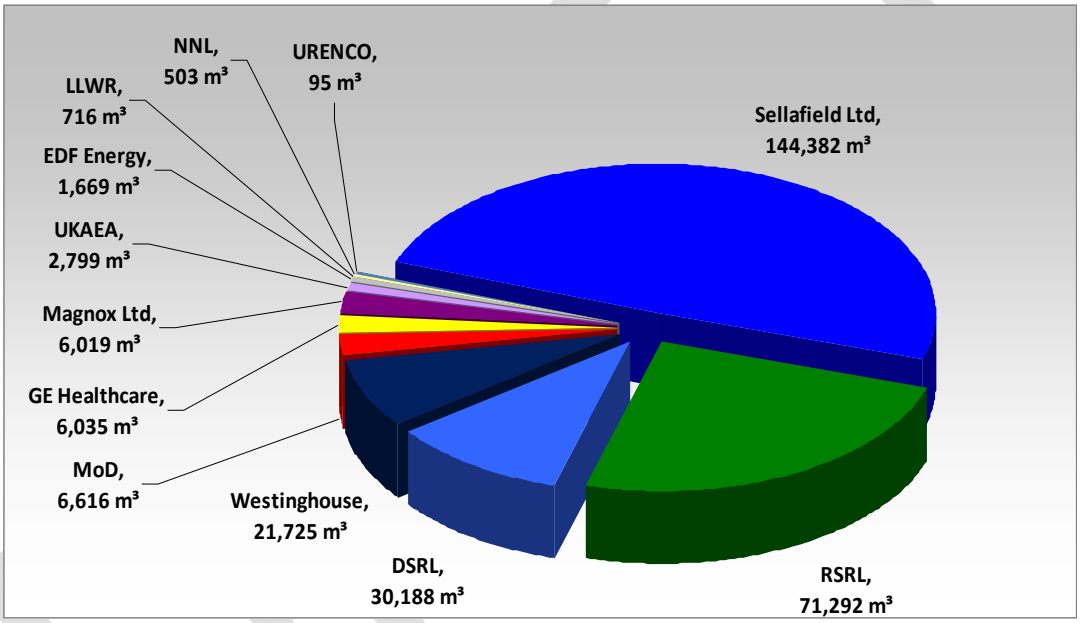
3.1. 2010 UK Radioactive Waste Inventory

For the purposes of this report, the analysis of the UKRWI focuses on the period 2012 – 2030. Whilst the 2011 report addressed the full period of the NDA's decommissioning

programme (to 2120), the methodology and assumptions used for deriving the final values remains the same. Within the UKRWI, the total volume of waste arisings during the period 2012 to 2030 with an activity of < 200Bq/g is predicted to be approximately 445,918m^3, or about 10% of the total LLW inventory reported in the 2010 UKRWI. This volume includes those wastes which could be suitable for recycling, incineration, volume reduction or alternative disposal. The set of assumptions used to estimate the volumes of waste that will require disposal are included in the 2011 report

Following application of the waste hierarchy assumptions and excluding those wastes categorised as likely to be exempt, the resultant volume of waste that may ultimately require disposal to an alternative disposal facility is 292,039m^3 over this period, an average of 15,370m^3 a year. Figure 1 shows how this waste volume is apportioned at a waste organisation level. As can be seen, of the total estimated volume, the largest contribution is predicted to be from Sellafield Ltd, accounting for almost 50% of the total.

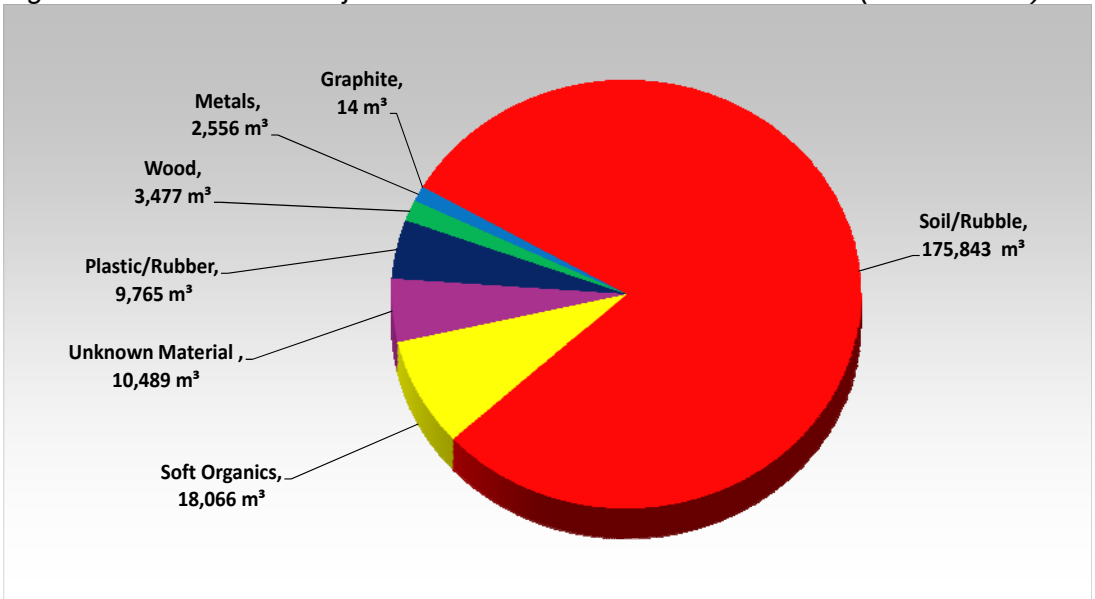
Figure 1 2010 UKRWI Volumes on LA-LLW per Organisation Post WH application



Waste from Dounreay and that identified for disposal at Sellafield's Calder Landfill Extension Segregated Area (CLESA) site have been included for completeness in Figure 1, but will be excluded from the capacity analysis.

If the Dounreay and CLESA wastes are excluded, the remaining waste amounts to 220,207m^3. The materials breakdown of this volume is shown in Figure 2. It is expected that the dominant waste material requiring disposal to near surface facilities will be soil and rubble, accounting for almost 80% or 175,843m³ of the total volume; the remainder being small amounts of metallic, combustible and unknown materials.

Figure 2 2010 UKRWI Projected Materials Breakdown of LA-LLW (2012 – 2030)



3.2. 2012 Joint Waste Management Plans

The JWMPs are waste management plans which have been developed by the SLCs and other waste producers in conjunction with the LLWR National Programme Office, to improve integration and coordination of implementation of the UK LLW Strategy.

The JWMPs contain a forecast of individual SLC waste arisings over a 5-year period commencing April 2012 for metallic, combustible, LA-LLW and LLW disposal volumes. This analysis focuses on the forecasts for those wastes reported as LA-LLW that are to be either 'disposed to landfill via LLWR framework', 'via direct contracts' or 'disposed onsite (packaged)'.

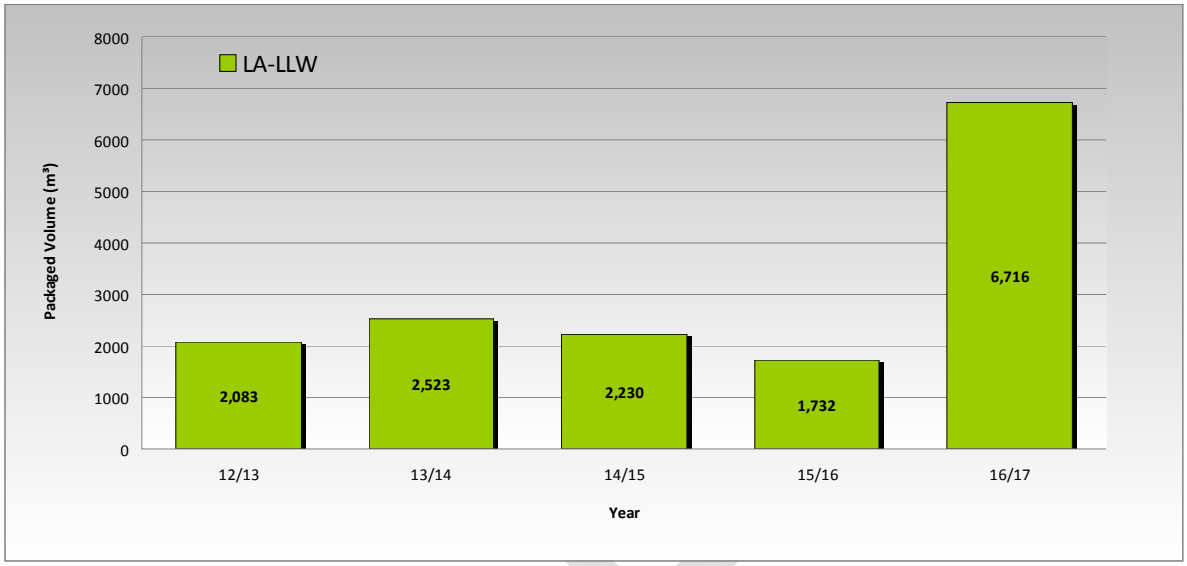
The JWMP waste arisings data has been sourced from those plans submitted on the 31st March 2012 by the following organisations:

- Sellafield Limited (SL)
- Magnox Limited
- Research Sites Restoration Limited (RSRL)

Whilst Dounreay Site Restoration Ltd (DSRL) submitted a JWMP in December 2011, no LA-LLW arisings were predicted for the 5 year period; and the current strategy for LLW is onsite disposal at Dounreay. In addition, JWMPs are currently in draft form for Springfields, LLWR, GE Healthcare and EDF-Energy and have therefore not been included. In comparison with the UKRWI, the waste arisings predicted by the three sites who have submitted JWMPs make up 62% of the UKRWI for the 5 year period concerned (excluding CLESA volumes).

Figure 3 shows the total LA-LLW waste arisings over the 5-year period. The figures reported within the 2012 JWMPs reference packaged volumes and are assumed to represent waste volumes after application of the waste hierarchy. The data used in the graph exclude CLESA volumes.

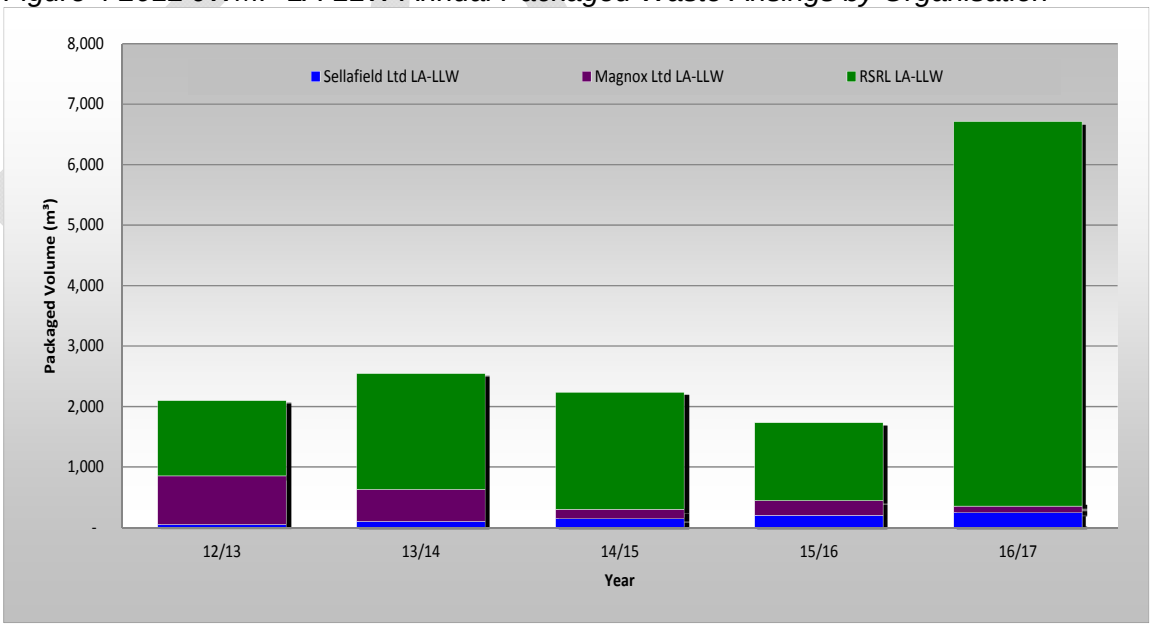
Figure 3 2012 JWMP LA-LLW Annual Packaged Waste Arisings



As can be seen, total LA-LLW arisings over the next 5 years amount to 15,283m³ of packaged waste across the three waste organisations; an average of 3,057m³ per annum.

Figure 4 shows the breakdown of these arisings by individual waste producer. The majority of LA-LLW originates with RSRL who is forecasting to generate 12,745m³ or 83% of the 5 year total.

Figure 4 2012 JWMP LA-LLW Annual Packaged Waste Arisings by Organisation



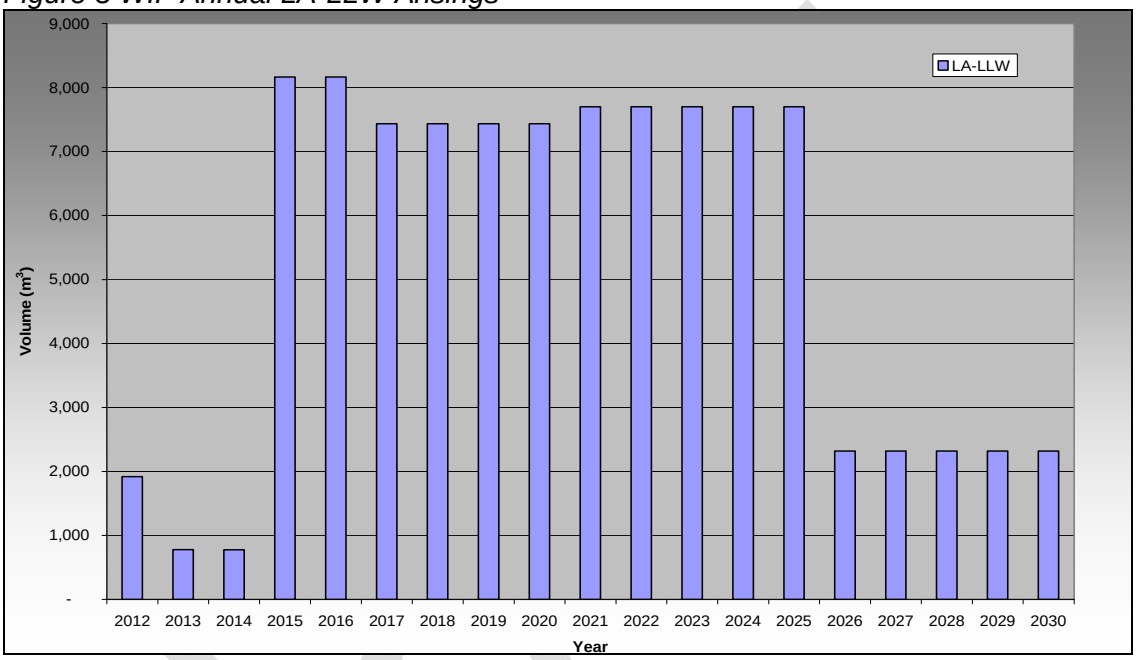
3.3. Waste Inventory Form

The WIF is the annual submission made by the NDA estate SLCs at the end of each financial year, providing projected arisings up to 2120. For the purpose of this analysis the

2012 data set for the period 2012 – 2030 was considered and, specifically, the subset of data which included waste volumes categorised as VLLW going to controlled burial, specified landfill or landfill. In addition, to align with the other two data sets, Sellafield waste identified for disposal in CLESA and Dounreay wastes were excluded.

At total of 99,625m^3 waste is predicted to arise during that period. Figure 5 shows the annual arisings until 2030.

Figure 5 WIF Annual LA-LLW Arisings



3.4. Inventory Analysis Summary

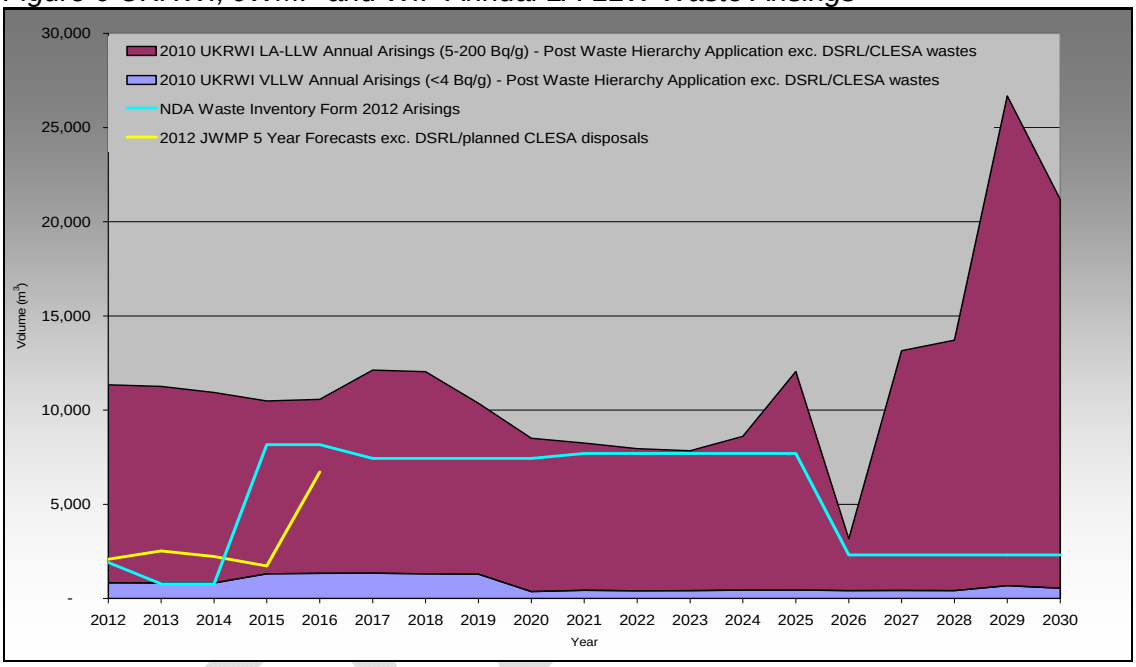
It can be seen from the individual analyses that there are significant differences in volumes reported in the three data sets. Figure 6 summarises the waste volumes.

During the same period, the 2010 UKRWI predicts an average of circa 11,600m^3 per annum of raw volume, whilst the JWMPs forecast 3,057m³ per annum of packaged volumes. Similarly, there is a significant difference in the projected total arisings of LA-LLW in the WIF in comparison with the UKRWI (99,625m^3 in comparison with 220,207m^3); whereas the WIF aligns more closely with the JWMP total for the nearer term 5 year period of the JWMPs (19,802m^3 in the WIF, in comparison with 15,283m³ in the JWMPs).

These differences are in part, because both the JWMPs and the WIF used for this analysis represent only three organisations (the 13 nuclear licensed sites operated by Sellafield, Magnox and RSRL), whereas the UKRWI includes all waste producers. Thus, neither the JWMP nor the WIF data sets include several organisations including Ministry of Defence (MoD), EDF-Energy, Westinghouse, URENCO, GE Healthcare, and LLWR which were included in the 2010 UKRWI analysis covering the same period. The waste predicted to arise from the three organisations make up 82% of the waste in the UKRWI for the period.

It should be noted that the actual categorisation of the waste will only occur when it arises (for example, waste that was predicted to be LA-LLW could be exempt, or waste that was predicted to be LLW could be LA-LLW); thus more recent inventory assessments (the JWMPs and the WIF) are likely to have a more accurate perspective of near term arisings.

Figure 6 UKRWI, JWMP and WIF Annual LA-LLW Waste Arisings



The differences in the data sets do highlight the continuing need to improve the accuracy and quality of waste inventory data submitted by the waste producing organisations. This is an existing strand of work within the LLW National Programme.

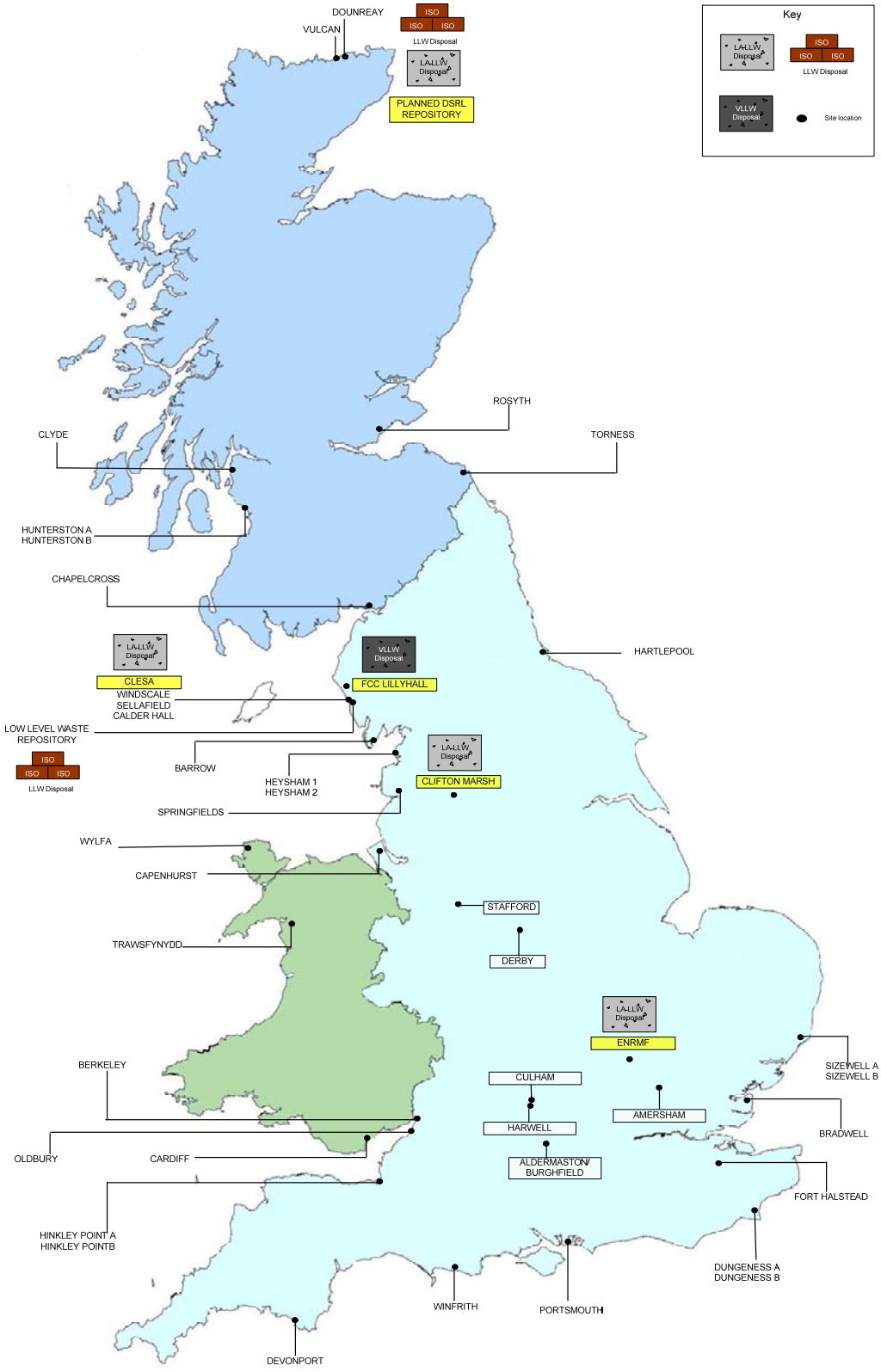
4. National LA-LLW Disposal Capacity

There are currently five authorised disposal facilities across the UK which can accept LA-LLW and High Volume Very Low Level Waste (HV-VLLW) disposals. The geographical locations of these facilities within the UK are shown in Figure 7.

Figure 7 includes both the Dounreay site and Sellafield Ltd's CLESA site for completeness. They are both, however, excluded from subsequent analysis. The Dounreay site is not yet available and will only be authorised to take suitable waste from the Dounreay and adjacent Vulcan sites; and CLESA is only permitted to accept waste originating from within the Sellafield site boundary that fall into specific criteria defined through their site permitting regulations[5].

[5] Environment Agency, 2012. The Environmental Permitting (England & Wales) Regulations 2010. Sellafield Ltd, Permit number EPR/KP3690SX (variation notice number EPR/KP3690SX/V003).

Figure 7 UK Locations of Existing/Planned Authorised Disposal Facilities



In addition, there are a number of existing authorisations made by the Environment Agency (EA) for LA-LLW disposals to a local landfill site. These are shown in Table 1.

Table 1 UK Sites Holding Local Disposal Authorisation

Site	Disposal Route	Authorised Volume p/a (m^3)
HM Naval Base Devonport	Disposal site not named	50
Devonport Royal Dockyard Limited	Heathfield Landfill at Newton Abott or Lean Quarry at Liskeard	1,000
GE Healthcare at Amersham	Disposal site not named	490
GE Healthcare at Cardiff	Disposal to Lamby Way Landfill site, Cardiff	200
GE Healthcare at Harwell	Disposal site not named	500
RSRL Winfrith	Two routes, both to unspecified landfills	1,000 for C14 and H3 300 for other radionuclides

These local disposal authorisations have been excluded from the capacity assessment because these authorisations will be reviewed as the operators update their authorisations to the new Environmental Permitting Regime.

The current capacities for the three landfill sites authorised to receive LA-LLW amounts to approximately 0.74 million m^3. As shown in Table 2, this capacity is available through three authorised disposal facilities operated by SITA, Augean plc and FCC.

It should be noted that, although FCC's Lillyhall site is included in the analysis, it only permitted to receive VLLW.

Table 2 LA-LLW Facility Status Summary

Site	Environmental Permitting Status	Total Capacity	Total LA-LLW Authorised Capacity (m3)	Annual Limits	Start Date	Current End of Planning	Potential Extension	Bulk Radioactive Limits*	Comments
FCC Lillyhall	Article 37 - March 2011 Permitting - April 2011	1,500,000m^3	582,000m^3	26,000m^3	May 2012	2014	2031	4Bq/g	• New planning permission was not required to accept VLLW. • FCC plan to extend the life of the site to continue to accept.
SITA Clifton Marsh	Article 37 - Feb 2011 Permitting – August 2012	2,100,000m^3	210,000m^3 (10% of total limit)	Unlimited for waste from the northwest; 4000te limit for waste from outside the northwest	Aug 2012	Dec 2015	2020	200Bq/g in a 10 (te) load, maximum activity of 1000 Bq/g within a 10 (te) load	• SITA's Environmental Safety Case specifies that only 10% of the total Site Capacity will be used for LA-LLW • Currently receiving waste from Springfields Fuels Ltd, Sellafield Ltd (Capenhurst Site) and URENCO UK Ltd based at Capenhurst Site under historic RSA 93 authorisations • New Planning Consent and EPR Permit allows receipt of waste from other UK sites • SITA may apply for extension
Augean ENRMF	Article 37 – Jan 2011 Permitting – May 2011	400,000m^3	No capacity limit specifically for LLW	No annual limit	Dec 2011	Dec 2016	2026	200Bq/g	• SoS granted planning permission in May 2011 • 249,000te limit per annum hazardous and LLW • Augean have applied for extension to 2026 including total capacity extension to 1,200,000m^3

*Note: The Waste Acceptance Criteria for each site may have specific limits for certain radionuclides

5. Capacity versus Arisings

This section of the report considers the inventory arisings in comparison with national capacity to establish the headroom, or otherwise, available within the existing disposal facilities.

The analysis makes use of the three data sources described earlier - the UKRWI and the WIF for the period 2012 – 2030 and the JWMPs for the 5 year period commencing April 2013. All these data sets exclude Dounreay wastes and those wastes designated for disposal at CLESA.

The first section considers this from a national perspective and the second from a regional perspective.

5.1. National Perspective

The volume of LA-LLW (including VLLW) previously identified within the three data sets after applying the waste hierarchy assumptions and excluding Dounreay and CLESA wastes are summarised in Table 3.

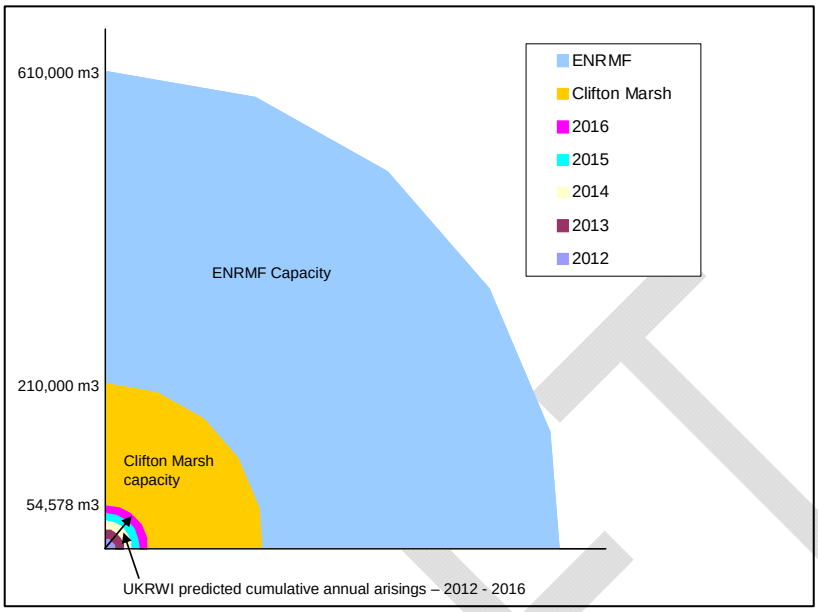
Table 3 National LA-LLW Arisings (m^3)

Data Set	Timeframe	2012	2013	2014	2015	2016	2017 - 2030	Total Waste Volume
UKRWI	2012-2030	11,343	11,258	10,934	10,479	10,565	165,629	220,207
JWMPs	2012-2017	2,083	2,523	2,230	1,732	6,716	-	15,283
WIF	2012-2030	1,919	778	776	8,165	8,165	79,823	99,625

Of these LA-LLW arisings only a small proportion (between 410 – 1341 m^3 per annum according to the UKRWI) is predicted to be VLLW, thus for this part of the capacity analysis the available volume at the Lillyhall site (26,000 m^3 per annum) has been excluded, since it can only accept VLLW.

If the data set predicting the greatest inventory, the UKRWI, is compared with the available capacity at the two sites which can take LA-LLW (Clifton Marsh and ENRMF), there is adequate capacity until December 2016, by which date the current authorisations for both sites will have ended (December 2015 and December 2016 respectively) - see Figure 8.

Figure 8 National Capacity versus 2010 UKRWI for the Period 2012 – 2016



After December 2016, if the extended planning permissions are granted, the available capacity of the landfill sites would be sufficient to accommodate all UKRWI LA-LLW arisings until 2026 assuming the limits for the sites are unchanged, when the proposed extension at the ENRMF site would end (the proposed extension at Clifton Marsh would have ended in 2020).

5.2. Regional Perspective

This section considers the capacity headroom available in authorised disposal sites on a UK regional basis. For this analysis two regions are considered:

- The South of the UK, which is assumed to include the South East, the South West, the East, the West and East Midlands;
- The North of the UK, which is assumed to include the North West, the North East, Scotland (excluding Dounreay) and Wales.

Wastes from the NDA sites in Scotland (excluding Dounreay) are included in this analysis since they are currently managed within existing UK government policy. They form less than 2% of the LA-LLW inventory being considered.

5.2.1. The Southern Region

The sites producing waste in this region within the scope of this study include the RSRL sites and the Magnox sites of Berkeley, Bradwell, Dungeness, Hinkley Point, Oldbury, and Sizewell A. The JWMP and WIF data sets include waste volumes for these sites only, whereas the UKRWI includes waste volumes for all sites in the region. Table 6 summarises the volumes identified within the three data sets.

Table 4 Southern Region LA-LLW Arisings (m^3)

Data Set	Timeframe	2012	2013	2014	2015	2016	2017 - 2030	Total Waste Volume

UKRWI	2012-2030	5,739	5,731	5,556	5,768	5,824	59,285	87,901
JWMPs	2012-2017	1,263	1,924	1,934	1,287	6368	-	12,777
WIF	2012-2030	1,426	776	776	8,102	8,102	70,432	89,614

The only near surface disposal facility assumed to be available in the South is ENRMF which has a total capacity of 400,000 m^3 (with an assumption that 20%, or 80,000m^3, will be used for LA-LLW) until December 2016, in comparison with a predicted arising of 28,618m^3 (from the UKRWI) for the same period.

Thus there is sufficient capacity in the South, if all of those sites in the region sent their predicted LA-LLW arisings to landfill.

If ENRMF was successful in gaining their planning extension (which includes an expansion of total capacity to 1.2 million m^3) there would be sufficient capacity until 2026 (when the UKRWI predicts a total of 85,193m^3 arisings). Beyond 2016 a further extension or additional capacity would be required within the South of the UK to accommodate LA-LLW arisings originating from this part of the country.

5.2.2. The Northern Region

The sites producing waste in this region within the scope of this study include Sellafield (excluding CLESA), Springfield, Capenhurst, and the Magnox sites (Chapelcross, Hunterston, Trawsfynydd and Wylfa). The JWMP and WIF data sets include waste volumes for these sites only, whereas the UKRWI includes waste volumes for all sites in the region. Table 5 summarises the waste volumes identified within the three data sets.

Table 5 Northern Region LA-LLW Arisings (m^3)

Data Set	Timeframe	2012	2013	2014	2015	2016	2017 - 2030	Total Waste Volume
UKRWI	2012-2030	5,604	5,527	5,378	4,711	4,742	106,344	132,306
JWMPs	2012-2017	820	599	296	445	348	-	2,508
WIF	2012-2030	493	2	0	63	63	9,391	10,012

Within this region it is assumed that there are two disposal facilities – Lillyhall and Clifton Marsh, the first only able to take VLLW and the second LA-LLW.

The total volume of VLLW predicted within the UKRWI for the period to 2014 within the North, when the current authorisations for waste disposal at Lillyhall end, amount to 1,958m^3 - well within the 26,000m^3 annual limit for the site.

The only site in the North assumed to be available to accept LA-LLW is Clifton Marsh which has a total capacity of 210,000m^3. If all the waste predicted to arise in the North until December 2015 (21,220m^3 within the UKRWI), when the current authorisations for Clifton Marsh end, is sent to that site there would be adequate capacity to dispose of it.

If the Clifton Marsh site gained further the potential extended planning permissions until 2020, there would be adequate capacity until that date (the UKRWI predicts a total of 42,665 m^3 arisings 2012 – 2020). After that date, a further extension or additional capacity would be required within the North of the UK to accommodate LA-LLW arisings originating from this part of the country.

6. Additional LA-LLW Opportunities

In order to provide a more complete picture in terms of the capacity requirement, this report acknowledges a potential opportunity for alternate use of LA-LLW, by re-using certain types of LA-LLW in the repository cap at the LLWR.

The proposed capping of the LLWR will be carried out in phases spanning circa 70 years. The cap could require between 145,000 – 455,000m^3 of capping material up to 2030 and between 85,000 – 265,000m^3 between 2031 and 2079, of which between 200,000 - 400,000m^3 could be VLLW over the total period. The start date for the site preparation phase could be as early as 2015.

According to the 2010 UKRWI, approximately 1.6 million m^3 of LA-LLW is estimated to arise during this 70 year period, of which 80% or 1.4 million m^3 is soil and rubble, which may be suitable for reuse in the LLWR cap (this will be dependant upon the design of the cap).

91% of this material is generated at Sellafield, although a significant quantity arises at Harwell, particularly in the early years, and a relatively smaller volume at the Springfields site after 2040. Other sources of LA-LLW do not contribute significantly to the total.

However, work is still ongoing to assess the impact on the wider LLWR Environmental Safety Case and a business case will have to be prepared to secure funding to execute the project. This opportunity cannot progress until the Environment Agency determines whether to grant a permit for disposal and planning permission is secured.

7. Conclusions

This report has undertaken a high level comparison of those waste material volumes that could be sent for alternative disposal at authorised landfill facilities with the available capacity of those sites.

Three waste inventory data-sets were considered:

- 2010 UKRWI for the period 2012 – 2030;
- 2012 JWMPs from Sellafield, Magnox and RSRL for the 5 year period commencing April 2012;
- 2012 WIF for the period 2012 – 2030.

Three authorised landfill facilities were included:

- FCC's Lillyhall site;
- Augean's ENRMF site;
- SITA's Clifton Marsh site.

The available capacity headroom was assessed for the period 2012 – 2030 on both a national and regional basis.

The key conclusions for the national assessment were:

- There is adequate capacity in the existing authorised sites until December 2016.

- If the extended authorisations are obtained for the sites, there is adequate capacity until 2026, after which further capacity would need to be identified and permissioned if disposal solutions were still required and demonstrated as BAT.

The conclusions from the regional analysis were:

- There is adequate capacity in the Southern region until December 2016 with the current authorisations; or until 2026 if ENRMF gain extended permissions. After 2026 more capacity would need to be identified and permissioned if disposal solutions were still required and demonstrated as BAT.
- In the Northern region, with the current permissions, there is adequate capacity until December 2015. If extended authorisations are obtained for the existing sites, there would be adequate capacity until 2020, after which more capacity would need to be identified and permissioned if disposal solutions were still required and demonstrated as BAT.

The potential use of LA-LLW in the LLWR cap could provide an opportunity for material re-use, and therefore reduce the volumes that would be required to be disposed of in suitable landfill sites.

It is clear from the difference in waste volumes reported in the three data sources that there is a need to improve the accuracy and quality of waste inventory data submitted by the waste producing organisations. However, the actual categorisation of the waste will only occur when it arises (for example, waste that was predicted to be LA-LLW could be exempt, or waste that was predicted to be LLW could be LA-LLW); thus more recent inventory assessments (the JWMPs and the WIF) are likely to have a more accurate perspective of near term arisings.

There is a programme of work associated with inventory improvements which remains a key deliverable of the NWP. Performance will continue to be monitored and assessed through the implementation of Element 8 (LAW Business & Information Reporting, Improving Communication) of the Programme.