

Management of Radioactive Waste & Materials Inventory Data

Credible Options Assessment (Stage A) and
Selection of Preferred Option (Stage B)

July 2018



Management of Radioactive Waste & Materials Inventory Data Credible Options Assessment (Stage A) and Selection of Preferred Option (Stage B) July 2018

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Glossary

BEIS Department for Business, Energy and Industrial Strategy

EC European Commission

GDF Geological Disposal Facility

IAEA International Atomic Energy Agency

LLWR Low Level Waste Repository Ltd.

NDA Nuclear Decommissioning Authority

NEA Nuclear Energy Agency

NRW Natural Resources Wales

RWM Radioactive Waste Management Ltd.

SEPA Scottish Environment Protection Agency

SLC Site Licence Company

UKAEA United Kingdom Atomic Energy Authority



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Executive Summary

In the UK, radioactive wastes and materials are produced by a range of businesses and organisations across the energy, medical, research, industrial and defence sectors. These producers are responsible for managing and maintaining information about the nature and quantities of radioactive waste and materials that they control, also known as their inventory.

Producers of radioactive wastes and materials currently contribute information about their inventories to a central, UK inventory data collection exercise once every three years. This data collection process is managed by the Nuclear Decommissioning Authority (NDA), and is jointly funded by the NDA and the Department for Business, Energy and Industrial Strategy (BEIS).

The UK Radioactive Waste & Materials Inventory (UK Inventory) provides comprehensive information on radioactive wastes and materials that were in stock and were forecast to arise across the UK at a specific point in time, called the 'stock date'. Information on the latest UK Inventory (based on a stock date of 1st July 2016) is publicly available via the UK Inventory website¹.

This strategy seeks to review the NDA's approach to collecting and compiling inventory data, with a particular focus on determining whether a different approach for management of the UK Inventory could have a positive impact across the sector. It is also recognised that the current approach does not enable the UK to meet international reporting obligations for spent fuels and nuclear materials, where data is required on an annual basis. This data has previously been collected on an informal basis and there are benefits associated with reviewing and formalising this approach.

The strategic objective for this area is:

To ensure that a single, approved radioactive waste and materials inventory data set is available when required:

- **to enable BEIS and the UK to meet relevant international reporting requirements;**
- **to enable the NDA to develop strategy and deliver its mission; and**
- **to provide sufficient, accessible information suitable for use by our key stakeholders, including waste producers, waste management and disposal organisations, regulators and the general public.**

This paper seeks to identify credible options aligned with the above strategic objective and to propose a preferred option, taking into account the above context for strategy development. This strategy focuses primarily on the overarching approach to compiling the UK Inventory,

¹ NDA & BEIS (2014), UK Radioactive Waste Inventory, www.nda.gov.uk/ukinventory



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but acknowledges the essential work needed to continually improve the quality of data being collected and reduce uncertainty in the inventory data.

A range of different options could be considered for managing radioactive waste and materials inventory data. It was useful to categorise these strategic options into five broad categories, as described below:

- **Purpose** - The purpose of the UK Inventory, for example as a reporting tool only or as an operational tool with reporting capability.
- **Funder** - The organisation/s responsible for funding the compilation of data for the UK Inventory. A range of funder options were proposed, including NDA, BEIS, Regulators, Low Level Waste Repository Ltd (LLWR), Radioactive Waste Management Ltd (RWM), industry, and various combinations of these.
- **Delivery Organisation** - The organisation/s responsible for undertaking the collection and compilation of data for the UK Inventory. A range of delivery options were considered, including NDA, BEIS, Regulators, LLWR, RWM, industry, supply chain and various combinations of these.
- **Frequency** - The number of times that the UK Inventory is compiled within a given period. Options from 10 yearly compilation of data, to 'live' reporting were considered.
- **Scope** - The content and extent of data and information captured in the UK Inventory. This considered options to retain the scope, expand the scope to include further information such as minor waste producers, reduce the scope or split the scope of the inventory into separate data collection processes for radioactive waste, materials and contaminated land.

Further information on each of the categories is provided in Appendix 4. Each of the proposed strategic options is presented in the Strategic Options Diagram in Figure 1.

Credible options and assessment approach

Given the number of different options in each category, there were hundreds of possible combinations that could be considered for further assessment. It was necessary to apply a shortlisting process to reduce the long list of options to a shorter list of credible options. This process involved the following stages:

- Development and application of screening criteria to all options to produce shortlist of options within each category;
- Consideration of less tangible factors that affect the credibility of options;
- Selection of one option in each category to generate a smaller number of complete, credible options for assessment.

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Shortlisted credible options are summarised below:

Option No.	Purpose	Funder	Delivery organisation	Frequency	Scope
1	Reporting tool	BEIS & NDA	Third party managed by NDA	Annually	Maintain existing
2	Reporting tool	NDA	Third party managed by NDA	Annually	Maintain existing
3	Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope
4	Reporting tool	NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope

Note: Those options highlighted in blue represent the current option being implemented.

Preferred option

Selection of the preferred option was based upon the outcome of the value assessment, the detailed assessment of options against the screening criteria and the ability of each option to meet our aspirational outcomes, considering the current context for implementing a new approach.

Option 3 was ultimately selected as the preferred option, as it:

- allows the strategic objective to be met;
- provides flexibility in terms of procurement and the opportunity to extract best value from the supply chain - splitting the scope of the inventory into three areas (radioactive waste; land contamination; and spent fuel and nuclear materials) offers BEIS and NDA the potential to access wider supply chain skills, to increase competition and to support development of a robust supply chain;
- offers flexibility in terms of delivery, notably the scope of the inventory;
- offers the opportunity to improve the efficiency and consistency of existing reporting for spent fuels and nuclear materials through formal rather than informal reporting;
- retains credibility associated with direct funding from Government.

Option 3 offers benefits over the current approach; however there are challenges that have been identified, notably a more complex procurement approach may be required, and project management costs associated with splitting the scope of the inventory may increase. These challenges are considered to be acceptable when offset against the benefits.

Some specific issues have not been tackled in this paper (such as widening of the UK Inventory scope) as these must be considered on a case by case basis. The format for data reporting has been excluded from this paper as a presentational issue, but should be



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addressed through work via the National Inventory Forum (a forum that brings together inventory practitioners from across the UK to share learning and best practice in the field of inventory data compilation, management and communication). Future contracts for the production of the inventory will seek to address both the content and method of inventory reporting.

The preferred option has been developed considering the current operating context. At present, there are significant uncertainties that limit the opportunity to pursue more ambitious options in the short term. In particular, uncertainty surrounding the UK's departure from the European Union means that it is unclear at this stage what impact this will have on the UK's international reporting requirements. In addition the NDA operates in a fiscally constrained environment. There is currently low risk appetite to support new, high cost or high risk investment above current inventory costs that will not deliver benefit to the NDA estate for example an increase in reporting frequency.

The preferred option must be supported by a programme of continuous improvement that will facilitate improvements in data quality and reduce uncertainty in the inventory.

The next stage in the strategy development process is to explore options for implementation including options for delivery within the next inventory cycle and funding of the preferred option, taking into account insight from key stakeholders.



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Introduction

In the UK, radioactive wastes and materials are produced by a range of businesses and organisations across the energy, medical, research, industrial and defence sectors. These producers are responsible for managing and maintaining information about the nature and quantities of radioactive waste and materials that they control, also known as their inventory.

Across the NDA estate, various Site Licence Companies (SLCs) and subsidiaries produce radioactive wastes and materials, and they are responsible for managing and maintaining appropriate information about their inventories on behalf of the NDA. The non-NDA estate sites are also responsible for managing their own inventory data.

Producers of radioactive wastes and materials currently contribute information about their inventories to a central, UK inventory data collection exercise once every three years. At present, this data collection process is managed by the Nuclear Decommissioning Authority (NDA), and is jointly funded by the NDA and the Department for Business, Energy and Industrial Strategy (BEIS).

The UK Radioactive Waste & Materials Inventory (UK Inventory) provides comprehensive information on radioactive wastes and materials that were in stock and were forecast to arise across the UK at a specific point in time, called the 'stock date'. The latest UK Inventory was based on a stock date of 1st July 2016 and the outputs of this reporting exercise are publicly available via the UK Inventory website².

Each organisation has adopted different solutions for managing their inventory data and for preparing information for UK Inventory submissions.

This strategy seeks to review the NDA's approach to collecting and compiling inventory data, with a particular focus on determining whether a different approach for management of the UK Inventory could have a positive impact across the sector. The stock date for the next UK Inventory is planned for 1st July 2019 and so it is timely to review the approach at this stage to allow any changes (if applicable) to be initiated early.

The role of the UK Inventory

The UK Inventory has a key role in enabling the UK to meet international reporting obligations, supporting strategy development and waste management planning, and engaging with stakeholders. Each of these is discussed below:

- **International reporting obligations;** One of the original drivers behind compilation of the UK Inventory was the requirement for UK Government to meet its international reporting obligations. The UK currently submits information on radioactive wastes and materials to the European Commission (EC), the Nuclear Energy Agency (NEA) and the International Atomic Energy Agency (IAEA). A summary of relevant reporting obligations is provided in Appendix 1. BEIS is ultimately responsible for ensuring that

² NDA & BEIS (2018), UK Radioactive Waste Inventory, www.nda.gov.uk/ukinventory



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a suitable UK Inventory data set is available to enable these international reporting obligations to be met.

- **Strategy development and waste management planning;** The UK Inventory provides essential data to inform strategy development and aid national radioactive waste and materials management planning. UK-wide information about radioactive wastes and materials is needed for the planning and management of national facilities, such as the Geological Disposal Facility (GDF) and the Low Level Waste Repository (LLWR). The supply chain also uses national inventory data to support investment decisions and to aid the development of products, services and facilities to support the sector. Inventory data is also required to demonstrate that Best Available Technique (BAT) and As Low as Reasonably Practicable (ALARP) requirements are being met with respect to the management of radioactive waste and materials.
- **Stakeholder engagement;** The UK Inventory has an important role in demonstrating our commitment to openness and transparency, and ensuring that the latest information is available to our key stakeholders. The UK Inventory provides information that is suitable for use by a range of stakeholders both nationally and internationally, including Government departments, regulators, waste producers, waste management and disposal organisations, researchers, academics and the general public. Ensuring that appropriate information is available can support cross-industry working and aid stakeholder engagement.

Failure to compile a comprehensive UK inventory (and make this information available) would result in a range of significant, negative impacts including:

- preventing the UK from making and implementing effective long-term plans for the safe management of radioactive wastes and materials, increasing risks to human health and the environment;
- reputational damage, both within the UK and internationally, through a lack of transparency, an inability to demonstrate underpinning for key strategic decisions and an inability to meet radioactive waste and materials reporting obligations;
- in some cases financial penalties, due to an inability to report inventory information to regulators and through international agreements.



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1. Current situation, case for change and context

Current situation and case for change

At present, there is no over-arching strategy for the management of radioactive waste and materials inventory data³.

In July 2015, the NDA published a paper entitled *Management of Radioactive Waste and Materials Inventory Data – Research and Strategic Case (Gate 0)*⁴. This paper set out the NDA's strategic objective for inventory work, assessed existing management arrangements and concluded that a review of the current approach to inventory data compilation, management and communication would be beneficial.

The Gate 0 paper identified that the development of an appropriate strategy would provide an opportunity to address long-standing issues surrounding:

- The role of the inventory (greater emphasis is needed on the central role of the inventory and its importance in underpinning and influencing operations on site, rather than being solely a product of periodic reporting exercises);
- Proactive engagement with inventory and safeguards teams;
- The existence of multiple, conflicting inventory data sets;
- Improving transparency and reducing uncertainty;
- Improving information and records management;
- Opportunities to streamline inventory data reporting process;
- Sharing best practice (both nationally and internationally);
- Improving the communication of inventory data to support sites in the optimisation of their operations and to support treatment and disposal organisations in planning for management of the radioactive wastes and materials.

The current approach involves annual collection of data on spent fuels and nuclear materials through an informal reporting channel to enable the UK to meet international reporting obligations for spent fuels and nuclear materials data, which is required on an annual basis by the NEA (see Appendix 1 for further information). Data for these reporting obligations have previously been collected on an informal basis and there are benefits associated with reviewing and formalising this approach.

³ An overview of the strategy development process is provided in Appendix 2, for reference.

⁴ NDA (2015), *Management of Radioactive Waste and Materials Inventory Data – Research and Strategic Case (Gate 0)*, www.nda.gov.uk



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Context for strategy development

Many of the issues raised within the Gate 0 paper are still valid today and the case remains for a review of the approach to inventory management across our estate. However, a number of key considerations have arisen since publication of the above paper, which must be taken into account during development of the strategy:

- **Implementation of the National Inventory Forum** - The National Inventory Forum (NIF) brings together inventory practitioners from across the UK to share learning and best practice in the field of radioactive waste (and materials) inventory data compilation, management and communication. The NIF was initiated in 2014 and has since become established, encouraging participation from NDA and non-NDA estate members, regulators and Government. The NIF has an important role in supporting the continual improvement of inventory management activities across the UK.
- **Magnox and RSRL merger and consolidation activities** - On 1 July 2015, Magnox Ltd and Research Sites Restoration Ltd (RSRL) merged to form a single Site Licence Company (SLC) operating as Magnox Ltd. Since their merger, there has been a consolidation period where management systems and approaches have been standardised across the organisation. In terms of inventory data management, this has meant the transfer of RSRL inventory data into the bespoke inventory management system commissioned by Magnox Ltd. As a result, 12 NDA sites are now using a single inventory data management software system.
- **LLWR inventory management** - Low Level Waste Repository (LLWR) Ltd. have also investigated options for improving their inventory data management. LLWR have recently procured the same inventory management software system used by Magnox Ltd. This system will be customised to meet LLWR's specific operational needs.
- **NDA Strategy publication** - The NDA published its Strategy⁵ on 1 July 2016. A new strategy for managing radioactive waste and materials inventory data must recognise interfaces with existing strategies and offer alignment.
- **Impact of referendum on UK membership of the European Union on international reporting requirements** - In July 2016, a referendum was held which resulted in a decision for the UK to leave the European Union; subsequently it was also determined that the UK would leave Euratom⁶. It is unclear at this stage what impact this will have on the UK's international reporting requirements with respect to radioactive waste and materials inventory data. However, the UK remains a member of the International Atomic Energy Agency (IAEA) and reporting requirements under

⁵ NDA (2016), Strategy, Effective from July 2016, ISBN 978-1-4741-3043-1

⁶ Euratom – the European Atomic Energy Community – establishes a single market for trade in the nuclear materials and technologies. Although Euratom is separate from the European Union, it is governed by many of its institutions, including the European Commission, and it sits under the jurisdiction of the European Court of Justice.



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this international collaboration agreement will continue. The UK will continue to submit spent fuel and nuclear materials data to the Nuclear Energy Agency (NEA). Further information on the UK's international reporting commitments is provided in Appendix 1.

- **Economic and political uncertainty** - This strategy is being developed at a time of considerable economic and political uncertainty within the UK. This uncertainty contributes to a reduced risk appetite amongst key decision makers and ultimately affects the ability of BEIS and the NDA (current UK Inventory project sponsors) to support new, high investment or high risk projects that are perceived to be non-critical.
- **International inventory management practice** – Further information has been obtained relating to international approaches to the management of radioactive waste and materials inventory data. This has been summarised in Section 4 and Appendix 3.

Strategic objective

The strategic objective for this area is:

To ensure that a single, approved radioactive waste and materials inventory data set is available when required:

- **to enable BEIS and the UK to meet relevant international reporting requirements;**
- **to enable the NDA to develop strategy and deliver its mission; and**
- **to provide sufficient, accessible information suitable for use by our key stakeholders, including waste producers, waste management and disposal organisations, regulators and the general public.**

This paper seeks to identify credible options aligned with the above strategic objective and to propose a preferred option, taking into account the above context for strategy development.

2. Scope and boundaries

The focus of this work is to ensure that the proposed strategic objective can be met.

It is important to recognise that inventory data management comprises three key elements:

- The inventory 'infrastructure' (i.e. the systems, processes and tools used to collect and compile the data);
- The knowledgeable resource required to manage it;
- The inventory data that is input to the system.

This strategy focuses primarily on the overarching approach and inventory 'infrastructure', but acknowledges the essential work needed to retain knowledge and continually improve the



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quality of data being collected and reduce uncertainty in the inventory data. Further comment on inventory improvement opportunities is provided in Section 4.

It is recognised that the development and implementation of this strategy will affect both NDA and non-NDA estate waste and materials producers. As a result, engagement with these organisations through the National Inventory Forum will be essential during the development of the strategy.

It is acknowledged that the NDA has greater ability to influence the actions of the NDA estate SLCs rather than the non-NDA SLCs; however, it is in the interest of all waste producers to support effective and proportionate inventory initiatives, particularly where they have a bearing on national radioactive waste and materials management planning.

3. Inventory uncertainty and improvement mechanisms

The UK Inventory provides a summary of the best available information on wastes and materials at a specific point in time (the 'stock date'). Although the best available information is used, there can be uncertainties and gaps in the data. These uncertainties can affect the estimated quantity of waste, the physical, chemical and radiological characteristics of the waste and the timing of waste arisings.

In general, uncertainty in inventory data is higher for wastes that were generated a long time ago (legacy wastes); we may not have sufficient information to make accurate estimates of the nature and quantity of waste, as detailed records were not kept as they are now. Sites typically have a good degree of confidence in estimates of future arisings from operations in the short term. Uncertainty increases the further that arisings are projected into the future. The greatest uncertainty rests with future waste arisings from decommissioning and site clean-up, including contaminated land. This is particularly the case for wastes at the lower end of the Low Level Waste (LLW) activity range, where strategies, plans and waste assessment techniques are continually improving and providing better estimates of future volumes.

Reducing uncertainty to an appropriate level can help sites to optimise their use of waste and materials management routes. Uncertainty can be reduced through conducting desk-based research and undertaking site-based activities, in particular waste characterisation⁷. Waste characterisation is a costly process that involves sampling wastes for testing; sites must prioritise which wastes they wish to sample and at what time to support their decommissioning programmes.

⁷ Waste characterisation involves sampling and testing waste to improve our understanding of its physical, chemical and radiological characteristics. The accuracy of the data produced through characterisation depends upon a range of factors, including how much waste was sampled (in general, the larger the sample, the better the result), how comprehensive the testing was, what testing methods were used and when the testing was undertaken.



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It is not realistic or achievable to completely eliminate uncertainty from the entire inventory; for example, some wastes cannot be adequately characterised until they are removed from the ponds, containers or vessels that they are stored in. Instead, a controlled programme of timely inventory improvement activities will help the industry to continually improve their understanding of the inventory to support the safe and effective management of radioactive wastes and materials.

This strategy focuses primarily on the overarching approach and inventory 'infrastructure', but must be supported by an ongoing programme of activities to improve data quality. The National Inventory Forum has a key role in supporting inventory improvement activities, but sites are obliged to manage their own inventory improvement activities.

Sites are responsible for collating information on inventory improvement opportunities from a wide range of sources, including their own operations and through engagement with external users of the data. Sites must then prioritise improvement activities, allocate responsibility for addressing issues and action accordingly.

4. International inventory management practice

As part of the strategy development process, the NDA examined international practices in the field of national radioactive waste and materials inventory data management. The purpose was to identify whether different approaches were being used and whether the UK could learn from international experience in this area.

With the support of the IAEA, further information has been gathered relating to international practices. The key findings of this review are presented in Appendix 3.

This review identified a wide range of approaches deployed by the international community, specifically differences in the inventory sponsor and delivery organisation, the method by which data is compiled (single software across all sites, multiple software solutions or Microsoft Excel data gathering) and the frequency of reporting. Only a small number of countries with small waste inventories have progressed to deployment of a single software solution.

France has a similar size inventory to the UK and a similarly mature national inventory data reporting exercise; however, the national inventory data is collected more frequently (on an annual basis), with public reports produced every three years. However, these published inventory reports present more limited waste forecast data than the UK inventory.

The UK has one of the most well-established and comprehensive inventories, in terms of data collected about stock (physical, chemical and radiological characteristics) and forecast waste arisings. There is still scope for improving the UK inventory and the NDA shall continue to follow international practices in the field of national radioactive waste and materials inventory to ensure developing best practice is applied to the UK inventory.



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5. Aspirational outcomes

The strategy, and supporting tactics, must drive appropriate behaviours from all key stakeholders to ensure that the strategic objective can be met and proposed benefits can be realised. The preferred option for this strategy should aim to deliver the aspirational outcomes summarised below:

- Require radioactive waste and materials producers to maintain a single, approved inventory data set;
- Reposition inventory data as central to business operations;
- Simplify the collection and processing of data relating to radioactive waste and materials;
- Encourage producers to adopt good practice in information management for their inventory data records;
- Drive stakeholder and site behaviours to assist inventory teams in their roles.
- Improve the availability of inventory data;
- Enable sufficient inventory data to be collected to ensure that international reporting obligations can be met;
- Provide improved transparency on data sources, assumptions and uncertainties;
- Enable and encourage regular updates of inventory data sets;
- Encourage joint-working and collaboration between waste producers;
- Provide high level information to assist the supply chain in waste management service and facility planning;
- Provide a sustainable solution, capable of being adapted to accommodate future data requirements and reporting needs;
- Avoid unnecessary or disproportionate reporting requirements and streamline reporting exercises where appropriate;
- Adequately protect sensitive information; and
- Allow waste producers the ability to access and manipulate inventory data collected in the UK Inventory reporting exercise, not just for their own sites.

At the next stage of the strategy development process (Stage C – Implementation), it is expected that a small number of measures will be developed to enable the health of the strategy to be measured in the longer term and support monitoring of implementation. The aspirational outcomes listed above will be used to inform the development of such criteria.



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6. Constraints to strategy development

There are some key constraints to the development of this strategy; those that have been identified include:

- The NDA operates in a fiscally constrained environment. There is currently low risk appetite to support new, high cost or high risk investment above current inventory costs that will not deliver benefit to the NDA estate for example an increase in reporting frequency;
- Uncertainty surrounding the UK's departure from the European Union means that it is unclear at this stage what impact this will have on the UK's international reporting requirements;
- The NDA has limited influence over non-NDA producers; the strategy must encourage knowledge sharing and collaborative working to enable benefits of this strategy to be shared with non-NDA estate producers;
- There is an aspiration to agree the preferred option for managing radioactive waste and materials inventory data in advance of the 2019 national inventory reporting exercise. This imposes time constraints, but these constraints are not anticipated to be a significant barrier to development of the strategy;
- Data requirements for the national inventory are ultimately set by BEIS, in agreement with the NDA and other key stakeholders. The NDA must ensure that the strategy for managing radioactive waste and materials inventory data is sufficiently flexible to enable future changes in reporting requirements to be accommodated.

Constraints to strategy implementation are acknowledged during the options assessment work.

7. Risks associated with development of strategy

The risks associated with the development of a new strategy in this area include:

- Use of internal and external stakeholder time in developing, reviewing and selecting credible and preferred options;
- The potential selection of an inventory data management option that is significantly different to current practice, resulting in additional costs (e.g. software development and delivery, system integration and waste producer training); this risk must be balanced against the proposed benefits of the new approach and will be fully assessed through the Strategy Management System.

Overall, it is considered that work to develop this strategy is low risk.

Risks associated with the implementation of strategic options are considered in the options assessment work.



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8. Stakeholders

During the development of this strategy, the needs of key stakeholders were taken into account. There are a wide range of stakeholders with an interest in radioactive waste and materials inventory data. These include:

- **Government departments and agencies who develop policies and strategies for managing waste**, including BEIS and the NDA;
- **Waste producers** who seek to optimise their operations through the effective management of inventory data;
- **Waste planners** who are responsible for ensuring that waste management facilities meet local and national needs, including RWM and LLWR;
- **Supply chain organisations** who process waste materials and need data to support the planning, operation and performance of their facilities;
- **Researchers, academics and consultancy businesses** who are developing technologies and processes for managing radioactive waste;
- **Government departments and agencies who regulate nuclear operations**, including the Office for Nuclear Regulation (ONR), the Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW) and the Northern Ireland Environment Agency.
- **International agencies**, including International Atomic Energy Agency (IAEA) and Nuclear Energy Agency (NEA);
- **Members of the public** who would like to understand more about radioactive waste and materials in the UK.

Primary engagement on the development of options has been through the National Inventory Forum (NIF). The NIF is a forum for information sharing between NDA and non-NDA estate data providers, environmental and nuclear regulators and Government. The NIF aims to improve the efficiency of data collection for the UK Inventory and related programmes of work, identify, prioritise and implement areas of improvement and share best practice. In addition this strategy was discussed with the Integrated Waste Management Theme Overview Group and the Critical Enablers Theme Overview Group. This strategy will also be made publicly available via the NDA website to enable wider stakeholder input.

9. Summary of strategic option categories

A range of different options could be considered for managing radioactive waste and materials inventory data. It was useful to categorise these strategic options into five broad categories, as described below:

- **Purpose** - The purpose of the UK Inventory, for example as a reporting tool only or as an operational tool with reporting capability.



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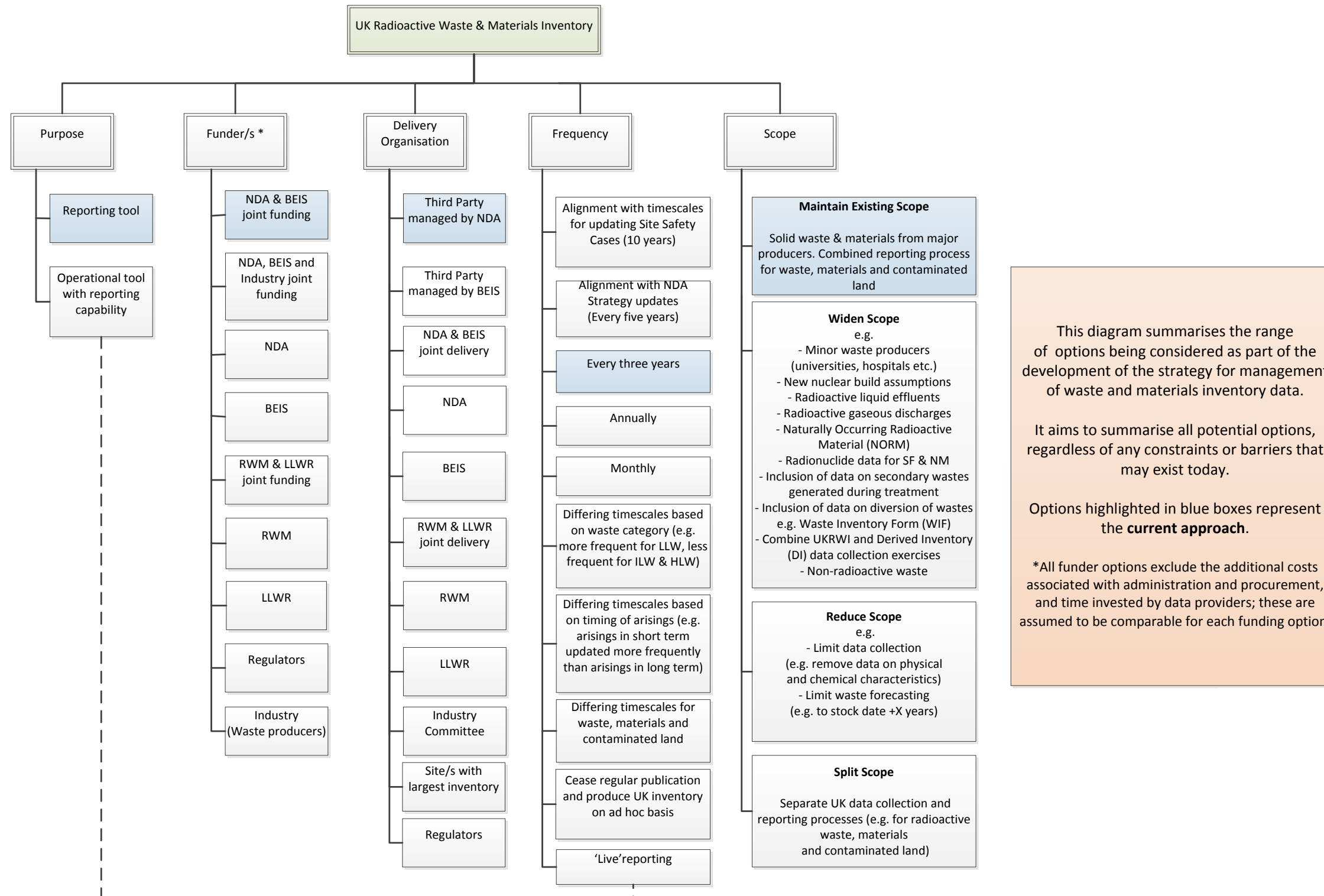
- **Funder** - The organisation/s responsible for funding the compilation of data for the UK Inventory.
- **Delivery Organisation** - The organisation/s responsible for undertaking the collection and compilation of data for the UK Inventory.
- **Frequency** - The number of times that the UK Inventory is compiled within a given period.
- **Scope** - The extent of data and information captured in the UK Inventory.

An overview of each of the categories is provided in Appendix 4.

Each of the proposed strategic options is presented in the Strategic Options Diagram in Figure 1. Those options highlighted in blue represent the current option being implemented. Options where it was clear from the outset that the strategic objective would not be met (e.g. cease production of the UK Inventory) were discounted. Although each of the options will be assessed individually, it will be important to take a holistic view when selecting the appropriate combination of options.

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Figure 1 – Long list of potential options





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10. Summary of current approach

The current approach is highlighted in the blue boxes in Figure 1 and can be summarised by the below:

- **Purpose** - The UK Inventory is currently primarily a reporting tool. It does not offer any real 'operational' benefit to waste producers. It supports essential strategy development and waste management planning at a national level.
- **Funder** - Production of the UK Inventory is currently funded by BEIS and the NDA on an equal basis.
- **Delivery Organisation** - A contractor is appointed to undertake the collection and compilation of data for the UK Inventory. The contractor is currently managed on a day to day basis by the NDA.
- **Frequency** - The UK Inventory is compiled every three years.
- **Scope** - The UK Inventory involves collection of data on solid wastes from all major waste producers in the UK. Further information on the scope of the UK Inventory can be found in the UK Inventory *Context and Methodology* report⁸.

11. Generation of credible options

Given the number of different options in each category, there are hundreds of possible combinations that could be considered for further assessment. It was necessary to apply a shortlisting process to reduce the long list of options (illustrated in Figure 1) to a shorter list of credible options. This process involved the following stages:

- Development and application of screening criteria to all options to produce shortlist of options within each category;
- Consideration of less tangible factors that affect the credibility of options;
- Selection of one option in each category to generate a smaller number of complete, credible options for assessment.

Development and application of screening criteria

Screening criteria were developed to help reduce the long list of options (illustrated in Figure 1) to a smaller set of options that could satisfy the strategic objective.

The screening criteria below have been derived from the strategic objective, aspirational outcomes for this strategy and constraints that are placed on this topic area. The screening criteria question whether each option will:

⁸ NDA & BEIS (2016), 2016 UK Radioactive waste & Materials Inventory, Context & Methodology Report, ISBN 978-1-905985-32-6



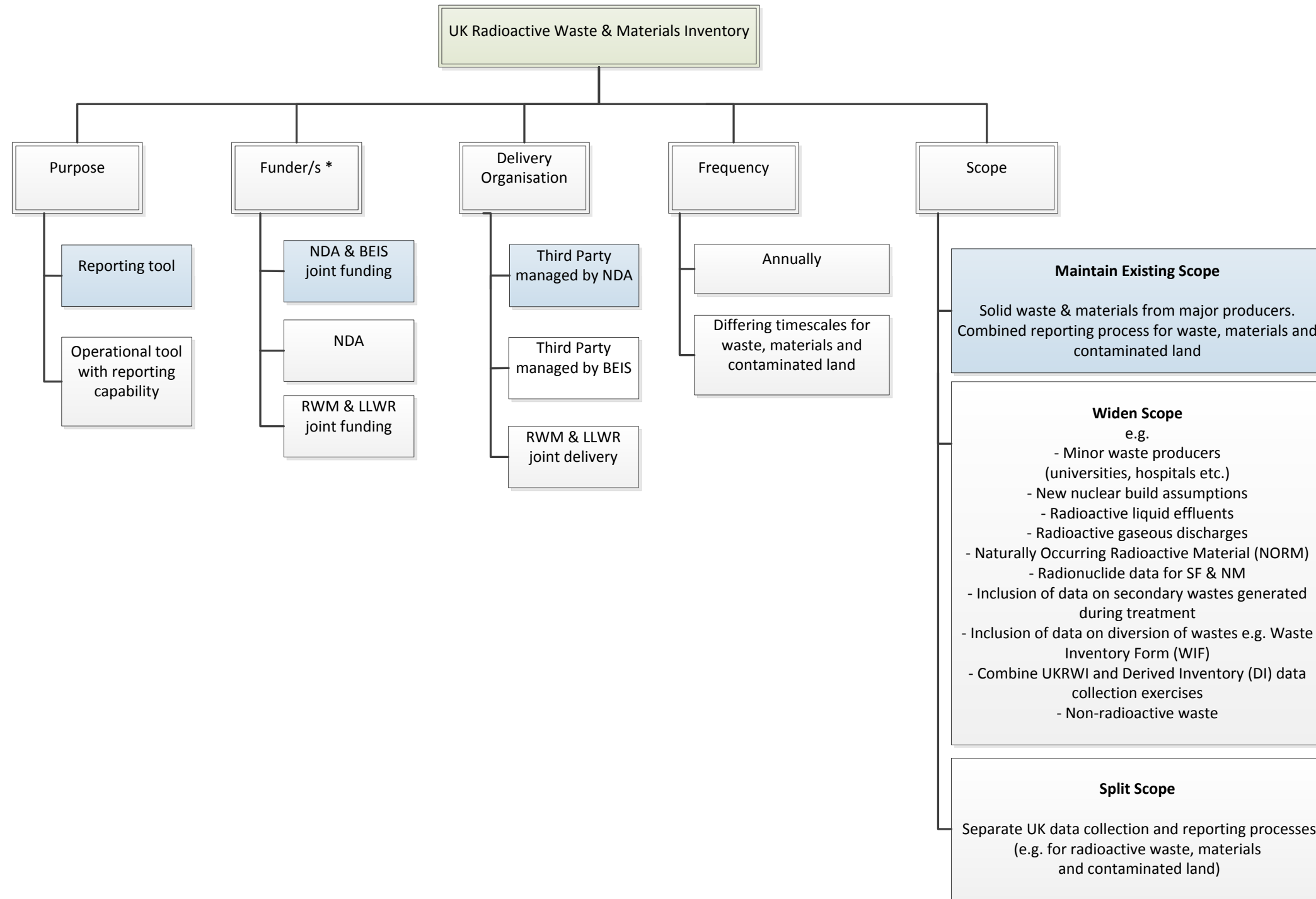
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- result in the availability of a single, approved waste and materials inventory data set.
- enable BEIS and the UK to meet international reporting requirements, with respect to radioactive waste and materials.
- support the NDA in developing strategy and delivering its mission.
- provide sufficient, accessible information suitable for use by our key stakeholders, including waste producers and the general public.
- align with the NDA Information Governance Strategy. The objective for our Information Governance Strategy is *'to optimise value from NDA knowledge and information assets in a compliant and secure manner, investing only in that which needs to be retained to deliver the NDA's mission'*.
- support producers in the optimisation of their operations.
- be deliverable and sustainable over the long term.
- enable the identified organisations to operate within their remit.

Our full evaluation of all options against the screening criteria is presented in Appendix 5. The assessment was made using a 'traffic light' approach, (RED = Negative impact, AMBER = Minor negative impact/uncertainty, GREEN = Neutral or positive impact) and underpinning explanatory text has been provided for each assessment.

The outcome of this assessment formed the basis for shortlisting of the options (Figure 2). Those options that included a RED assessment were discounted from the shortlist. Refer to Appendix 5 for further information on which screening criterion were assessed as RED.

Figure 2 – Short list of potential options



NOTE: Options highlighted in blue represent the current approach.



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Application of additional factors in shortlisting

The assessment of individual options against the screening criteria provided a useful, initial indication of those options in each category which should be considered further; however, these options must ultimately be grouped together (i.e. selection of one option from each option category) to form full credible options for further assessment.

The initial assessment against the screening criteria was not sufficient to enable shortlisting of credible options; although individual options in each category may satisfy the screening criteria, when put together in different combinations the results were not all realistic or deliverable. The subsequent assessment – looking at different option combinations – required consideration of a number of additional factors to assess their credibility.

It was necessary to consider the results of the screening assessment alongside the key points below. These points represent issues and factors that are perhaps less tangible and contribute to the professional judgement that was required to determine a short list of suitable, credible options.

- **Relative importance of screening criteria:** Those options that included a RED against any of the initial screening criteria were discounted from the shortlist.

Of the remaining options, only one option was rated GREEN against all screening criteria. As a consequence, it was necessary to take a view on the relative importance of AMBER assessments. Some options have been assessed as AMBER because there is uncertainty over whether the option will enable the criterion to be met, or because there may be flexibility in delivery that may enable or prevent the screening criteria to be met. These options were assessed on a case by case basis and a decision to pursue or discount the options informed by professional judgement and consideration of the factors below.

- **Context:** The current context for making the strategic decision has been taken into account (see considerations in Section 1 and constraints in Section 6). Constraints to public sector spending and uncertainty surrounding the political and economic environment has a negative impact on the ability of BEIS and the NDA (current UK Inventory project sponsors), and other potential sponsors, to support high investment and high risk projects. This situation also means that there is little appetite to increase staffing for in-house delivery, particularly for projects that are delivered on a periodic rather than continual basis. Options that were considered to be high risk, high investment or involving significant increases in staff numbers were discounted on this basis. This does not mean these options are to be excluded in future reviews of this strategy, as the operating context may change.

An example includes the option to pursue the UK inventory as an operational tool with reporting capability. In the current context, this option is not preferred; it is constrained by the anticipated high cost and risks associated with establishing a suitable inventory management system; however, this option may be considered appropriate in future reviews of this strategy.



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- **Interaction between strategic options:** Crucially, each of the strategic options could not be considered independently. The shortlisting process aimed to prevent unrealistic combinations from progressing. An example includes the relationship between Funder and Delivery Organisation; it would not be appropriate for RWM & LLWR to fund the work, for it then to be delivered by a third party managed by BEIS.
- **Organisational remit:** Although there are various options that could be implemented in theory, there is a need to consider each organisation's remit and appropriate interactions between organisations.

Considering funding, for example, Government (BEIS) involvement adds credibility to the UK inventory data collection process and encourages non-NDA estate participation. In addition, NDA strategic oversight is important; we have a fundamental role in developing nationally significant solutions to decommissioning and radioactive waste management challenges, for which the inventory provides important underpinning data. The NDA is also driven to make efficient use of SLC and subsidiary resources.

Certain option combinations would also be considered as unlikely or illogical, such as NDA fully funding the inventory and the work then being delivered by a third party managed by BEIS. These were discounted on a case by case basis.

- **Independent data collection:** There is value in waste management organisations, such as RWM and LLWR, being provided with an independent, approved national inventory data set. This helps to mitigate any external stakeholder concern about their impartiality. It is not preferable for RWM and LLWR to become too involved in the funding and delivery of the UK Inventory for this reason, although they are recognised as key stakeholders who should be consulted, particularly in terms of specifying data requirements and providing guidance on the prioritisation of inventory improvement activities.
- **Administrative burden:** There was a need to consider the potential administrative burden to all parties associated with options that would result in the placement of multiple contracts. For example, should scope be split, delivered by a third party and produced on an annual basis this would significantly increase the administrative burden during delivery. Such cost increases would need to be offset by the benefits of appointing multiple contractors (such as the potential to access wider supply chain skills, and to increase competition).
- **Scope option – widening scope:** When assessing 'scope' options, it was determined that 'Widening Scope' would need to be assessed on a case by case basis, with input from waste producers and other relevant stakeholders relevant to the proposed scope change. Some appropriate and agreed scope increases could be accommodated through business-as-usual, incremental improvements to the inventory (data requirements are already fluid and under current arrangements do change in response to policy, regulatory and planning changes). Other scope increases, for example the inclusion of NORM waste in the UK inventory, would

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require much more significant changes and involvement of an entirely different set of stakeholders.

BEIS and the NDA would prefer to establish a strategy that is sufficiently flexible and future-proofed to accommodate future scope changes, rather than attempt to address all potential scope increases at this stage. As a result, specific discussion around options to widen scope will be addressed on a case by case basis outside of this strategy and will involve engagement with relevant stakeholders. Significant changes to the scope of the UK Inventory would need to be supported by an appropriate business case.

- **Scope option – splitting scope:** Splitting the scope (i.e. having separate data collection processes for radioactive waste, nuclear materials and land contamination) would only be beneficial if different delivery contractors were to be used (i.e. bringing different, specialist expertise to the process) and/or different timescales for updating the inventories were to be applied.

The above factors were taken into account when assessing the short listed options illustrated in Figure 2 and selecting full credible options (i.e. selecting one option from each category).

Based on this assessment, four credible options were considered valid for further investigation and development; these are shown in Table 1. Options highlighted in blue indicate where there is no change from the current approach.

Table 1 - Shortlisted credible options

Credible Option No.	Purpose	Funder ¹	Delivery organisation	Frequency	Scope
1	Reporting tool	BEIS & NDA	Third party managed by NDA	Annually	Maintain existing
2	Reporting tool	NDA	Third party managed by NDA	Annually	Maintain existing
3	Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope
4	Reporting tool	NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope

1. Note that the NDA as an organisation is funded by BEIS, meaning that all funding for the UK Inventory is ultimately provided by BEIS.

The commercial, management and financial arrangements for each shortlisted credible option is summarised in Appendix 6.



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12. Value framework assessment

Each of the credible options must be assessed to establish the preferred option. To ensure transparency in our decision-making, we have established the attributes that we consider when assessing strategic options. These are summarised in the NDA's Value Framework⁹, which includes a large number of factors for assessment across the following areas:

- health and safety;
- security;
- environment;
- risk / hazard reduction;
- socio-economic impacts;
- finance; and
- enabling the mission.

It is not necessary to assess each option against all of the attributes, as many may not be applicable. Instead, relevant factors are identified and each option is assessed against them.

Inventory data provides essential underpinning for the NDA's mission. It could be argued that the lack of a single, approved radioactive waste and materials inventory data set would have a significant negative impact across all of the Value Framework attributes. However, during this strategy development process, the options have been screened such that the credible options are deliverable and ensure that a single, approved radioactive waste and materials inventory data set is available when required. On this basis, it is possible to select a smaller selection of relevant Value Framework attributes that can be used to differentiate between the credible options.

This assessment process will help to identify a preferred option. The full Value Framework and selected options can be seen in Appendix 7. Table 2 provides commentary on the Value Framework attributes; those that are shaded grey have been assessed and are not deemed necessary for further consideration, those that have not been shaded have been considered for assessment.

⁹ NDA (2016), Explaining the "Value Framework".

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Table 2 - Short listing of relevant Value Framework Factors

Value Framework	Discussion
Health & Safety	Health & Safety is a significant consideration in site activities associated with the characterisation of radioactive wastes and materials; however, management of radioactive waste and materials inventory data is primarily a desk based activity, which involves compiling information obtained from records and stakeholder discussions across different sites. There are a small number of conventional health and safety hazards associated with production of the UK Inventory, including office work hazards and business travel hazards; however, these are assumed to be common across all of the credible options selected. Health and safety factors are not considered to be significant differentiators between the credible options proposed and so have been excluded from the assessment.
Security	Compilation of the inventory involves handling information that is Official-Sensitive in nature; 'information security' is certainly a relevant factor for consideration across all options considered. From a security perspective, there may be a marginal benefit associated with options that encourage in-house delivery; however, methods for managing information security whilst working with approved supply chain organisations are well established, meaning that this is not a significant differentiator. It is expected that all options will comply with current information security standards with respect to data handling, compilation and publication. Whilst information security is a relevant Value Framework attribute, the security factors are not considered to be significant differentiators between the credible options proposed and so have been excluded from the assessment.
Environment	<p>Management of radioactive waste and materials inventory data is primarily a desk based activity, which involves compiling information obtained from records and stakeholder discussions across different sites. There are a small number of environmental impacts associated with production of the UK Inventory, including energy and materials consumption, and climate change impacts associated with business travel. The environmental impacts are considered to be minimal and are not significant differentiators between the credible options proposed.</p> <p>It is recognised that poor quality inventory data could lead to sub-optimal decisions being made about management of waste streams, leading to higher environmental impacts. However, this strategy focuses primarily on the mechanics of how inventory data is collected and compiled; issues surrounding the data quality itself are to be assessed through tactical, ongoing improvement measures, regardless of the strategy to be implemented. As a result, environmental factors have been excluded from the assessment.</p>

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Risk/Hazard Reduction	<p>Radioactive waste and materials inventory data underpins key risk reduction programmes across the estate; however, the credible options proposed for management of radioactive waste and materials inventory data do not have a notable positive or negative impact on risk reduction across the estate, either directly or indirectly.</p> <p>As above, it is recognised that poor quality inventory data could lead to sub-optimal decisions being made about management of waste streams, leading to higher risk. However, this strategy focuses primarily on the mechanics of how inventory data is collected and compiled; issues surrounding the data quality itself are to be assessed through tactical, ongoing improvement measures, regardless of the strategy to be implemented. The value framework attributes relating to risk and hazard reduction are not differentiators and so have been excluded from the assessment.</p>
Socio-economic impacts	<p>Production of the UK Inventory is primarily a desk based activity. It could be argued that work to deliver the strategy supports a small number of jobs (although in the wider context this impact is negligible). It is assumed that resourcing across the proposed credible options is approximately comparable (or not significantly different). As a result, socio-economic factors have been excluded from the assessment.</p>
Finance	<p>There will be differences in the financial costs associated with the credible options. This factor will be considered for further assessment.</p>
Enabling the mission	<p>There may be differences in how each credible option enables the mission. In particular considering how each option may support the development and maintenance of capability, and the reputational impact associated with implementation of each option.</p>
Implementability	<p>The implementability of each option will need to be considered. In particular:</p> <ul style="list-style-type: none"> • Resources (Affordability, people) • Policy & strategy (compliance with other strategies, policies, principles and legislation) • Stakeholder confidence (Confidence in information)

13. Value framework attribute: Finance

Costs considered during the financial assessment include:

- **Direct costs** - Costs directly associated with completing contracted work.
- **Indirect costs** - Costs associated with:
 - Project sponsor staff resourcing (i.e. contract management, procurement and administration)

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- Waste producer staff resourcing (i.e. resource required to submit inventory data in the format required and review deliverables)

All of the credible options involve appointing a third party contractor for compilation of the UK Inventory data. For the purposes of this assessment it is assumed that third party day rates for each option would be comparable, meaning that costs would only increase where the frequency of data collection is increased or multiple contractors are appointed (leading to greater project management fees). It is assumed that any future inflation in day rates would be approximately comparable across all options, so this variable has been excluded.

Costs have been assessed on a qualitative basis in comparison to the existing approach. They have been assessed based on the value provided to the taxpayer:

- **GREEN** = Offers potential cost saving compared to current approach.
- **GREY** = Offers no change compared to current approach.
- **AMBER** = Introduces marginal increase in cost compared to current approach.
- **RED** = Introduces potentially significant/unsustainable increase in cost compared to current approach.

The outcome of the financial assessment is shown in Table 3.

Table 3 - Assessment of credible options (Finance)

No.	Purpose	Funder	Delivery org.	Frequency	Scope
1	Reporting tool	BEIS & NDA	Third party managed by NDA	Annually	Maintain existing
	Direct Costs	It is expected that this option would result in a significant increase in direct costs incurred by the taxpayer (approximately triple current costs).			
	Indirect costs	It is expected that this option would result in a significant increase in indirect costs incurred by the taxpayer and by waste producers (approximately triple current costs). Some efficiency improvements may be realised through regular production; however, it is expected that this benefit would be negligible.			
2	Reporting tool	NDA	Third party managed by NDA	Annually	Maintain existing
	Direct Costs	It is expected that this option would result in a significant increase in direct costs incurred by the taxpayer (approximately triple current costs).			
	Indirect costs	It is expected that this option would result in a significant increase in indirect costs incurred by the taxpayer and by waste producers (approximately triple current costs). Some efficiency improvements may be realised through regular production; however, it is expected that this benefit would be negligible.			
3	Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope

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	Direct Costs	There is a marginal increase in direct costs incurred by the taxpayer compared to the current approach associated with increased contractor project management fees. Should frequencies for certain aspects be increased (for example, six-monthly reporting for nuclear materials) it is expected that this increase would be greater than if frequencies were to remain on the current three yearly cycle. It is assumed that waste reporting is unlikely to be increased to an annual basis; if this position were to change in future the direct costs would significantly increase.			
	Indirect costs	There is a marginal increase in costs compared to the current approach, principally surrounding contract management, procurement and administration.			
4	Reporting tool	NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope
	Direct Costs	There is a marginal increase in direct costs incurred by the taxpayer compared to the current approach associated with increased contractor project management fees. Should frequencies for certain aspects be increased (for example, six-monthly reporting for nuclear materials) it is expected that this increase would be greater than if frequencies were to remain on the current three yearly cycle. It is assumed that waste reporting is unlikely to be increased to an annual basis; if this position were to change in future the direct costs would significantly increase.			
	Indirect costs	There is a marginal increase in costs compared to the current approach, principally surrounding contract management, procurement and administration.			

14. Value framework attribute: Enabling the mission

There are a number of relevant factors in the Value Framework relating to each option's ability to enable the mission. Key factors for assessment include:

- Maintain/develop capability
- Reputation

These factors have been assessed on a qualitative basis in comparison to the existing approach. They have been assessed based on:

- **GREEN** = Offers potential benefit compared to current approach.
- **GREY** = Offers no benefit/detriment compared to current approach.
- **AMBER** = Introduces marginal negative impact compared to current approach.
- **RED** = Introduces potentially significant/unsustainable negative impact compared to current approach.

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Table 4 - Assessment of credible options (Enabling the mission)

No.	Purpose	Funder	Delivery org.	Frequency	Scope
1	Reporting tool	BEIS & NDA	Third party managed by NDA	Annually	Maintain existing
	Maintain/develop capability	This option would encourage more frequent updates of the UK Inventory data set. Increasing the frequency of UK Inventory to an annual submission may encourage sites to maintain/develop inventory skills; this may be particularly beneficial for sites that currently do not have well managed inventory data sets. This option would also encourage greater inventory management skills retention within the supply chain.			
	Reputation	Compiling national inventory data on an annual basis may improve the reputation of BEIS and the NDA, through the provision of more representative data to support the sector. External stakeholders may perceive frequent inventory changes to be negative (rather than reflecting continual improvement); increasing reporting frequency would require good communications support.			
2	Reporting tool	NDA	Third party managed by NDA	Annually	Maintain existing
	Maintain/develop capability	This option would encourage more frequent updates of the UK Inventory data set. Increasing the frequency of UK Inventory to an annual submission may encourage sites to maintain/develop inventory skills; this may be particularly beneficial for sites that currently do not have well managed inventory data sets. This option would also encourage greater inventory management skills retention within the supply chain.			
	Reputation	Compiling national inventory data on an annual basis may improve the reputation of the NDA, through the provision of more representative data to support the sector. External stakeholders may perceive frequent inventory changes to be negative (rather than reflecting continual improvement); increasing reporting frequency would require good communications support.			
3	Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope
	Maintain/develop capability	This option is similar to the current approach, but provides a different delivery split. This option may encourage more specific skills development in the areas of waste, materials and land contamination inventory management. It may also offer the opportunity for more supply chain companies to gain experience in inventory data management, compilation and communication.			
	Reputation	This option may improve the reputation of BEIS and the NDA amongst the supply chain, by providing greater opportunities. It may improve external stakeholder opinion through the provision of tailored information on frequency required. The procurement process would need to be well managed to minimise the potential additional project management/administrative costs associated with this option, which could have a negative impact reputationally.			
4	Reporting tool	NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and	Split scope

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				3) land contamination	
	Maintain/ develop capability	This option is similar to the current approach, but provides a different delivery split. This option may encourage more specific skills development in the areas of waste, materials and land contamination inventory management. It may also offer the opportunity for more supply chain companies to gain experience in inventory data management, compilation and communication.			
	Reputation	This option may improve the reputation of the NDA amongst the supply chain, by providing greater opportunities. It may improve external stakeholder opinion through the provision of tailored information on frequency required. The procurement process would need to be well managed to minimise the potential additional project management/administrative costs associated with this option, which could have a negative impact reputationally.			

15. Value framework attribute: Implementability

The implementability of each option must be considered. There are a number of relevant factors that must be taken into account:

- Affordability
- People
- Compliance with other strategies, policies, principles and legislation
- Stakeholder confidence in information and evaluation processes

The affordability of all of the credible options was considered as part of this assessment. Affordability considers more than simply the financial costs (which have been assessed previously); affordability also takes into account the profile and predictability of future spend, as well as the funding mechanism and likely availability of future funds.

It is worth noting that the overall cost of delivering the UK inventory, for all of the selected credible options, is comparatively low when compared with the broader mission spend (under existing arrangements, three yearly updates to the UK Inventory incur contractor costs in the region of £300,000 over two years; costs associated with waste producer time compiling data submissions are in addition to this).

As all of the selected credible options are to be funded by Government and/or a non-departmental public body, there is generally more certainty over the availability of future funds than for funding mechanisms that rely on private sector income. The regular requirement for UK inventory compilation generates a spending profile that is predictable, with known (and relatively small) peaks and troughs in expenditure; this enables the funding bodies to plan effectively. Even given increases in the frequency of data collection, these will be at known intervals which then enable planning.

All of the selected credible options, including those that involve splitting scope and/or increasing frequency, were considered to be affordable.

All other factors have been assessed on a qualitative basis in comparison to the existing approach. They have been assessed based on:

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- **GREEN** = Offers potential benefit compared to current approach.
- **GREY** = Offers no benefit/detriment compared to current approach.
- **AMBER** = Introduces marginal negative impact compared to current approach, or does not meet requirements sufficiently.
- **RED** = Introduces potentially significant/unsustainable negative impact compared to current approach.

Table 5 - Assessment of credible options (Implementability)

No.	Purpose	Funder	Delivery org.	Frequency	Scope
1	Reporting tool	BEIS & NDA	Third party managed by NDA	Annually	Maintain existing
	People	An increase in resource provision will be required to implement this option, within the funding, delivery and waste producer organisations. This option also restricts the opportunity to implement more ambitious inventory improvement activities between reporting cycles.			
	Compliance	The proposed change will enable BEIS to better meet international reporting obligations, including the requirement for annual data relating to spent fuel and nuclear materials.			
	Stakeholder confidence	This option is likely to have a positive impact on stakeholder confidence, as data will be collected on a more frequent basis. However, BEIS and the NDA may have to invest more time to explain inventory fluctuations, which may counter this benefit.			
2	Reporting tool	NDA	Third party managed by NDA	Annually	Maintain existing
	People	An increase in resource provision will be required to implement this option, within the funding, delivery and waste producer organisations. This option also restricts the opportunity to implement more ambitious inventory improvement activities between reporting cycles.			
	Compliance	The proposed change will enable BEIS to better meet international reporting obligations, including the requirement for annual data relating to spent fuel and nuclear materials.			
	Stakeholder confidence	This option is likely to have a positive impact on stakeholder confidence, as data will be collected on a more frequent basis. However, the NDA may have to invest more time to explain inventory fluctuations, which may counter this benefit.			
3	Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope
	People	An increase in resource provision will be required to implement this option, within the funding, delivery and waste producer organisations.			
	Compliance	The proposed change will enable BEIS to better meet international reporting obligations, including the requirement for annual data relating to spent fuel and			

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		nuclear materials.			
	Stakeholder confidence	This option may have a positive impact on stakeholder confidence if data is collected on a more frequent basis. However, BEIS and the NDA may have to invest more time to explain inventory fluctuations, which may counter this benefit.			
4	Reporting tool	NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope
	People	An increase in resource provision will be required to implement this option, within the funding, delivery and waste producer organisations.			
	Compliance	The proposed change will enable BEIS to better meet international reporting obligations, including the requirement for annual data relating to spent fuel and nuclear materials.			
	Stakeholder confidence	This option may have a positive impact on stakeholder confidence if data is collected on a more frequent basis. However, the NDA may have to invest more time to explain inventory fluctuations, which may counter this benefit.			

16. Value framework assessment summary

A summary of the value assessment outcomes is shown in Table 6, for quick reference. The assessment indicates that none of the options are fundamentally undeliverable. A more detailed discussion of the options is presented in Section 17 (Selection of Preferred Option).

Table 6 - Summary of Credible Options Value Assessment

Value framework attribute		Option 1	Option 2	Option 3	Option 4
Finance	<i>Direct costs</i>				
	<i>Indirect costs</i>				
Enabling the mission	<i>Maintain/develop capability</i>				
	<i>Reputation</i>				
Implementability	<i>Affordability</i>	✓	✓	✓	✓
	<i>People</i>				
	<i>Compliance</i>				
	<i>Stakeholder confidence</i>				

Further detail on the shortlisted credible options is shown in Table 1.

GREEN Offers potential benefit or cost saving compared to current approach.

GREY Offers no benefit or detriment compared to current approach.

AMBER Introduces marginal negative impact or increase in costs compared to current approach.

RED Introduces potentially significant/unsustainable negative impact or increase in costs compared to current approach.

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17. Selection of preferred option

Selection of the preferred option is based upon:

- the outcome of the value assessment;
- the detailed assessment of options against the screening criteria (Appendix 5);
- the ability of each option to meet the aspirational outcomes (Section 5);
- the current situation (Section 1) and context for implementing a new approach.

A detailed discussion of the three credible options is included below to explain why Options 1 and 2 have been rejected, and why Option 3 has been selected as the preferred option.

Option 1 - Option is rejected

No.	Purpose	Funder	Delivery org.	Frequency	Scope
1	Reporting tool	BEIS & NDA	Third party managed by NDA	Annually	Maintain existing

Option 1 is similar to the current approach, but involves the production of a full UK Inventory on an annual basis. This would enable the UK to meet its international reporting obligations for spent fuel and nuclear materials and would exceed reporting requirements for radioactive waste. As the additional reporting for waste would not be essential to meet international reporting obligations, it is unlikely that non-NDA estate waste producers would volunteer to submit data on this frequency.

A significant amount of information is collected relating to radioactive waste streams and a full update on an annual basis represents under current arrangements a significant workload increase for waste producers. Increasing the frequency of radioactive waste reporting may offer some benefits, for example, providing up to date information to inform waste management planning and strategy development, the potential to replace other inventory data collection exercises and offering some reputational benefit for BEIS and NDA; however, there is no clear driver or justification from stakeholders to increase radioactive waste reporting to an annual basis at this time.

It is expected that this option would result in significant increases to direct and indirect costs incurred by the taxpayer and by waste producers (approximately triple current costs). Some efficiency improvements may be realised through regular production and repeat procurement; however, it is expected that this benefit would be negligible when compared to the costs.

This option may also inhibit waste producers' ability to proactively identify and implement inventory improvement activities, as resource is likely to be occupied by the increased reporting demand.

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Based on the above concerns, this option is not considered to be a preferred option.

Option 2 - Option is rejected

No.	Purpose	Funder	Delivery org.	Frequency	Scope
2	Reporting tool	NDA	Third party managed by NDA	Annually	Maintain existing

Option 2 is very similar to Option 1, but places NDA as the sole funder. This option involves the production of a full UK Inventory on an annual basis and has been discounted based on the concerns described above. In addition, it is perceived that the inventory benefits from direct Government involvement, adding credibility to the work and emphasising the importance of the inventory, not only in meeting national demands but also international demands. It is advantageous for BEIS to remain involved as BEIS are ultimately responsible for ensuring that the UK meets international reporting obligations with respect to spent fuel and radioactive waste. It is therefore important BEIS retain a level of ownership of the inventory; this will also ensure that BEIS continue to contribute and influence the inventory.

Option 3 - Preferred option

No.	Purpose	Funder	Delivery org.	Frequency	Scope
3	Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope

Option 3 involves splitting the existing scope of the UK Inventory and establishing separate reporting timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination.

In the UK, data for radioactive waste, land contamination and spent fuel and nuclear materials is currently formally collected on a three yearly basis, with a stock date of 1 July. This aligns with financial years. It is desirable to keep alignment for the three areas to ensure that a complete, single data set is compiled on a three yearly basis, meeting the strategic objective.

Currently, data for spent fuel and nuclear materials is also collected at the end of each calendar year on an informal basis to meet specific international reporting obligations (Eurostat, OECD NEA Brown Book and OECD/IAEA Red Book). It is proposed that this annual data collection exercise is formalised and brought in line with UK Inventory reporting approach (third party managed by NDA). This will help improve the consistency and efficiency of reporting in the spent fuels and nuclear materials area. Data on spent fuel and nuclear material is also collected every three years as part of the UK Inventory; the information

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collected as part of the UK Inventory is slightly different as it requests a sum of future arising's rather than estimated arising's per year.

The table below summarises the collection of data for the UK Inventory every three years and the addition collection of data on spent fuels and nuclear materials annually. This is simply a formalisation of existing arrangements, as indicated below:

Year	2019		2020		2021		2022		2023		2024		2025		2026	
Stock date	1st Apr	31st Dec	1st Apr	31st Dec	1st Apr	31st Dec	1st Apr	31st Dec	1st Apr	31st Dec	1st Apr	31st Dec	1st Apr	31st Dec	1st Apr	31st Dec
Radioactive waste	✓						✓						✓			
Land contam.	✓						✓						✓			
Spent fuel and nuclear materials	✓	✓		✓		✓	✓	✓		✓		✓	✓	✓		✓

Notes: Formal reporting for radioactive waste and land contamination on a three yearly basis. Existing reporting undertaken for spent fuel and nuclear materials formalised to align with three yearly reporting cycle for radioactive waste and land contamination, and to meet the end of calendar year reporting requirements.

This option enables each data collection process to be better tailored to meet the specific requirements of each area and to allow each element to be procured separately (if applicable) to benefit from specific supply chain experience. The approach is sufficiently flexible to accommodate scope and reporting frequency changes in future, where required.

This option allows waste producers sufficient space to focus on waste and land contamination inventory improvement activities in between reporting cycles.

Although this option does attract potential direct and indirect cost increases, it addresses a fundamental issue relating to international reporting and formalises the reactive reporting already being undertaken by sites on an annual basis for spent fuels and nuclear materials.

This option offers a number of significant benefits including compliance with international reporting obligations, flexibility in delivery and formalisation of existing reporting activities. This option is the preferred option.

Reporting at 1st July has been retained to align with UK financial years and associated business planning decisions made on these timescales. In future reviews of this strategy, there is opportunity to consider whether the stock date for waste and land contamination reporting could be shifted to the end of the calendar year (31st December). This would reduce the reporting burden for sites (only requiring annual reporting of spent fuel and nuclear materials data), it would relieve pressure on sites at the end of the financial year and would bring the UK into alignment with other countries internationally (for example, France report their inventory based on the end of the calendar year). Some sites, such as those managed by UKAEA and EDF Energy, may also benefit from a calendar year reporting arrangements as they have strong ties internationally, where reporting is typically on a calendar year basis. However, for other sites, including NDA sites, the majority of business decisions and



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contractual commitments are made on the basis of activities undertaken in financial years. Shifting reporting to the end of calendar year may introduce additional challenges for these organisations. At this time, a shift to end of calendar year reporting for all aspects of the UK Inventory is not considered to be appropriate.

Option 4 - Option is rejected

Option 4 is very similar to Option 3, but places NDA as the sole funder. This option has been rejected primarily on the basis that the inventory benefits from direct Government involvement, adding credibility to the work and emphasising the importance of the inventory, not only in meeting national demands but also international demands. It is advantageous for BEIS to remain involved as BEIS are ultimately responsible for ensuring that the UK meets international reporting obligations with respect to spent fuel and radioactive waste. It is therefore important BEIS retain a level of ownership of the inventory; this will also ensure that BEIS continue to contribute and influence the inventory.

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18. Conclusions

Option 3 was selected as the preferred option:

Purpose	Funder	Delivery org.	Frequency	Scope
Reporting tool	BEIS & NDA	Third party managed by NDA	Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination	Split scope

The preferred option:

- allows the strategic objective to be met;
- provides flexibility in terms of procurement and the opportunity to extract greater value from the supply chain - splitting the scope of the inventory into three areas (radioactive waste, land contamination, spent fuel and nuclear materials) offers BEIS and NDA the potential to access wider supply chain skills, to increase competition and to reduce concerns associated with supply chain health;
- offers flexibility in terms of delivery, notably the scope of the inventory;
- offers the opportunity to improve the efficiency and consistency of existing reporting for spent fuels and nuclear materials, for both waste producers and data compilers, through formal rather than informal reporting;
- retains credibility associated with direct funding from Government.

Some specific issues have not been tackled in this paper (such as widening of the UK Inventory scope) as these must be considered on a case by case basis. The format for data reporting has been excluded from this paper as a presentational issue, but should be addressed through work via the National Inventory Forum.

The preferred option has been developed considering the current operating context. There is value in reviewing the strategy in future, in particular to assess the UK Inventory sponsors' appetite for investment in alternative approaches, and to assess whether the proposed reporting frequency adequately meets future stakeholder needs.

The preferred option must be supported by a programme of continuous improvement that will facilitate improvements in data quality and reduce uncertainty in the inventory.

The next stage in the strategy development process is to explore options for implementation including options for implementation during the next inventory cycle and funding of the preferred option, taking into account insight from key stakeholders.

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Appendix 1 Summary of international reporting commitments

International Reporting Obligation/Requirement	Requesting/Co-ordinating Body	Purpose of reporting requirement	Specific requirements relating to inventory	Frequency of reporting	Consequences to the UK of not submitting inventory data (e.g. financial penalty, reputational damage)
Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste	European Commission (EC)	The Directive establishes a community framework for the responsible and safe management of spent fuel and radioactive waste. Reporting encourages member states to provide transparency on their inventory and management arrangements.	<p>Council Directive 2011/70/Euratom requires Member States to include details of their inventory, of all spent fuel and radioactive waste and estimates for future quantities including those from decommissioning, within their national programme (under Article 12(1)(c)); and for Member States to submit national reports to the Commission every three years (under Article 14(1)).</p> <p>UK report produced to comply with the Directive is '<i>Lead Document setting out the United Kingdom's National Programme for the Responsible and Safe Management of Spent Fuel and Radioactive Waste</i>'.</p>	Every three years	Whilst still a member of the EU and Euratom, the UK remains subject to Council Directive 2011/70/Euratom, This means the European Commission could challenge the UK for not reporting its data and could subject the UK to infraction proceedings for not complying with the Directive, which could result in financial penalties, as well as reputational damage to the UK.
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	International Atomic Energy Agency (IAEA)	The primary objective of the Joint Convention is to achieve and maintain a high level of safety	<p>Article 32 includes an obligation to submit "an inventory of radioactive waste that:</p> <p><input type="checkbox"/> Is being held in storage at radioactive waste management and nuclear fuel cycle facilities;</p> <p><input type="checkbox"/> Has been disposed of; or</p>	Every three years	Reputational damage to the UK.

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International Reporting Obligation/Requirement	Requesting/ Co-ordinating Body	Purpose of reporting requirement	Specific requirements relating to inventory	Frequency of reporting	Consequences to the UK of not submitting inventory data (e.g. financial penalty, reputational damage)
		worldwide in spent fuel and radioactive waste management. Reporting encourages member states to provide transparency on their inventory and management arrangements.	<input type="checkbox"/> <i>Has resulted from past practices. This inventory shall contain a description of the material and other appropriate information available, such as volume or mass, activity and specific radionuclides.</i> Article 32 also includes an obligation to submit <i>“an inventory of spent fuel that is subject to this Convention and that is being held in storage and of that which has been disposed of. This inventory shall contain a description of the material and, if available, give information on its mass and its total activity”.</i>		
Status and Trends in Spent Fuel and Radioactive Waste Management	IAEA, EC and Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency (NEA).	To provide a global compilation of data, with a particular focus on the current status of spent fuel and radioactive waste management.		Every three years	Reputational damage to the UK.

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International Reporting Obligation/Requirement	Requesting/Co-ordinating Body	Purpose of reporting requirement	Specific requirements relating to inventory	Frequency of reporting	Consequences to the UK of not submitting inventory data (e.g. financial penalty, reputational damage)
Nuclear Energy Data (OECD NEA Brown Book)	OECD NEA	Nuclear Energy Data is the OECD Nuclear Energy Agency's annual compilation of statistics and country reports documenting nuclear power status in the OECD area.	The OECD NEA requires the UK to submit information on the spent fuel inventory and storage and reprocessing capacities.	Annually	Reputational damage to the UK
Uranium: Resources, Production and Demand (OECD NEA/IAEA Red Book)	OECD NEA and IAEA	Analyses information on world uranium resources, production and demand.	The OECD NEA and IAEA require the UK to provide information on the inventory of reprocessed uranium.	Every two years	Reputational damage to the UK
Eurostat	EC (Eurostat is a Directorate-General of the European Commission. Its task is to provide the	Analyses information on the capacity and production of uranium and plutonium	The EC requests information from the UK on its plutonium and uranium inventory.	Annually	The European Commission could challenge the UK for not reporting its inventory and could subject the UK to infraction proceedings for not complying, which could result in financial penalties, as well as reputational damage to the UK.

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International Reporting Obligation/Requirement	Requesting/Co-ordinating Body	Purpose of reporting requirement	Specific requirements relating to inventory	Frequency of reporting	Consequences to the UK of not submitting inventory data (e.g. financial penalty, reputational damage)
	EU with European statistics at a European level for policy-level decision making)				
EU directive on High-activity radioactive sources and orphan sources 2003/122/Euratom; EU HASS	EU	High-activity Sealed Radioactive Sources (HASS) are potentially hazardous, and as such they are subject to a rigorous regulatory regime. The EU Control of High-activity Sealed Radioactive Sources and Orphan Sources directive was introduced to	Member states are required to keep specific records of all sources under their responsibility, their location and their transfer.	Currently no formal reporting requirement in place	Whilst still a member of the EU, the UK remains subject to the EU directives. This means the European Commission could challenge the UK for not reporting its data and could subject the UK to infraction proceedings for not complying, which could result in financial penalties, as well as reputational damage to the UK.

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International Reporting Obligation/Requirement	Requesting/ Co-ordinating Body	Purpose of reporting requirement	Specific requirements relating to inventory	Frequency of reporting	Consequences to the UK of not submitting inventory data (e.g. financial penalty, reputational damage)
		provide strict control on the control of HASS, particularly in terms of maintaining accurate and up to date records of the location, composition and activity level of all HASS held in EU Member States.			
UK voluntary offer safeguards agreement with the IAEA and Euratom ¹⁰	IAEA	Safeguards accountancy	The UK provides the IAEA with a list of its civil nuclear facilities. Nuclear materials accountancy reports and basic design information for all these facilities	Annual	Reputational damage to the UK

¹⁰ The UK voluntary offer safeguards agreement with the IAEA and Euratom came into force in 1978 and specifies the UK's acceptance of the application of IAEA safeguards "On all source or special fissionable material in facilities or parts thereof within the United Kingdom, subject to exclusions for national security reasons only." As part of measures to strengthen the global safeguards regime, the UK has agreed an additional protocol with the IAEA and Euratom which supplements its voluntary offer safeguards agreement.

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International Reporting Obligation/Requirement	Requesting/ Co-ordinating Body	Purpose of reporting requirement	Specific requirements relating to inventory	Frequency of reporting	Consequences to the UK of not submitting inventory data (e.g. financial penalty, reputational damage)
			is supplied to the IAEA via the European Commission.		
European Commission Regulation on the application of Euratom safeguards (Euratom 302/2005)	EC	Safeguards accountancy	<p>The regulation sets out requirements for the provision of Basic Technical Characteristics (BTCs) and programmes of activities for installations subject to safeguards, and for nuclear material accountancy reports and associated notifications:</p> <ul style="list-style-type: none"> • Inventory Change Reports; • Materials Balance Reports; • Physical Inventory Listings; and • advance notifications of the import or export of material. 	Monthly	Whilst still a member of the EU and Euratom, the UK remains subject to Euratom regulations . This means the European Commission could challenge the UK for not reporting its data and could subject the UK to infraction proceedings for not complying, which could result in financial penalties, as well as reputational damage to the UK.



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Appendix 2 Summary of strategy development process

The typical process for generating a preferred strategic option is outlined below. The approach is flexible and may be adjusted depending upon the number, nature and complexity of strategic alternatives for assessment.

Stage 0 – In July 2015, the NDA published the *Management of Radioactive Waste and Materials Inventory Data – Research and Strategic Case (Gate 0)*^{Error! Bookmark not defined.}. This paper aimed to clarify the NDA's strategic objective for inventory work, review current inventory management arrangements and assess whether further work would be required to ensure that a robust, sustainable and optimised strategy is in place.

Stage A - Stage A aims to determine credible, strategic options that could enable the strategic objective to be realised. The following approach has been taken:

- Generate long list of strategic options;
- Develop and apply screening criteria (these are constraints or attributes that a particular option must have in order to be considered credible);
- Outline short list of credible options following application of screening criteria.

Stage B – Stage B supports selection of the preferred option. This includes:

- Assessing short-listed, credible options against the NDA's Value Framework¹¹ attributes and other factors which may affect the viability of the strategic option;
- Select the preferred option based on the outcome of the Value Framework assessment and other supplementary assessments, if applicable.

This paper covers Stage A and Stage B. Subsequent stages include:

Stage C - Stage C analyses approaches for implementation and funding of the preferred option, and agrees the preferred implementation and funding options with the SLCs, other delivery organisations and key stakeholders.

Stage D - The strategy is then formally handed over to delivery teams responsible for developing supporting tactics and implementing the strategy. Where there is a change in strategy, this stage may involve revision of Client Specifications and change controlling Lifetime Plans (LTPs) to introduce the revised scope of work.

¹¹ NDA (2016), The NDA Value Framework, January 2016, Version 1.2, www.nda.gov.uk

Appendix 3 International approaches to national inventory data collection

Country	FUNDING FOR NATIONAL INVENTORY		DATA COLLECTION / PRESENTATION FOR NATIONAL INVENTORY			FREQUENCY		REVIEWING APPROACH TO NATIONAL INVENTORY DATA MANAGEMENT	
	What organisation/s fund data collection?	What is the role of this organisation?	Who compiles the inventory data/reports?	What is the role of this organisation?	How is data collected and managed by sites?	How often is data collected for the national inventory?	How often is data published for the national inventory?	What key challenges does the country face with regard to their national inventory?	Is the country looking at other ways to deliver their national inventory?
UK	The Department of Business, Energy & Climate Change (BEIS) and the Nuclear Decommissioning Authority (NDA) provide funds for compilation of the national inventory and production of the reporting outputs. Sites provide resource to gather and submit the data, but they do not fund the contractor.	BEIS is a government department, responsible for developing and delivering industrial strategy; leading the government's relationship with business; ensuring secure energy supplies; ensuring the UK remains at the leading edge of science, research and innovation; and tackling climate change. The NDA is a non-departmental public body responsible for decommissioning UK legacy nuclear sites.	NDA and BEIS appoint a contractor from the supply chain to collect data for the national inventory. Sites submit data to the contractor.	Supply chain contractor.	On a day to day basis, sites use their own software systems for managing inventory data. Each site is responsible for ensuring that its inventory data is up to date and managed effectively. For the national inventory, sites are currently required to complete Microsoft Excel spreadsheets for each of their waste streams. These spreadsheets are then compiled and put into a central database (Microsoft Access). The inventory contractor then transfers all of the finalised data into bespoke software called DiQuest to enable the complex data queries to be undertaken.	Data is collected every three years for: 1) Radioactive waste 2) Land contamination 3) Spent fuel and nuclear materials	Data is published every three years for: 1) Radioactive waste 2) Land contamination 3) Spent fuel and nuclear materials Information is published online: http://ukinventory.nda.gov.uk/	Managing uncertainty; Demonstrating that data is underpinned; Generating accurate forecasts; Feeding back improvement activities; Credibility of data at end of 3 years;	Yes – the UK is currently reviewing options for delivering the inventory differently. <i>(Please refer to earlier sections in this strategy paper for detail).</i>
Canada	Department of Natural Resources Canada (NRCan)	NRCan is the lead federal government department responsible for developing and implementing uranium, nuclear energy and radioactive waste management policy in Canada	Prior to 2016, the Low-Level Radioactive Waste Management Office (LLRWMO) – operated by Atomic Energy of Canada Limited procured a supply chain contractor to collect and compile data for the national inventory. Waste owners submitted data to the third party. The LLRWMO was responsible for	LLRWMO was established to carry out the responsibilities of the federal government for the management of historic low-level radioactive waste in Canada. NRCan is the federal government department responsible for federal radioactive waste policy.	Each waste owner, a Canadian Nuclear Safety Commission (CNSC) licensee, is required to develop and implement an accountability system, including the appropriate records for their waste inventory. This system and associated records are subject to regulatory oversight. A variety of systems are used by different waste owners, commensurate with their needs. Waste owners also make periodic formal reports on inventory and status to the CNSC under the terms of their licence. The regulator (CNSC) maintains a database of used nuclear fuel for safeguards monitoring purposes, which	Data is collected every three years. Approach and timing for the collection of data align with the preparation of Canada's national report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.	A detailed national inventory report is published every three years to provide an overview of the production, accumulation and future projections of radioactive waste in Canada in a user-friendly and illustrative format which is publicly available. The most recent report can be found here: http://www.cnl.ca/site/	No major issues encountered in the past with respect to collecting and reporting inventory data for national and international needs. Experiences include: - Correspondence with waste owners is essential to better understand the waste volumes provided. - Collection of data into a standard template for all waste owners	Yes – additional information was requested in the 2016 reporting cycle: - Waste inventory projections to the end of 2100 (in addition to the three-year look ahead and the mid-term projection of 2050) to cover off the decommissioning of all existing nuclear power plants in Canada. - Information on the estimated volumes of L&LRW that will be emplaced in long-term management facilities by

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Country	FUNDING FOR NATIONAL INVENTORY		DATA COLLECTION / PRESENTATION FOR NATIONAL INVENTORY			FREQUENCY		REVIEWING APPROACH TO NATIONAL INVENTORY DATA MANAGEMENT	
	What organisation/s fund data collection?	What is the role of this organisation?	Who compiles the inventory data/reports?	What is the role of this organisation?	How is data collected and managed by sites?	How often is data collected for the national inventory?	How often is data published for the national inventory?	What key challenges does the country face with regard to their national inventory?	Is the country looking at other ways to deliver their national inventory?
			<p>publishing Canada's Radioactive Waste Inventory Report under the funding and direction of NRCan.</p> <p>Since 2016, NRCan decided to collect and compile data for the national inventory and to publish the Inventory Report in-house.</p>		<p>is updated on a regular basis.</p> <p>For the national inventory, a survey of waste owners is conducted on a triennial basis. Waste producers that do not store waste for extended periods of time (e.g. they send their waste to a broker) are not included in the survey.</p> <p>Waste owners are asked to complete a set of questions/ set of tables for each of their waste streams. The Inventory report includes both historic wastes and "ongoing" wastes, as well as decommissioning waste, along with future waste projections in Canada, summarised by waste category and waste owner.</p> <p>Uranium mining & milling waste and used fuel are considered to be waste and are included in the report in addition to low and intermediate level radioactive waste.</p>		<p>media/Parent/2013-CNL_LLRLW-Summary-Report-Eng.pdf</p> <p>As part of the reporting requirement to the Joint Convention, radioactive waste inventory data is also included in Section D of Canada's National Report for the Joint Convention.</p>	<p>requires careful scrutiny to ensure all data is reported on a consistent basis.</p> <ul style="list-style-type: none"> - Knowledge management - document the data and the source of data, recognising that different personnel could be responsible for the next campaign to collect waste inventory data, both at NRCan and for the waste owners. 	<p>2050 and 2100, to reflect the projects underway to establish long-term management facilities in Canada for low-level and intermediate-level radioactive waste (L&ILRW).</p> <ul style="list-style-type: none"> - Decommissioning schedules and associated waste volume projections for nuclear power plants, and research and prototype reactors. <p>For efficiency and where possible, Canada is streamlining data collected for international reporting such as the Joint Convention and other international projects and reports related to waste inventories – e.g. IAEA Status and Trends Report, NEA Brown Book updates.</p>
Croatia	State Office for Radiological and Nuclear Safety (SORNS) provide data collection and funds for the decommissioning of the Krško NPP	SORNS is the regulatory body entrusted with the implementation of the legislative and regulatory framework. SORNS are responsible for funding and planning decommissioning of the Krško nuclear power plant, and for radioactive waste and spent fuel management.	SORNS with the help of technical support organisations (TSOs).	Regulator.	The owner and / or holder of radioactive waste (RW), disused sources or sources of ionising radiation that are not intended to be used (DSRS) have to keep records of their inventory and send the data to SORNS's inventory database. Each owner/holder is responsible for ensuring that its inventory data is up to date for each site and managed effectively. It is responsibility of owner/holder to characterise and classify RW and/or DSRS.	RW/DSRS owners/holders are required to provide data for the inventory database every year and send it to SORNS, including radioactive waste and disused sources. The SORNS is obliged to keep inventory records.	A summary of data from the SORNS database is delivered annually to the IAEA Net Enabled Waste Management Database (NEWMDB). Data on radioactive sources in use are published annually on the SORNS web-page: http://cms.dzrns.hr/	-	Croatia is currently reviewing options for delivering the inventory differently.

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Country	FUNDING FOR NATIONAL INVENTORY		DATA COLLECTION / PRESENTATION FOR NATIONAL INVENTORY			FREQUENCY		REVIEWING APPROACH TO NATIONAL INVENTORY DATA MANAGEMENT	
	What organisation/s fund data collection?	What is the role of this organisation?	Who compiles the inventory data/reports?	What is the role of this organisation?	How is data collected and managed by sites?	How often is data collected for the national inventory?	How often is data published for the national inventory?	What key challenges does the country face with regard to their national inventory?	Is the country looking at other ways to deliver their national inventory?
Denmark	Danish Decommissioning (DD) DD stores all the Danish radioactive waste (the full inventory).	Decommissioning and waste management organisation	DD, in-house The Danish Health Authority (SIS) reports to Joint Convention	Decommissioning and waste management organisation Danish Health Authority (SIS)	All waste is collected and managed by Danish Decommissioning. Therefore, there is no need to collect data across sites. Data regarding radioactive waste is collected in the Waste Documentation System (WDS) (SQL database) using a web interface. The inventory is compiled through data queries from WDS using a custom made python program. The data of each container is quality controlled before transfer to storage.	Radioactive waste data is collected annually for our reporting to the Danish authorities. The same data are used for Joint Convention reporting.	Inventories for storage are requested by the authorities on a yearly basis. Reports regarding Joint Convention as requested.	Uncertainty and lack of measurements for parts of historical waste.	No - our waste registration system and inventory calculation program are sufficient, as long as we have available data to calculate the inventory from.
Estonia	State owned and funded ALARA Ltd collects data. ALARA is also responsible for interim storage of waste and for final disposal in the future. Annual reports about inventory will be sent to regulator.	Waste management organisation (WMO)	ALARA collects waste and also compiles inventory reports. ALARA is the only operator dealing with radioactive waste in Estonia. Waste is kept in single site.	Waste management organisation (WMO)	On a day to day basis. ALARA is responsible for ensuring its inventory data is up to date, managed and saved effectively. For the national inventory summary, data are sent in Microsoft Excel format. Regulator stores summaries and calculates annual changes in inventory, but detailed information is kept only in ALARA Ltd.	Once every three years for European Commission national report a more detailed summary is compiled for radioactive waste.	Once every three years.	Characterisation of the waste is needed as large volume of inventory is not fully characterised. Uncertainty related with characterisation.	Generally current inventory is sufficient. It's labour-intensive but as waste streams are small we can handle it. Regulator is seeking for new options arrange inventory as outcomes from the inventory are not as clear as they are expecting.
France	Directorate-General for Energy and Climate (DGEC) provide funds to Andra to compile the inventory data and to publish the national inventory. Sites provide resource to collect the data.	DGEC is in charge of the national energy policy in France, of the fight against the climate change, of the air pollution.	Andra compiles the inventory data/reports. Sites submit data to Andra.	Andra is the French National Radioactive Waste Management Agency, responsible for the long-term management of radioactive waste produced in France.	Each site is responsible for the data they submit to Andra. Sites submit data to Andra by using internet. This data is saved in a database. Data collected in the database can be exported into Microsoft Excel to produce statements. For forecast and radioactive materials, sites can complete Microsoft Excel spreadsheets to submit data.	Data is collected every year, except data for forecasts, storage and activity, which is collected every three years.	Data collected every year is published every year. Data collected every three years is published every three years.	To be exhaustive. Defining scenarios for the forecasts.	No.
Germany	Federal Ministry for the Environment, Nature Protection, Building and Nuclear Safety (BMUB).	German Federal regulator.	Nuclear fuel and radioactive waste from reprocessing: GRS „Gesellschaft für Anlagen- und Reaktorsicherheit gGmbH“	GRS is a non-profit organisation which deals with technical-scientific research and provides expertise. BGE is the	Every site has their own software system for managing their data. Once a year waste producers/owners are requested to fill out Excel templates and send them back to GRS or BGE, respectively. GRS and BGE check and compile the data. Before publication of	Every year.	The comprehensive national inventory is published every three years. Summary reports are published every year: https://doris.bfs.de	Merging different levels of detail in the obtained information. Managing uncertainties in the forecasts.	No.

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Country	FUNDING FOR NATIONAL INVENTORY		DATA COLLECTION / PRESENTATION FOR NATIONAL INVENTORY			FREQUENCY		REVIEWING APPROACH TO NATIONAL INVENTORY DATA MANAGEMENT	
	What organisation/s fund data collection?	What is the role of this organisation?	Who compiles the inventory data/reports?	What is the role of this organisation?	How is data collected and managed by sites?	How often is data collected for the national inventory?	How often is data published for the national inventory?	What key challenges does the country face with regard to their national inventory?	Is the country looking at other ways to deliver their national inventory?
			Other radioactive waste: BGE „Bundesgesellschaft für Endlagerung mbH“ ¹²	implementer in the field of radioactive waste disposal.	the inventory the supervisory authorities are requested to fact check the inventory.		“Umweltradioaktivität und Strahlenbelastung”		
Italy	No need for funding: various actors provide resources for data collection and analysis: - Waste Producers - ISIN - SOGIN		Waste producers ISIN (Nuclear Safety Authority–Regulator) SOGIN (Producer)	Collect their own data Collects data from the various producers and derives annual report for existing waste Derives the National Inventory to be delivered to the National Repository analysing ISIN report (for existing waste) and Producers’ data (for future decommissioning waste)	Each Producer uses its own tailor made software system for managing inventory data. Each producer is responsible for ensuring that its inventory data is up to date and managed effectively. For the National Inventory of existing waste, producers are required to complete Microsoft Excel spreadsheets for each of their waste streams. These spreadsheets are then compiled and put into a central SQL database (SIRR) by ISIN who publishes annual report For the National Inventory of all waste (existing and future waste) Sogin performs periodic visits at the Producers premises in order to agree treatment/conditioning processes for unconditioned waste. Microsoft Excel spreadsheets completed by Producers are then compiled and analysed by Sogin for deriving the overall National Inventory of waste to be delivered to the National Repository	Data are collected and reported annually by ISIN for the inventory of existing waste Data are collected and reported upon major national inventory change by SOGIN	Report on inventory of existing waste is published annually. Summary of the National Inventory is published annually by SOGIN within the Sustainability Balance Sheet.	Development of a new integrated Waste Information Tracking System. Reducing inventory variability (by improving waste characterisation; standardising waste treatment/conditioning; finalising WAC definition; etc.).	Yes – SOGIN would undertake in the future all actions needed for setting up an integrated national system for collecting and managing data of all Producers on a ‘from cradle to grave’ approach.
Russian Federation	No funding data collection for the national inventory.	-	Sites provide data to ROSATOM according to national policy.	ROSATOM is responsible for developing national policy.	On a day to day basis, sites use their own software systems for managing inventory data. Each site is responsible for ensuring that its inventory data is up to date and managed effectively. For the national inventory, sites are required to complete spreadsheets for	Data is collected every three months.	Information is classified and not published online.	Managing uncertainty; Demonstrating that data is underpinned; Generating accurate forecasts; Feeding back improvement activities.	ROSATOM continuously optimises the inventory management system for the nuclear sector to make it clear and simple to use.

¹² BGE took over the tasks for construction, operation and closure of repositories from the Federal Office for Radiation Protection (BfS) on 25.04.2017.

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Country	FUNDING FOR NATIONAL INVENTORY		DATA COLLECTION / PRESENTATION FOR NATIONAL INVENTORY			FREQUENCY		REVIEWING APPROACH TO NATIONAL INVENTORY DATA MANAGEMENT	
	What organisation/s fund data collection?	What is the role of this organisation?	Who compiles the inventory data/reports?	What is the role of this organisation?	How is data collected and managed by sites?	How often is data collected for the national inventory?	How often is data published for the national inventory?	What key challenges does the country face with regard to their national inventory?	Is the country looking at other ways to deliver their national inventory?
					each of their waste streams. These spreadsheets are then compiled and put into a central database in ROSATOM.				
Spain	-	-	ENRESA is responsible for developing and compiling the national inventory. Two teams are involved; Safety & Licencing is responsible for the inventory and associated forecast while International Relations is responsible for reporting to international organisations.	-	-	-	-	-	-
Switzerland	Every Swiss radioactive waste producer collects its own inventory data. Nagra compiles the data in a centralized database. This work is funded by Nagra.	Waste management organisation	Data compilation is done in-house. Reports are generated with the inventory database. Nagra gets IT support from a third party.	Waste management organisation	All waste producers use the same database software, in which data can be recorded and managed in the format required by the authority. The database is Oracle SQL based. Data are managed on a day to day basis. The central database at Nagra is fully compliant with the databases used at the sites. Imports and exports can easily be performed.	At least once per year.	This depends on the need for published data. The last fully documented and published national inventory is from 2014.	Having an inventory, which has the same level of detail for all producers; Generating accurate forecasts (characteristics and amounts).	Currently not.



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Appendix 4 Summary of strategic option categories

Purpose

The purpose of the UK Inventory will have a significant influence on the strategy direction. There are two key options for consideration:

- the UK Inventory as a reporting tool; or
- the UK Inventory as an operational tool (with the capability to produce a reporting output).

Reporting tool. The UK Inventory is currently considered as a reporting tool. Waste producers use their own inventory data management systems and periodically report their inventory of wastes and materials for the UK Inventory using templates provided by the UK Inventory contractor. The contractors then compile reports suitable for meeting the UK's international reporting obligations and for placing into the public domain.

Operational tool. An alternative option is that the sector moves towards a centralised inventory management system, with all waste producers using the same software for managing inventory data. There would be a shift in emphasis from the UK Inventory being produced purely as part of the UK's reporting obligations, to the UK Inventory being the central focus point for all inventory data, linked to operations on site. It is envisioned that waste producers would use a centralised software package for tracking their waste and materials from arisings through to conditioning, packaging, storage and disposal (as appropriate). The central software would replace all existing waste tracking software packages currently used by sites. In theory, a UK-wide Inventory data could then be obtained at any point to meet external stakeholder needs and international reporting obligations, with minimal input from waste producers.

This option prioritises the use of inventory data to support waste and materials management and tracking (at a site level), with reporting at a UK level being a secondary output.

This option would require bespoke software development and industry-wide change. Such a software solution must be capable of meeting the operational needs of all waste producers and/or have flexibility for waste producers to add their own, bespoke data management modules, as required. Such a tool would also need to be able to output reports when required, to enable the UK to meet various external stakeholder needs and international reporting obligations.

Funder

UK Inventory is currently jointly funded by BEIS and the NDA on a 50:50 basis. BEIS is responsible for ensuring that the UK is able to meet its international reporting obligations with respect to spent fuel and radioactive waste management. The NDA estate is a major waste producer and is also responsible for the planning and management of the UK's Low Level Waste Repository (LLWR), delivering a Geological Disposal Facility and providing a range of services to the nuclear sector. Although waste producers do not contribute to the costs of



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appointing a contractor to compile the UK Inventory, they do contribute financially through the provision of resource to support, collect, compile and submit inventory data and review the UK Inventory deliverables.

There is value in reviewing the funding arrangements for the UK Inventory to establish whether this remains the optimum funding solution. It is recognised that the UK Inventory funder/s would have significant influence over the scope of the UK Inventory and this has been taken into consideration during the assessment of options. It is acknowledged that any funder would need to allocate sufficient resource to manage the process of UK Inventory compilation (regardless of whether the bulk of delivery work is outsourced to contractors).

A core objective of this strategy is to ensure that the UK is able to meet its international reporting obligations. This is within the remit of BEIS, and as a consequence, it could be reasoned that BEIS should always be involved as a funder. We have consciously explored a wide range of funder options to ensure that we do not inadvertently miss any opportunities; the funder options that have been proposed include:

- **BEIS/NDA** - This option reflects the current approach. BEIS and the NDA currently fund the UK Inventory production on a 50:50 basis (with NDA taking responsibility for day to day management of the contract). All other inventory management arrangements and data submission costs are funded by waste producers. There is an option for the funding balance between BEIS and NDA to be adjusted if this is considered beneficial. However, there is value in BEIS and the NDA being equal funders, as both parties are able to equally influence the scope to meet the proposed strategic objective and ensure a balanced relationship during delivery. There is a view that this arrangement may add unnecessary complexity, given that the NDA as an organisation is funded by BEIS.
- **NDA, BEIS, Industry** - This option is similar to existing management arrangements; however, it requires an additional financial contribution from waste producers for production of the UK Inventory.
- **NDA** - As sole funder, the NDA would potentially have greater influence over the scope of the UK Inventory. Prioritising NDA needs is unlikely to result in a failure to meet the proposed strategic objective; however, BEIS would retain the risk associated with international reporting obligations. This option may not provide BEIS with sufficient ownership of this aspect of the UK Inventory. In this scenario, it is expected that additional funding would be required for delivery of the international inventory reporting aspects, which would remain the responsibility of UK Government.
- **BEIS** - BEIS would have greater influence over the scope of the UK Inventory; however, prioritising BEIS needs may result in failure to meet the proposed strategic objective, particularly with regard to strategy development and the optimisation of operations.
- **RWM / LLWR** - RWM and LLWR are responsible for developing nationally significant facilities and services for the management of radioactive waste in the UK. RWM and LLWR are currently consulted as stakeholders in the development of data collection



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tools for the UK Inventory and are key customers for the data collected. They do not currently contribute to funding of the UK Inventory.

- **RWM** - RWM is responsible for developing nationally significant facilities and services for the management of higher activity wastes in the UK. RWM is currently consulted as a stakeholder in the development of data collection tools for the UK Inventory and is a key customer for the data collected. RWM does not currently contribute to funding of the UK Inventory.
- **LLWR** - LLWR is responsible for developing nationally significant facilities and services for the management of lower activity wastes in the UK. LLWR is currently consulted as a stakeholder in the development of data collection tools for the UK Inventory and is a key customer for the data collected. LLWR does not currently contribute to funding of the UK Inventory; however, LLWR does provide data for the UK Inventory relating to wastes at the Low Level Waste Repository site.
- **Industry (Waste producers)** - In some countries (for example Sweden), industry representatives are responsible for compiling international reporting deliverables; however, the process typically has some oversight from a regulator or other independent body.
- **Regulators (Public funding)** - Clarity would be needed regarding which regulator would be most suited to funding the UK Inventory; the nuclear regulator (Office for Nuclear Regulation) or the environmental regulators (Environment Agency, Scottish Environment Protection Agency, Natural Resources Wales).

Delivery Organisation

Compilation of the UK Inventory and production of relevant reporting outputs is currently undertaken by a contractor, funded by BEIS and the NDA. This contractor is managed on a day to day basis by the NDA. A range of alternative delivery approaches could be implemented, which include direct delivery by relevant organisations (in house) or contracting options. The delivery organisation should be considered in close conjunction with the funder option to ensure an appropriate balance of influence between the relevant parties.

Frequency

Data for the UK Inventory is currently collected on a three yearly basis, historically in response to international reporting obligations for radioactive waste.

Council Directive 2011/70/EURATOM requires that from August 2015 (and every 3 years thereafter) Member States shall submit to the European Parliament and the Council a report on progress made with the implementation of the Directive and an inventory of radioactive waste and spent fuel present in the Community's territory and the future prospects. The UK has produced updates of the UK Inventory on a three yearly basis which enables the UK to meet this requirement.



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In July 2014 the IAEA, the OECD NEA and the European Commission established a Joint Working Group to coordinate the preparation of a report to serve as a reference for worldwide status and trends concerning arisings of spent fuel and radioactive waste and provisions for the long-term management of these materials. This initiative is known as the “Status and Trends Project” and the first report was recently published¹³. Beyond this, further reporting cycles are envisaged in line with the reporting cycles under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and the reporting cycle under the Council Directive 2011/70/Euratom.

Considering spent fuel and nuclear materials, the UK also submits information on an annual basis for the OECD NEA Brown Book (spent fuels) and the OECD NEA Red Book (uranics). Nuclear materials data is reported annually for Eurostat. This is not currently captured through the formal UK Inventory reporting cycle and information for these reporting obligations has been collected on an informal basis.

There is value in considering whether a change to the frequency of data collection for the UK Inventory (either increasing or decreasing) would deliver notable benefits. There are some key considerations when assessing the frequency of data collection:

- **Data credibility:** Towards the end of the three year reporting period, the UK inventory data does lose credibility. Increasing the frequency of data collection would help to ensure that more up to date information is used for developing strategy and for waste management planning purposes. This benefit must be balanced against the additional costs (resource and time) associated with more frequent reporting.
- **Multiple datasets:** The lack of more frequent updates encourages the production of multiple, conflicting ‘interim’ inventory data sets. However, it could be reasoned that increasing the frequency of data collection is unlikely to mitigate the existence of conflicting inventory data sets as this is a cultural issue that needs to be managed at a site level.
- **Identifying drivers:** There needs to be a clear driver for increasing the frequency of data collection for the UK Inventory, with end users identified for the data.
- **Ensuring value:** Increasing the frequency of reporting at a national level may introduce potentially significant additional costs to the sector, both in terms of the potential reporting burden on sites and administration of the process by the funding/delivery organisations. Options should consider the administrative burden associated with increased reporting.
- **Stakeholder management:** Increasing the frequency of public-facing reporting at a national level may lead to greater stakeholder management issues (i.e. justifying data changes, managing the credibility of the national inventory).

¹³ IAEA (2018), Status & Trends in Spent Fuel and Radioactive Waste Management, ISBN:978-92-0-108417-0



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- **Impact on related work:** Increasing the frequency of data collection may have an impact on related projects that use UK Inventory data (for example, the three-yearly Inventory for Geological Disposal).
- **Opportunity to improve and/or update strategy:** The frequency of inventory reporting should not increase to such an extent that resource becomes tied to ongoing delivery, missing opportunities for strategic thinking and implementing more ambitious inventory improvement projects.
- **Formalising data collection:** The three yearly cycle is not currently sufficient to meet international reporting requirements for spent fuel and nuclear materials. As a result, informal data collection exercises are currently undertaken in this area. Reviewing frequency provides an opportunity to improve the management of data collection in this area.

A range of options have been proposed:

- Alignment with timescales for updating Site Safety Cases (e.g. 10 years)
- Updates every five years to align with NDA Strategy updates
- Updates every three years (current approach)
- Annually - In some countries national inventory data is collected on an annual basis
- Monthly
- Differing timescales by waste category - Differing reporting frequencies based on the waste category; for example, there may be a desire to undertake more frequent reporting for LLW streams, for which there are a range of current waste treatment and disposal options currently available.
- Differing timescales based on the timings of waste and/or materials arisings - Although there are many potential options, the most likely scenario is increasing the frequency of reporting for near term arisings (e.g. for wastes and materials arising within next 20 years) and reducing the frequency of reporting for long term arisings (e.g. for wastes and materials arising in 20+ years time). This would lead to a focus on improving information for nearer-term arisings.
- Differing timescales for 1) radioactive waste, 2) spent fuel & nuclear materials, and 3) land contamination. Although there are many potential options for changing the frequency of reporting for these elements, the most likely scenario has been assessed: three yearly reporting for waste and land contamination, and end of calendar year reporting for spent fuel and nuclear materials.
- Ad Hoc production of a UK Inventory - This option would require a UK Inventory to be produced on an 'ad-hoc' basis when there is a clear user requirement for updated data. There are obvious challenges associated with this option, for example, who determines when the inventory should be updated? What factors are considered to be significant enough to instigate an update?



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- 'Live' – The option of a 'live' inventory has been explored, although this is likely to be an undeliverable option (see Appendix 2 for assessment).

It is recognised that in some countries national inventory data is collected at a defined frequency different to that of publication. For example, in France, national inventory data is collected on an annual basis but published only every three years. For the purposes of this strategy, frequency relates to the frequency of data collection. The aspect of publication will be reserved for discussion at the implementation phase.

Scope

There are four key options to consider when reviewing the scope of the UK Inventory. These include:

- **Maintain existing scope** - no change to current position. Current scope includes solid radioactive waste and materials from major producers. Specific exclusions are:
 - Authorised liquid and gaseous discharges;
 - Waste from small users;
 - Radioactive materials not subject to nuclear safeguards;
 - Certain radioactive sources;
 - Naturally Occurring Radioactive Material (NORM) waste;
 - Radioactive substances exempt from permitting.
- **Widen scope** – there are a wide range of options for expanding the scope of the UK Inventory. This could involve consolidating multiple inventory reporting exercises, collecting more detailed information about waste and materials streams that are currently in scope and/or collecting data for waste and materials streams that are not currently captured in the UK Inventory. Possible options for widening the scope include:
 - Inclusion of data on opportunities for managing waste in accordance with the waste hierarchy (consolidates an existing reporting requirement called the Waste Inventory Form¹⁴);
 - Inclusion of data currently collected during compilation of the Inventory for Geological Disposal (consolidates an existing reporting process);
 - Inclusion of data relating to radioactive liquid effluents;
 - Inclusion of data relating to radioactive gaseous discharges;

¹⁴ The Waste Inventory Form (WIF) looks at opportunities to apply the waste hierarchy and implement more sustainable waste management practices.



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- Collection of more detailed data directly from all minor waste producers (such as universities and hospitals);
 - Inclusion of assumptions about radioactive waste and materials produced from proposed new nuclear build programmes;
 - Inclusion of data for Naturally Occurring Radioactive Material (NORM) waste (this would involve engagement with new sectors, such as the Oil & Gas sector);
 - Inclusion of radionuclide data for spent fuel and nuclear materials;
 - Inclusion of data for all secondary wastes that are generated during treatment.
- **Reduce scope** - options may include removing data requirements relating to waste stream physical, chemical and radiological characteristics, and/or limiting the period for waste forecasting. It should be noted that a full review of data requirements was undertaken for the 2016 UK Inventory, meaning that any redundant data fields were removed and all remaining data fields had identified end users. Should data fields be removed, the resulting impact on key stakeholders should be considered. It must also be considered that a reduction in scope of the UK Inventory may lead to corresponding scope increases for other reporting requirements.
 - **Split scope** - This option involves splitting the existing scope of the UK Inventory and running separate data collection and reporting processes for radioactive waste, radioactive materials and land contamination. This would enable each data collection processes to be tailored to meet the specific requirements of each area.

Additional Comments on Format for Reporting

At present, data is collected for the UK Inventory on a waste stream basis. Waste streams are designated to summarise waste or a collection of waste items at a particular site, usually in a particular facility and/or from particular processes or operations. A waste stream is often distinguishable by its radionuclide content and in many cases also by its physical and chemical characteristics. Waste streams are currently determined by waste producers.

There are options to present information in the UK Inventory differently. For example, collecting and presenting data by waste package type or by proposed disposal route. These options are considered to be tactical rather than strategic and so have been excluded from the assessment.

Appendix 5 Assessment of options against screening criteria

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
Purpose	Reporting tool	Managing the UK Inventory as a reporting output encourages the availability of a single, approved waste and materials inventory data set.	Producing the UK Inventory as part of a reporting process enables BEIS and the UK to meet international reporting requirements.	Although this approach can support the NDA in developing strategy, the value of the UK Inventory data is linked to reporting frequency. If reporting is infrequent, information may become out-dated meaning that this option may not sufficiently support NDA in developing strategy and delivering its mission.	As a reporting tool, the UK Inventory can be tailored to meet end user needs. However, the suitability of this option is linked to the frequency of reporting; at present the UK Inventory loses credibility towards the end of the three year reporting period, so less frequent reporting would not enable sufficient, accessible information to be made available for use by our key stakeholders.	Producing the UK Inventory as part of a reporting process may not encourage sufficient value to be extracted from the data set, particularly with regard to waste producer usage of the data and the optimisation of operations on site.	Producing the UK Inventory as part of a reporting process does not directly support producers in the optimisation of their operations; however, there are benefits to producers in driving all sites to update their inventory data at the same time through reporting – this encourages regular updates to inventory data and openness/transparency in reporting findings does give waste producers the ability to see opportunities to work with other waste producers. Having a solely reporting based focus; however, does not directly encourage UK waste producers to exploit the data set to their benefit.	Producing the UK Inventory as part of a reporting process is deliverable and sustainable over the long term. However, this is also linked to frequency – should reporting frequency increase, this would occupy additional resource within the funding, delivery and waste producer organisations. Retaining the current three yearly reporting cycle would lead to this being one of the lowest cost options.	Option does not require identified organisation/s to operate outside of their remit.
	Operational tool (with reporting capability)	This option would enable a single data set to be maintained; however, should data be extracted (for reporting or other purposes) on a frequent basis there are risks that multiple, conflicting data sets would be available to stakeholders. Controls would be needed to ensure that data is approved prior to extraction from the system for reporting purposes; this may not be feasible if data extractions are on a frequent basis.	Should the operational tool have sufficient capability for producing reporting outputs this option would not prevent BEIS and the UK from meeting international reporting requirements.	Should the tool be optimised to support operations on site, this option could be advantageous and would support the NDA in delivering its mission. The ability to extract an approved data set when required would be essential to enable the NDA to develop strategy.	This option could provide sufficient information for stakeholders; however, it depends upon the frequency of production of approved outputs for stakeholder use from the tool. At present the UK Inventory loses credibility towards the end of the three year reporting period, so the production of infrequent reporting outputs would not support this criterion.	Producing the UK Inventory as part of an operational process may improve the industry's ability to extract best value from the data set in a compliant and secure manner.	In the long term, there could be benefits in terms of optimising operations. Short term disruption would be significant and would need to be offset against benefits (particularly for sites that have already recently invested in inventory management systems, those that are approaching interim end states and those that are approaching the end of their decommissioning mission).	Providing a new, central tool for estate-wide inventory data management and production of the UK Inventory is not currently a deliverable option, primarily from a practicability and affordability perspective. This option may be deliverable if existing, common systems were to be expanded across the NDA estate; however, this may leave the NDA vulnerable to a single supplier and this option cannot imposed upon non-NDA estate businesses for UK Inventory reporting purposes. This option could become feasible if a site were to adopt an open source solution and was prepared to share this solution with other sites. Reliant on other waste producers adopting the software.	Option does not require identified organisation/s to operate outside of their remit.

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
Funder/s	BEIS & NDA joint funding	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements.	Recognising that funders often have greatest impact over scope, this option is likely to support the NDA in developing strategy and delivering its mission. This option gives the NDA immediate access to information from the non-NDA estate to support national waste planning (e.g. LLWR and GDF).	Recognising that funders often have greatest impact over scope and publication of outputs, this option does not present any key barriers to providing sufficient, accessible information suitable for use by our key stakeholders. BEIS and the NDA have joint interest in ensuring our stakeholders are well informed.	Recognising that funders often have greatest impact over scope, this option is likely to result in alignment with the NDA Information Governance Strategy.	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations (in terms of specifying a suitable inventory output); however, if waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised.	This option is likely to be one of the most deliverable and sustainable funding options. Government is responsible for ensuring that UK international reporting obligations are met and that the NDA mission can be realised.	Option does not require identified organisation/s to operate outside of their remit. Government sponsorship adds credibility to the UK Inventory process. Industry benefits from NDA influence over the scope of the UK Inventory to support the development and delivery of national waste and materials management programmes, services and facilities.
	NDA, BEIS and industry joint funding	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements.	Recognising that funders often have greatest impact over scope, this option is likely to support the NDA in developing strategy and delivering its mission. This option gives the NDA immediate access to information from the non-NDA estate to support national waste planning (e.g. LLWR and GDF).	Recognising that funders often have greatest impact over scope and publication of outputs, this option does not present any key barriers to providing sufficient, accessible information suitable for use by our key stakeholders. BEIS and the NDA have joint interest in ensuring our stakeholders are well informed.	Recognising that funders often have greatest impact over scope, this option is likely to result in alignment with the NDA Information Governance Strategy.	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations, with input from industry, BEIS and the NDA. Waste producers may be more likely to prioritise inventory work if they are also responsible for part funding it (in addition to existing resource allocated). Waste producers may be more likely to use the data if they have been involved in funding the work.	This option is unlikely to be deliverable. There is no incentive for industry to provide further funding for a national inventory (Industry already contributes funding in the form of resource to compile the UK inventory).	Option does not require identified organisation/s to operate outside of their remit. Government sponsorship adds credibility to the UK Inventory process. Industry benefits from NDA influence over the scope of the UK Inventory to support the development and delivery of national waste and materials management programmes, services and facilities. Industry are able to have greater influence over the process.
	NDA	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements (NDA is funded by BEIS).	Recognising that funders often have greatest impact over scope, this option will support the NDA in developing strategy and delivering its mission. This option gives the NDA immediate access to information from the non-NDA estate to support national waste planning (e.g. LLWR and GDF).	Recognising that funders often have greatest impact over scope and publication of outputs, this option does not present any key barriers to providing sufficient, accessible information suitable for use by our key stakeholders. NDA has a vested interest in ensuring our stakeholders are well informed.	Recognising that funders often have greatest impact over scope, this option is likely to result in alignment with the NDA Information Governance Strategy.	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations (in terms of specifying a suitable inventory output); however, if waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised.	This option is likely to be one of the most deliverable and sustainable funding options. Government is responsible for ensuring that UK international reporting obligations are met and that the NDA mission can be realised. The NDA is a non-departmental public body funded by the Government Department of BEIS. NDA would need increased financial support to fund the UK Inventory in its entirety.	Option does not require identified organisation/s to operate outside of their remit. Industry benefits from NDA influence over the scope of the UK Inventory to support the development and delivery of national waste and materials management programmes, services and facilities. International reporting would remain the responsibility of BEIS.

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	BEIS	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements.	Recognising that funders often have greatest impact over scope, this option <i>may</i> support the NDA in developing strategy and delivering its mission; however, there is some concern that should BEIS sole fund, BEIS may prefer to scale back the UK Inventory scope to meet only minimal international reporting obligations. This would hinder the NDA estate (and wider industry) in delivering its mission. NDA may then need to establish an alternative reporting process to support delivery of the NDA mission.	Recognising that funders often have greatest impact over scope and publication of outputs, this option does not present any key barriers to providing sufficient, accessible information suitable for use by our key stakeholders, should scope remain the same (BEIS has a vested interest in supporting the NDA's mission). However, should BEIS scale back the UK Inventory scope to meet only international reporting obligations, this would hinder the NDA in delivering its mission.	Recognising that funders often have greatest impact over scope, it is not certain that this option will align directly with the NDA Information Governance Strategy (as the work would be funded by a non-NDA organisation). It is likely that good practice in Information Governance will be implemented.	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations (in terms of specifying a suitable inventory output); however, if waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised.	This option is likely to be one of the most deliverable funding options. Government is responsible for ensuring that UK international reporting obligations are met and that the NDA mission can be realised.	This option would require BEIS to collect more information than is necessary to fulfil the international reporting obligations of BEIS. At present, more detailed information is required by NDA to support national infrastructure development (i.e. Geological Disposal Facility and LLW Repository) and development of the NDA strategy. There is a high risk that(should BEIS sole-fund the UK inventory) data granularity may be lost; requiring NDA to establish an additional, alternative reporting process to support delivery of the NDA mission and development of national infrastructure.
	RWM & LLWR joint funding	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements (RWM and LLWR are funded by NDA, which is funded by BEIS).	This option may support the NDA in developing strategy and delivering its mission. RWM and LLWR are organisations that are both funded by the NDA; it is possible for the NDA to influence the work, but the level of control over scope and execution is reduced. This option gives both RWM and LLWR immediate access to information from the non-NDA estate to support national waste planning (e.g. LLWR and GDF).	Recognising that funders often have greatest impact over scope and publication of outputs, this option does not present any key barriers to providing sufficient, accessible information suitable for use by our key stakeholders. RWM and LLWR have a vested interest in ensuring that NDA stakeholders are well informed.	Recognising that funders often have greatest impact over scope, this option is likely to align with the NDA Information Governance Strategy (RWM and LLWR form part of the NDA estate).	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations (in terms of specifying a suitable inventory output); however, if waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised. There is some concern that under this funding model, scope may creep to include 'nice to have' rather than that necessary to support effective waste and materials management planning. This has a direct impact on waste producer resourcing.	This is a deliverable option. NDA would need increased financial support to enable RWM & LLWR to fund the UK Inventory in its entirety.	Option does not require identified organisation/s to operate outside of their remit. RWM and LLWR are likely to ensure that the inventory data collection process retains a strong focus on end user needs. This option may also encourage greater collaboration between RWM and LLWR. International reporting would remain the responsibility of BEIS.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	RWM	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements (RWM is funded by NDA, which is funded by BEIS).	Although NDA has overarching influence here, it is recognised that funders often have greatest impact over scope; there is a risk that the UK Inventory would become very HAW centric, and may not support LLW planning as effectively. This option gives RWM immediate access to information from the non-NDA estate to support national waste planning (e.g. GDF).	Although NDA has overarching influence here, it is recognised that funders often have greatest impact over scope; there is a risk that the UK Inventory would become very HAW centric, and may not support LLW planning as effectively.	Recognising that funders often have greatest impact over scope, this option is likely to align with the NDA Information Governance Strategy (RWM forms part of the NDA estate).	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations (in terms of specifying a suitable inventory output); however, if waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised.	This is a deliverable option. NDA would need increased financial support to enable RWM to fund the UK Inventory in its entirety.	It is outside the remit of RWM to fund data collection for Low Level Wastes.
	LLWR	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option will enable BEIS and the UK to meet international reporting requirements (LLWR is funded by NDA, which is funded by BEIS).	Although NDA has overarching influence here, it is recognised that funders often have greatest impact over scope; there is a risk that the UK Inventory would become very LLW centric, and may not support HAW planning as effectively. This option gives LLWR immediate access to information from the non-NDA estate to support national waste planning (e.g. LLWR).	Although NDA has overarching influence here, it is recognised that funders often have greatest impact over scope; there is a risk that the UK Inventory would become very LLW centric, and may not support HAW planning as effectively.	Recognising that funders often have greatest impact over scope, this option is likely to align with the NDA Information Governance Strategy (LLWR forms part of the NDA estate).	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations (in terms of specifying a suitable inventory output); however, if waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised.	This is a deliverable option. NDA would need increased financial support to enable LLWR to fund the UK Inventory in its entirety.	It is outside the remit of LLWR to fund data collection for Higher Activity Wastes.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
Regulators	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, this option is likely to enable BEIS and the UK to meet international reporting requirements (the Regulators are funded by Government).	Recognising that funders often have greatest impact over scope, this option may support the NDA in developing strategy and delivering its mission.	Recognising that funders often have greatest impact over scope and publication of outputs, this option does not present any key barriers to providing sufficient, accessible information suitable for use by our key stakeholders (provided that outputs are made publicly available).	Recognising that funders often have greatest impact over scope, it is not certain that this option will align directly with the NDA Information Governance Strategy (as the work would be funded by non-NDA organisations). It is likely that good practice in Information Governance will be implemented.	Recognising that funders often have greatest impact over scope, this option may support waste producers in the optimisation of their operations; however, there are concerns that the scope of the UK inventory may increase, creating a greater data management burden for sites. If waste producers are not directly involved (as funders or delivery bodies) then direct benefits to site operations may reduce and their sense of ownership of the process is minimised.	This option is unlikely to be deliverable. Regulators must maintain their independence from site activities and are unlikely to be in a position to provide funds for compilation of the UK Inventory on behalf of industry.	Regulators must maintain their independence from site activities. Funding an inventory data compilation exercise may be outside the remit of regulators. In addition, the regulators are not key customers for the data and significant NDA oversight would still be required to ensure that NDA objectives are met.	
Industry (waste producers) <i>Note that waste producers currently contribute significantly to the cost of production of the UK Inventory by submitting appropriate data and reviewing UK Inventory outputs. However, waste producers do not currently contribute to the assessment of data and authoring of UK Inventory reports.</i>	Funding option does not prevent the availability of a single, approved waste and materials inventory data set.	Recognising that funders often have greatest impact over scope, there is uncertainty over whether this option will guarantee that BEIS and the UK will meet international reporting requirements.	Potential for the UK Inventory focus to shift onto funder-specific drivers rather than support NDA strategic decisions. Recognising that funders often have greatest impact over scope, there is concern that the UK Inventory scope may reduce significantly (to save time and resource) meaning a loss of data granularity and an inability to develop strategy and plan for long term waste and materials management.	Recognising that funders often have greatest impact over scope, there is concern that the UK Inventory scope may reduce significantly (to save resource) and there may be less emphasis on publication and sharing of UK Inventory outputs (in order to reduce costs). This may mean that information may not be sufficient for stakeholder needs and the accessibility of data may reduce. There is a risk that the credibility of the UK Inventory could reduce.	Recognising that funders often have greatest impact over scope, it is not certain that this option will align directly with the NDA Information Governance Strategy (as the work would be funded by non-NDA organisations). It is likely that good practice in Information Governance will be implemented.	Recognising that funders often have greatest impact over scope, this option may have a positive impact in supporting waste producers in the optimisation of their operations as industry (including waste producers and waste disposal organisations) are well positioned to identify data requirements that will support their activities. However, this option may suffer from lack of Government and regulator oversight which helps sites to plan for long term waste and materials management.	This option is unlikely to be deliverable. There is no incentive for industry to provide further funding for a national inventory (Industry already contributes funding in the form of resource to compile the UK inventory). Allocating responsibility for driving the initiative and encouraging proactive participation would be a challenge. This option is likely to still require significant NDA oversight. Minor waste producers may struggle to contribute funding. How would funding be sourced?	Industry has a vested interest in making information available that will support long term waste and materials management planning. Although Industry must support the production of a national inventory to meet the UK's international reporting obligations, responsibility for managing these obligations remains with BEIS.	

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
Delivery organisation	Third party managed by NDA	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion). NDA involvement in delivery increases the likelihood that the requirements of BEIS (NDA's sponsor) will be met.	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion). NDA involvement in delivery increases the likelihood that NDA requirements will be met. Using a contractor to support delivery enables NDA to focus internal resource on wider, strategic issues and forward planning.	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option is likely to enable alignment with the NDA Information Governance Strategy, although much will depend upon the funder (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Using an experienced contractor can help sites in identifying opportunities for improving their inventory data.	This is the current approach and (on a three yearly frequency) has proven deliverable and sustainable to date. There are some concerns about the health of the supply chain in inventory data management, but this is not considered to be a major barrier as present. Resource can be contracted on an 'as required' basis which gives flexibility. However, contracting for the typical contracting period (~15 months) could be a more costly option compared to appointing permanent staff within the funding organisation/s. Should frequency change, a different approach may be more preferable to account for procurement timescales.	Option does not require identified organisation/s to operate outside of their remit. NDA is well placed to act as the Intelligent Customer for this work.
	Third party managed by BEIS	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion). BEIS involvement in delivery increases the likelihood that BEIS requirements will be met.	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option (non-NDA estate delivery) may enable alignment with the NDA Information Governance Strategy, although much will depend upon the funder's approach (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Using an experienced contractor can help sites in identifying opportunities for improving their inventory data.	This is similar to the current approach (third party managed by NDA). This model has proven deliverable and sustainable. There are some concerns about the health of the supply chain in inventory data management, but this is not considered to be a major barrier at present. Resource can be contracted on an 'as required' basis which gives flexibility. However, contracting for the typical contracting period (~15 months) could be a more costly option compared to appointing permanent staff within the funding organisation/s. Should frequency change, a different approach may be more preferable to account for procurement timescales.	Option does not require identified organisation/s to operate outside of their remit, although additional resource would be required within BEIS to manage the contract.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	BEIS & NDA joint delivery (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion). BEIS involvement in delivery increases the likelihood that BEIS requirements will be met.	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion). NDA involvement in delivery increases the likelihood that NDA requirements will be met.	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option is likely to enable alignment with the NDA Information Governance Strategy, although much will depend upon the funder (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites unable to benefit from supply chain expertise in inventory management.	This option may be considered, but would require BEIS and the NDA to acquire additional resource (on a temporary or permanent basis) to support delivery. Joint delivery would introduce practical challenges surrounding the division of labour. This option may have a detrimental impact on inventory skills in the supply chain.	The NDA is a strategic body and BEIS is a policy development body. It is outside of the current remit of both organisations to conduct large scale data gathering projects in house.
	NDA (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion). NDA involvement in delivery increases the likelihood that the requirements of BEIS (NDA's sponsor) will be met.	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion). NDA involvement in delivery increases the likelihood that NDA requirements will be met.	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option is likely to enable alignment with the NDA Information Governance Strategy, although much will depend upon the funder (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites unable to benefit from supply chain expertise in inventory management.	This option would require NDA to acquire additional resource (on a temporary or permanent basis) to support delivery, particularly for waste reporting. This option may have a detrimental impact on inventory skills in the supply chain. For spent fuel and nuclear materials, formalising an in-house reporting option may help to improve existing data collection processes.	The NDA is a strategic body. It is outside of the current remit of the NDA to conduct large scale data gathering projects in house.
	BEIS (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion). BEIS involvement in delivery increases the likelihood that BEIS requirements will be met.	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option (non-NDA estate delivery) may enable alignment with the NDA Information Governance Strategy, although much will depend upon the funder's approach (recognising that funders often have greatest impact over scope). It is likely that good practice will be implemented.	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites unable to benefit from supply chain expertise in inventory management.	This option would require BEIS to acquire additional resource (on a temporary or permanent basis) to support delivery. This option may have a detrimental impact on inventory skills in the supply chain.	BEIS is a policy development body. It is outside of the current remit of BEIS to conduct large scale data gathering projects in house.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	RWM (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion).	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option is likely to enable alignment with the NDA Information Governance Strategy as RWM is an NDA subsidiary, although much will depend upon the funder (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites able to benefit from RWM expertise in inventory management.	This option would require RWM to acquire additional resource (on a temporary or permanent basis) to support delivery. This option may have a detrimental impact on inventory skills in the supply chain.	It is outside the remit of RWM to manage data collection for Low Level Wastes.
	LLWR (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion).	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option is likely to enable alignment with the NDA Information Governance Strategy as LLWR is an NDA SLC, although much will depend upon the funder (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites able to benefit from LLWR expertise in inventory management.	This option would require LLWR to acquire additional resource (on a temporary or permanent basis) to support delivery. This option may have a detrimental impact on inventory skills in the supply chain.	It is outside the remit of LLWR to manage data collection for Higher Activity Wastes.
	RWM & LLWR joint delivery (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion).	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	This delivery option is likely to enable alignment with the NDA Information Governance Strategy as RWM is an NDA subsidiary and LLWR is an NDA SLC, although much will depend upon the funder (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites able to benefit from RWM & LLWR expertise in inventory management.	This option would require RWM and LLWR to acquire additional resource (on a temporary or permanent basis) to support delivery. This option may have a detrimental impact on inventory skills in the supply chain.	Organisations would not be operating outside of remit.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	Industry committee	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion).	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	It is not certain that this option (partial NDA estate delivery) will encourage alignment with the NDA Information Governance Strategy; much will depend upon the funder's approach (recognising that funders often have greatest impact over scope).	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). This option may attract greater industry insight and expertise to enhance the management of inventory data. Industry empowered to take ownership of the UK Inventory process to meet industry needs, and encourages collaboration and knowledge sharing. Sites unable to benefit from supply chain expertise in inventory management.	An industry committee may be able to produce the UK Inventory; however, there would need to be clear leadership and allocation of responsibilities. Resource would be required by industry. It is not clear who would provide this direction and what would incentivise participation. Without ongoing Government involvement it is unlikely that this option would be sustainable.	Industry has a vested interest in making information available that will support long term waste and materials management planning, and a requirement to support Government in meeting international reporting obligations; however, taking responsibility for managing compilation of a UK Inventory may be considered outside of industry remit.
	Site with largest inventory (i.e. Sellafield site).	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion).	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	It is not certain that this option will encourage alignment with the NDA Information Governance Strategy; much will depend upon the funder (recognising that funders often have greatest impact over scope).	This option (with greater industry involvement) may encourage producers in the optimisation of their operations. This option may attract greater industry insight and expertise to enhance the management of inventory data. Sites unable to benefit from supply chain expertise in inventory management.	Option could be deliverable, but would require a specification change and additional resource. This option may have a detrimental impact on inventory skills in the supply chain.	It is outside of the remit of Sellafield site to produce a UK Inventory that will enable BEIS and the UK to meet international reporting requirements and support the NDA in developing strategy and delivering its mission. Although mechanisms exist to enable this option to be delivered, it is an additional demand and detracts from the Sellafield mission.
	Regulators (in house)	Delivery option does not prevent the availability of a single, approved waste and materials inventory data set.	Option does not prevent BEIS and the UK from meeting international reporting requirements (funder has greater influence over this screening criterion).	Option does not prevent the NDA from developing strategy and delivering its mission (funder has greater influence over this screening criterion).	Delivery organisation has minimal impact on whether sufficient, accessible information suitable for use by our key stakeholders is made available. This screening criterion is more influenced by scope and funding organisation.	It is not certain that this option (non-NDA estate delivery) will encourage alignment with the NDA Information Governance Strategy; much will depend upon the funder's approach (recognising that funders often have greatest impact over scope). It is likely that good practice will be implemented.	Neutral. The delivery option does not have a significant impact on whether producers will be supported in the optimisation of their operations; other strategic options have greater bearing on this screening criterion (for example, scope and frequency). Sites unable to benefit from supply chain expertise in inventory management.	This option may be considered, but would require regulators to acquire additional resource (on a temporary or permanent basis) to support delivery. Joint delivery would introduce practical challenges. This option may have a detrimental impact on inventory skills in the supply chain, but may have a positive impact on preservation of inventory skills within the industry.	Regulators must maintain their independence from site activities. Funding an inventory data compilation exercise may be outside the remit of regulators.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
July 2018**

Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
Frequency	Alignment with safety cases – Compilation and publication of a UK Inventory every 10 years	Does not prevent the availability of a single, approved waste and materials inventory data set.	Frequency does not meet the Council Directive 2011/70/EURATOM requirement for an inventory that is updated every three years. This will become less of a concern following the UK's planned departure from the European Union. Frequency does not meet proposed reporting cycle for IAEA/NEA/European Commission Status & Trends project. Frequency does not meet international annual reporting obligations for spent fuel and nuclear materials.	Infrequent production of a UK Inventory does not support the NDA in developing strategy and delivering its mission. Significant changes in our understanding of wastes for management can occur within a 10 year time scale. The UK Inventory currently loses credibility towards the end of a three year reporting cycle; production of UK Inventory on a less frequent basis would hinder strategy development and waste management planning activities further. Furthermore, timescales for the update of safety cases are not aligned.	A UK Inventory produced on a 10 yearly basis would not be sufficient to meet the needs of key stakeholders, including waste management organisations, regulators, researchers and members of the public. The lack of publicly available data would also contribute to a loss of confidence in the sector.	This frequency of UK Inventory data compilation is unlikely to optimise value from NDA information assets and so would not align with the NDA Information Governance Strategy.	Although this option would reduce the resource used to produce the UK Inventory, this option is unlikely to support producers in the optimisation of their operations. Information will become out-dated and lose credibility. This option will inhibit cross-SLC working and the identification of opportunities to collaborate. It will also inhibit the supply chain's ability to support the management of waste and materials. One potential positive is that the reduced frequency may free resource to undertake more ambitious inventory improvement projects. However, the opposite may also be true, in that less frequent reporting may lead to a loss of momentum/urgency for inventory improvement activities.	Option is potentially deliverable, but there are concerns that UK reporting on this frequency may lead to a loss of technical inventory capability/resource and knowledge across organisations. Should the inventory purpose remain as a reporting tool, this option would reduce costs associated with UK Inventory preparation (compared to the current approach).	Not applicable.

**Management of Radioactive Waste & Materials Inventory Data
Credible Options Assessment (Stage A) and Selection of
Preferred Option (Stage B)
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Strategic Option (with comments as appropriate)		SCREENING CRITERIA						
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term
Alignment with NDA Strategy - Compilation and publication of a UK Inventory every five years	Does not prevent the availability of a single, approved waste and materials inventory data set.	Frequency does not meet the Council Directive 2011/70/EURATOM requirement for an inventory that is updated every three years. This will become less of a concern following the UK's planned departure from the European Union. Frequency does not meet proposed reporting cycle for IAEA/NEA/European Commission Status & Trends project. Frequency does not meet international annual reporting obligations for spent fuel and nuclear materials.	Infrequent production of a UK Inventory does not support the NDA in developing strategy and delivering its mission. Significant changes in our understanding of wastes for management can occur within a 10 year time scale. The UK Inventory currently loses credibility towards the end of a three year reporting cycle; production of UK Inventory on a less frequent basis would hinder strategy development and waste management planning activities further.	A UK Inventory produced on a five yearly basis would not be sufficient to meet the needs of key stakeholders, including waste management organisations, regulators, researchers and members of the public. The lack of publicly available data would also contribute to a loss of confidence in the sector.	This frequency of UK Inventory data compilation is unlikely to optimise value from NDA information assets and so would not align with the NDA Information Governance Strategy.	Although this option would reduce the resource used to produce the UK Inventory, this option is unlikely to support producers in the optimisation of their operations. Information will become out-dated and lose credibility. This option will inhibit cross-SLC working and the identification of opportunities to collaborate. It will also inhibit the supply chain's ability to support the management of waste and materials. One potential positive is that the reduced frequency may free resource to undertake more ambitious inventory improvement projects. However, the opposite may also be true, in that less frequent reporting may lead to a loss of momentum/urgency for inventory improvement activities.	Option is potentially deliverable, but there are concerns that UK reporting on this frequency may lead to a loss of technical inventory capability/resource and knowledge across organisations. Should the inventory purpose remain as a reporting tool, this option would reduce costs associated with UK Inventory preparation (compared to the current approach).	Not applicable.
Every three years	Does not prevent the availability of a single, approved waste and materials inventory data set.	Meets the Council Directive 2011/70/EURATOM requirement for an inventory that is updated every three years and the proposed reporting cycle for IAEA/NEA/European Commission Status & Trends project. Frequency does not currently meet international annual reporting obligations for spent fuel and nuclear materials. (International reporting obligations are currently being met through informal arrangements).	Currently sufficient; however, it is recognised that the UK Inventory loses some credibility towards the end of each three yearly reporting cycle.	A UK Inventory produced on a three yearly basis currently meets the majority of key stakeholder needs; however, there is recognition that the UK Inventory loses credibility towards the end of each three year cycle. It is acknowledged that the availability of more up to date inventory data would improve planning for the management of wastes arising in the near term.	This frequency of UK Inventory data compilation may help to optimise value from NDA information assets in alignment with the NDA Information Governance Strategy.	Currently sufficient; however, it is recognised that the UK Inventory loses some credibility towards the end of each three yearly reporting cycle which may not support waste producers in the optimisation of their operations. This frequency may allow producers to undertake more ambitious inventory improvement projects. However, the opposite may also be true, in that less frequent reporting may lead to a loss of momentum/urgency for inventory improvement activities.	This option has proven to be deliverable and sustainable in the long term. It would not require any change to resourcing provided by the funding, delivery and waste producer organisations.	Not applicable.

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	Annually	Does not prevent the availability of a single, approved waste and materials inventory data set.	Exceeds the Council Directive 2011/70/EURATOM requirement for an inventory that is updated every three years and the proposed reporting cycle for IAEA/NEA/European Commission Status & Trends project. Frequency meets international annual reporting obligations for spent fuel and nuclear materials.	Increased frequency of data compilation for the UK Inventory would support the NDA in developing strategy and delivering its mission; however, benefits would need to be offset against additional resource demands across the estate and associated increases in contractor fees.	A UK Inventory produced on an annual basis may offer key stakeholders access to better, more accurate information for their needs. Note - Collecting and publishing UK Inventory data on a more frequent basis may attract an increase in stakeholder queries that will need to be managed.	This frequency of UK Inventory data compilation may help to optimise value from NDA information assets in alignment with the NDA Information Governance Strategy.	This option may better support waste producers in the optimisation of their operations. It would also provide the supply chain with more up to date information to help with waste management planning, and the development of products and services to support the mission. Benefits would need to be offset against potentially considerable additional resource demands across the estate and associated increases in contractor fees. This option may reduce the availability of resource to identify and implement inventory improvement activities between inventory cycles.	This option has the potential to be deliverable and sustainable in the long term; however, there would be a need to carefully consider whether the potentially considerable increases in resource and contractor costs could be accommodated to deliver real benefit. Should the inventory purpose remain as a reporting tool, delays in the production of one inventory could affect subsequent inventories. It may not be realistic to expect the non-NDA estate to provide data on radioactive waste on an annual basis as there is no obligation. For materials and spent fuel there is an annual reporting obligation.	Not applicable.
	Monthly	Does not prevent the availability of a single, approved waste and materials inventory data set.	Exceeds the Council Directive 2011/70/EURATOM requirement for an inventory that is updated every three years and the proposed reporting cycle for IAEA/NEA/European Commission Status & Trends project. Exceeds international annual reporting obligations for spent fuel and nuclear materials.	Increased frequency of data compilation for the UK Inventory would support the NDA in developing strategy and delivering its mission; however, benefits would need to be offset against additional resource demands across the estate and associated increases in contractor fees. It is not clear that a monthly UK inventory update would add significantly more value.	A UK Inventory produced on an annual basis may offer key stakeholders access to better, more accurate information for their needs. However, this option increases the likelihood of multiple, conflicting inventory data sets being available in the public domain. Note - Collecting and publishing UK Inventory data on a more frequent basis may attract an increase in stakeholder queries that will need to be managed.	This frequency of UK Inventory data compilation is a potential over-investment and may not optimise value from NDA information assets. As a result, this option would not align with the NDA Information Governance Strategy.	This frequency of UK Inventory data compilation is likely to lead to significantly increased resource use, which would inhibit waste producers in the optimisation of their operations. This may; however, encourage producers to improve the efficiency of their inventory data management approaches to support the increased demand for information. It is unclear what benefits this option would deliver to waste producers. This option may reduce the availability of resource to identify and implement inventory improvement activities between inventory cycles.	Producing a UK Inventory on a monthly basis is unlikely to be deliverable and sustainable in the long term due to significant additional resources required (e.g. for data compilation, checking, analysis and reporting). Should the inventory purpose remain as a reporting tool, delays in the production of one inventory could affect subsequent inventories. It may not be realistic to expect the non-NDA estate to provide data on a monthly basis as there is no formal reporting obligation.	Not applicable.

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA						
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term
<p>Differing timescales by waste category</p> <p>Although there are many potential options, the most likely scenario is HLW and ILW reporting on a three yearly basis and LLLW and VLLW reporting on a more frequent basis (most likely annually). The assessment has been made with this scenario in mind but acknowledges alternatives.</p>	<p>This option is likely to hinder the availability of a single, approved waste and materials inventory data set. Considering the proposed scenario, there would be years when data is only collected for LLW and VLLW (HLW and ILW data would need to be sourced from previous data collection exercise); to analyse the complete UK inventory data set, the user would need to source information from multiple inventory data collection exercises.</p>	<p>Depending upon the selected frequency of updates, this option may enable BEIS and UK to meet international reporting obligations for waste. With no proposed increase to spent fuel and nuclear materials reporting, this option will not enable NDA and BEIS to meet international reporting requirements.</p>	<p>In the scenario described, this option may provide sufficient data to support strategy development; however, this option is potentially in conflict with the NDA's drive for a more integrated waste management approach to waste management – the NDA wishes to 'place greater emphasis on the nature of wastes (radiological, chemical and physical properties) rather than the classification (e.g. ILW and LLW)⁵'</p> <p>Reducing the frequency of data collection may also hinder the NDA's ability to develop strategy and deliver its mission.</p>	<p>This option may provide sufficient information for some key stakeholders, but this would be dependent upon the timescales allocated to each waste category. If data collection frequency is reduced for a particular waste category, this may prevent sufficient information from being available. For example, if the reporting frequency for higher activity waste was reduced, this would inhibit RWM's ability to plan effectively and to respond to stakeholder queries. If the reporting frequency for LLW was increased, this may better support the supply chain in short term waste management planning.</p>	<p>Uncertain. This option may help to optimise value from NDA information assets in alignment with the NDA Information Governance Strategy, depending upon the proposed frequency of data compilation for each category.</p>	<p>This option may not support waste producers in the optimisation of their operations; this option does not encourage the identification of opportunities to improve the management of boundary level wastes. In the proposed scenario, it may also appear that 'priority' is given to the management of LLW, meaning that long-term opportunities for optimising operations for HAW (in particular those at the ILW/LLW boundary and those that are considered to be problematic) may be missed.</p>	<p>This option appears to be deliverable and sustainable in the long term (based on the proposed scenario), but this would be dependent upon the timescales allocated to each waste category.</p>	<p>Not applicable.</p>
	<p>Differing timescales based on timings of arisings</p> <p>Although there are many potential options, the most likely scenario is increased reporting for near term arisings (e.g. arising within next 20 years) and reduced reporting for long term arisings (e.g. arising in 20+ years time). The assessment has been made with this scenario in mind but acknowledges alternatives.</p>	<p>This option is likely to hinder the availability of a single, approved waste and materials inventory data set. Considering the proposed scenario, long term forecasts would be updated at a reduced frequency compared to near term arisings; to analyse the complete UK inventory data set, the user would need to source information from multiple inventory data collection exercises.</p>	<p>Depending upon the selected frequency of updates, this option may enable BEIS and UK to meet international reporting obligations for waste. With no proposed increase to spent fuel and nuclear materials reporting, this option will not enable NDA and BEIS to meet international reporting requirements.</p>	<p>This option does not support the NDA in developing strategy and planning for long term waste management, as significant changes in long term waste and materials forecasts may not be captured for many years. This option may encourage waste producers to neglect essential planning for long term arisings.</p>	<p>This option will not produce sufficient information for organisations, such as RWM and LLWR who are responsible for long term waste management planning activities.</p>	<p>Uncertain. This option may help to optimise value from NDA information assets in alignment with the NDA Information Governance Strategy, depending upon the proposed frequency of data compilation.</p>	<p>This option may not support waste producers in the optimisation of their operations. Changes in long term waste and materials forecasts may not be captured for many years. This option may also encourage producers to neglect essential planning for long term arisings.</p>	<p>This option appears to be deliverable and sustainable in the long term, but this would be dependent upon the timescales allocated.</p>

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
<p>Differing timescales for 1) radioactive waste, 2) spent fuel and nuclear materials, and 3) land contamination</p> <p>Although there are many potential options, the most likely scenario is three yearly reporting for waste and land contamination, and end of calendar year reporting for spent fuel and nuclear materials. The assessment has been made with this scenario in mind but acknowledges alternatives.</p>		<p>May hinder the availability of a single, approved waste and materials inventory data set.</p> <p>This option would; however, enable a full single waste data set, a full single materials data set and a full, single land contamination data set to be compiled. Other options (e.g. differing timescales based on waste category and based on timing of arisings) would not permit this.</p>	<p>Considering the proposed scenario, this option should enable BEIS and UK to meet international reporting obligations. This would depend upon the selected frequency of updates for each aspect. May meet international annual reporting obligations for spent fuel and nuclear materials.</p>	<p>Considering the proposed scenario, this option would support the NDA in developing strategy and delivering its mission. Simpler data collection exercises (i.e. for spent fuel, nuclear materials and land contamination) can be separated from the more complex waste data collection.</p> <p>(The ability of this option to support the NDA in developing strategy and delivering its mission would also depend upon proposed frequency of updates.)</p>	<p>It is expected that the proposed scenario would provide sufficient information for key stakeholders, but this is dependent upon the timescales. If data collection frequency is reduced for any element (i.e. to less often than three yearly updates), this would prevent sufficient information being available.</p>	<p>Uncertain. This option may help to optimise value from NDA information assets in alignment with the NDA Information Governance Strategy, depending upon the proposed frequency of data compilation for each aspect.</p>	<p>This option may support waste producers in the optimisation of their operations. Benefits would need to be offset against additional resource demands across the industry.</p>	<p>This option has the potential to be deliverable and sustainable in the long term; however, should the frequency of data collection for certain elements increase, there would be a need to carefully consider whether increases in resource and contractor costs (if applicable) could be accommodated to deliver real benefit.</p>	Not applicable.
<p>Ad-hoc</p> <p>Data collected on an ad-hoc basis when there is a clear user need.</p>		<p>Frequency may prevent the availability of a single, approved waste and materials inventory data set. Would depend upon frequency of data collection. This option introduces significant uncertainty.</p>	<p>Uncertain; depends upon selected frequency of updates.</p>	<p>This option introduces significant uncertainty, which may inhibit the NDA's ability to develop strategy and (if updates are infrequent) may lead to a loss of key inventory management skills required for NDA to deliver its mission.</p> <p>This option also makes it challenging for the funder to plan expenditure.</p>	<p>This option introduces significant uncertainty. It is unclear whether ad hoc updates may lead to more or less frequent inventory updates, and whether this would meet stakeholder needs; however, the uncertain timescales would inhibit stakeholders' ability to plan.</p>	<p>This option may support the NDA by investing in information updates only when required to support NDA in delivering its mission; however, it is unclear whether this option would lead to more frequent or less frequent data compilation and whether this would help to optimise value from NDA information assets.</p>	<p>This option introduces significant uncertainty and prevents producers from planning effectively.</p> <p>This option may also damage stakeholder relationships (for example, who determines when the inventory should be updated? What factors are considered to be significant enough to instigate an update?).</p>	<p>The ad-hoc nature of this option introduces uncertainty. This means that waste producers are unable to plan effectively and reduces the likelihood of this option being deliverable.</p>	Not applicable.

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	<p>'Live'</p> <p>In this scenario, it is proposed that live reporting is undertaken through a central inventory tool that all sites use for their inventory management arrangements.</p>	<p>This option increases the risk of multiple, conflicting inventory data sets being circulated.</p>	<p>This option would enable BEIS and the UK to meet international reporting requirements, should the 'live' system enable formal approvals and data extracts on a minimum of an annual basis for spent fuel and nuclear materials, and three yearly basis for waste. It is likely that a separate process would be required to extract data for international reporting purposes; this may be automated or manual.</p>	<p>This option may support delivery of the NDA mission by repositioning the inventory as central to business operations and offering the opportunity to access up to date information when required; however, there is a risk that this option will consume greater resource (continual approvals for external stakeholder use) and lead to multiple, conflicting data sets that may hinder the NDA's ability to plan and deliver our mission effectively.</p> <p>Offers the potential to reduce reliance on an inventory contractor to compile data if the 'live' system is established correctly.</p>	<p>This option may support stakeholders in having access to up-to-date inventory data on an 'as required' basis; however, the risk of multiple, conflicting inventory data sets being used creates challenges for stakeholders, leading to uncertainty over which inventory data should be used.</p>	<p>This option may not optimise value from NDA knowledge and information assets. Significant resource will be required to implement and maintain an inventory that is suitable for external stakeholder use on an 'as required' basis.</p>	<p>This option may support waste producers by raising the profile of effective inventory management, improving the efficiency of data compilation/extraction and repositioning the inventory as central to business operations; however, there is a risk that this option will consume greater resource (continual approvals for external stakeholder use) and lead to multiple, conflicting data sets that may hinder waste producers in planning activities.</p> <p>There may be conflicting interests for inventory software development (i.e. what is required for operational purposes and what is required for reporting purposes).</p> <p>Many sites have already invested heavily in inventory management software packages (and training) that meets their specific operational needs. A roll out of a replacement would not necessarily be an efficient use of resource, particularly for sites that are nearing Care and Maintenance or the end of their decommissioning programmes.</p>	<p>A genuinely 'live' inventory system is not a realistic possibility, primarily because of the lack of ability to capture waste data as waste arises and the subsequent lag between waste arising and data reporting, data input and quality assurance. Inventory data sets can only represent a snapshot at a specific point in time, and so it may only be possible to generate 'semi-live' data sets (e.g. inventory data is reviewed and approved for wider use at frequent, defined intervals such as weekly updates).</p> <p>A 'semi-live' option would still require a robust software solution, allowing waste producers to report in to (or use) a single inventory management system; this is likely to be a high cost option (either by enabling different inventory management tools to interface with a new central reporting system or by rolling out a single, new inventory management system across all sites) and is likely to be undeliverable.</p> <p>The NDA may be in a position to require NDA estate sites to use a prescribed inventory management tool, but this is not the case for non-NDA estate waste producers.</p>	<p>Not applicable.</p>

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
Scope	Maintain existing scope	Option does not prevent the availability of a single, approved waste and materials inventory data set, but it is recognised that the current scope does not capture all radioactive wastes from other industries (currently outside of NDA remit).	This option currently enables BEIS and the UK to meet international reporting requirements.	This option currently supports the NDA in developing strategy and delivering its mission.	This option currently provides sufficient information to meet the majority of key stakeholder needs; however, it is recognised that there is a need to regularly review end user requirements to reflect changes in operational and regulatory needs, and to ensure that data collected is still required.	Option is not in conflict with NDA Information Governance Strategy.	This option can support waste producers in optimising their operations, should the data be used effectively.	This option has proven to be deliverable and sustainable in the long term.	Not applicable.
	Widen scope	Option does not prevent the availability of a single, approved waste and materials inventory data set; however, certain options may be simpler to adopt than others (e.g. inclusion of NORM would represent a much bigger challenge to ensure alignment due to the need to engage, build relationships and set expectations within a new sector).	This option would enable BEIS and the UK to meet international reporting requirements.	This option may offer benefits in supporting the NDA in developing strategy and delivering its mission (dependent upon the proposed scope change). Options to widen scope would need to be assessed on a case by case basis.	Widening scope provides an opportunity to meet a wider range of key stakeholder needs.	Uncertain. Dependent upon the proposed scope increase; wide scope increases may be in conflict with the objective of 'investing only in that which needs to be retained to deliver the NDA's mission'. For wide scope increases, additional funding and/or resource may need to be sourced from relevant sponsors.	Uncertain. Options for widening scope could help waste producers in optimising their operations (e.g. partnering with businesses producing similar waste types regardless of industry). However, this would need to be assessed on a case by case basis, considering the specific scope change proposed. Any proposal to increase data collection must be in response to a clear user need.	Uncertain. Dependent upon the proposed scope change. Incremental scope changes (e.g. collecting more data about existing waste types) may be more deliverable than large step changes where significant investments (time and funding) and leadership outside of the NDA may be required. Large, diverse scopes of work may be difficult to contract (should a third party be selected to deliver).	Not applicable.
	Reduce scope (in terms of data collected)	This option does not prevent the availability of a single, approved waste and materials inventory data set.	Depends on extent of scope reduction.	Depends on extent of scope reduction. Current scope has been developed to meet identified stakeholder needs, including the NDA. Reducing the scope may hinder the NDA's ability to develop strategy and deliver its mission.	Unlikely to provide sufficient information to meet stakeholder needs; a major review of data fields was conducted for the 2016 UK Inventory to identify end users for all data fields – cutting scope would lead to key stakeholder needs not being met.	Option is not in conflict with NDA Information Governance Strategy.	This option may not support waste producers in the optimisation of their operations.	This option is likely to be deliverable in the long term but may not be sustainable; reducing the scope would mean that certain stakeholders would not have access to information that they require.	Not applicable.

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Strategic Option (with comments as appropriate)		SCREENING CRITERIA							
		Availability of a single, approved radioactive waste and materials inventory data set	Enable BEIS and the UK to meet international reporting requirements	Support the NDA in developing strategy and delivering its mission	Provide sufficient, accessible information suitable for use by our key stakeholders	Align with the NDA Information Governance Strategy	Support producers in the optimisation of their operations	Deliverable and sustainable over the long term	Enable the identified organisations to operate within their remit
	<p>Split scope Manage inventory data collection for 1) radioactive waste, 2) spent fuel and nuclear materials, and 3) land contamination, as separate exercises.</p>	<p>A single, approved radioactive waste and materials inventory data set may not be available if timings for data collection then differ based on the scope (linked to frequency).</p>	<p>This option would enable BEIS and the UK to meet international reporting requirements, should waste and materials inventory data be updated on a minimum three yearly basis. It would be advisable for timescales to coincide for three yearly reporting.</p>	<p>This option may support the NDA in developing strategy and delivering its mission. If contractors are appointed, this allows each package to be contracted with appropriate supply chain organisations. Option also allows flexibility to increase the frequency of reporting for different aspects of scope (rather than the full scope), if beneficial.</p>	<p>This option is likely to provide sufficient, accessible information suitable for use by key stakeholders.</p>	<p>Option is not in conflict with NDA Information Governance Strategy.</p>	<p>This option can support waste producers in optimising their operations, should the data be used effectively.</p>	<p>This option is likely to be deliverable and sustainable in the long term. This option only delivers real benefit if the different aspects are produced on differing timescales or if it is perceived that using different contractors for each element would deliver benefit. This option does introduce increased costs in terms of funder administration of multiple procurement processes.</p>	<p>Not applicable.</p>

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Appendix 6 Arrangements for shortlisted credible options

Option 1 - Change to frequency	
Purpose	Reporting tool
Funder	BEIS & NDA
Delivery org.	Third party managed by NDA
Frequency	Annually
Scope	Maintain existing scope
Commercial arrangements	Third party contractor will be appointed through an NDA estate managed framework/open tender (as appropriate). Third party contractor will invoice the NDA. NDA will invoice BEIS for 50% of third party costs (costs associated with NDA staff time managing the contract are excluded).
Financial arrangements	Costs of data compilation and submission funded by waste producers. NDA funds NDA staff time associated with contract management. There will be increased costs associated with contract set-up/contractor management. Third party costs funded by BEIS and the NDA on a 50:50 basis.
Management arrangements	NDA waste producers will submit data as required by their Client Specifications (no changes required). Non-NDA waste producers will continue to submit data on a voluntary basis. NDA will manage the third party contractor through contract.
Comments	It is expected that continual improvement activities will be supported by the National Inventory Forum.

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Option 2 - Change to funder and frequency	
Purpose	Reporting tool
Funder	NDA
Delivery org.	Third party managed by NDA
Frequency	Annually
Scope	Maintain existing scope
Commercial arrangements	Third party contractor will be appointed through an NDA estate managed framework/open tender (as appropriate). Third party contractor will invoice the NDA. NDA will fund all third party costs.
Financial arrangements	Costs of data compilation and submission funded by waste producers. NDA funds NDA staff time associated with contract management. There will be increased costs associated with contract set-up/contractor management. NDA funds third party costs.
Management arrangements	NDA waste producers will submit data as required by their Client Specifications. Although no change to the Client Specifications is required, sites will need to be formally notified of the increase in frequency for UK Inventory data requests. Non-NDA waste producers will continue to submit data on a voluntary basis. NDA will manage the third party contractor through contract.
Comments	It is expected that continual improvement activities will be supported by the National Inventory Forum.

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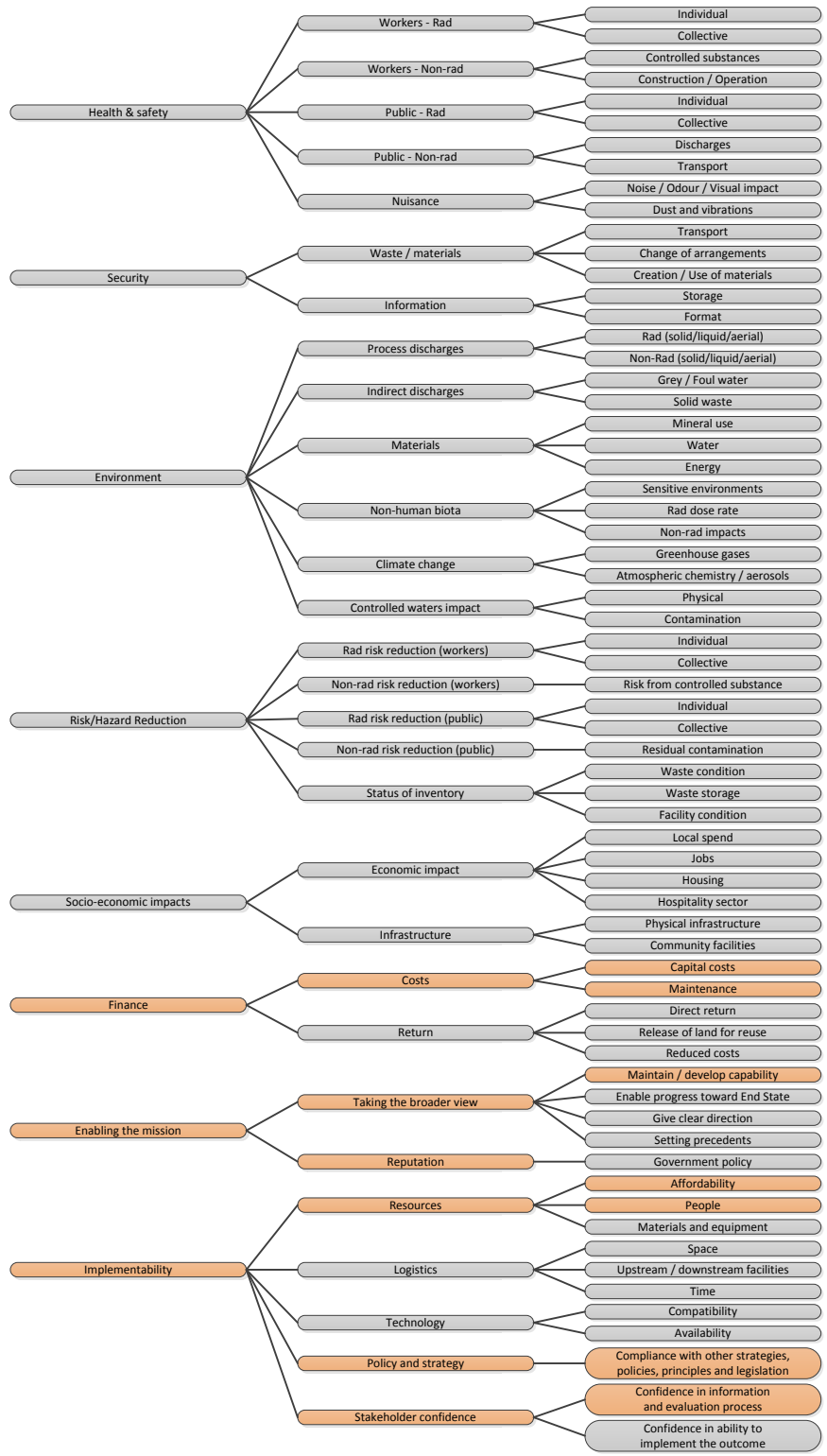
Option 3 – Change to frequency and splitting of scope	
Purpose	Reporting tool
Funder	BEIS & NDA
Delivery org.	Third party managed by NDA
Frequency	Differing timescales for 1) radioactive waste, 2) spent fuel and nuclear materials, and 3) land contamination
Scope	Split scope
Commercial arrangements	<p>Third party contractor/s will be appointed through an NDA estate managed framework/open tender (as appropriate).</p> <p>Third party contractor will invoice the NDA.</p> <p>NDA will invoice BEIS for 50% of third party costs (costs associated with NDA staff time managing the contract are excluded).</p> <p>This reflects current commercial arrangements.</p>
Financial arrangements	<p>Costs of data compilation and submission funded by waste producers.</p> <p>NDA funds NDA staff time associated with contract management. There will be increased costs associated with contract set-up/contractor management, particularly if separate contractors used for each element of work.</p> <p>Third party costs funded by BEIS and the NDA on a 50:50 basis.</p>
Management arrangements	<p>NDA waste producers will submit data as required by their Client Specifications (no changes required).</p> <p>Non-NDA waste producers will continue to submit data on a voluntary basis.</p> <p>NDA will manage the third party contractor through contract.</p>
Comments	It is expected that continual improvement activities will be supported by the National Inventory Forum.

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Option 4 – Change to funder, frequency and splitting of scope	
Purpose	Reporting tool
Funder	NDA
Delivery org.	Third party managed by NDA
Frequency	Differing timescales for 1) radioactive waste, 2) spent fuel and nuclear materials, and 3) land contamination
Scope	Split scope
Commercial arrangements	<p>Third party contractor/s will be appointed through an NDA estate managed framework/open tender (as appropriate).</p> <p>Third party contractor will invoice the NDA.</p> <p>NDA will invoice BEIS for 50% of third party costs (costs associated with NDA staff time managing the contract are excluded).</p> <p>This reflects current commercial arrangements.</p>
Financial arrangements	<p>Costs of data compilation and submission funded by waste producers.</p> <p>NDA funds NDA staff time associated with contract management. There will be increased costs associated with contract set-up/contractor management, particularly if separate contractors used for each element of work.</p> <p>Third party costs funded the NDA.</p>
Management arrangements	<p>NDA waste producers will submit data as required by their Client Specifications (no changes required).</p> <p>Non-NDA waste producers will continue to submit data on a voluntary basis.</p> <p>NDA will manage the third party contractor through contract.</p>
Comments	It is expected that continual improvement activities will be supported by the National Inventory Forum.

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Appendix 7 NDA value framework - relevant attributes



Those attributes highlighted in orange are those considered to be particularly pertinent and have been assessed during the development of this strategy. Those in grey have not been assessed as part of this strategy.