



# Nuclear Waste Services Annual Review 2021-22

Safe, sooner



Nuclear Waste  
Services

*As part of the wider NDA group, we can better integrate planning, change and delivery to make the best use of finite public funds.*

# Chair's Statement

By NWS Independent Chair Adrienne Kelbie CBE

## Introducing NWS

I am honoured to have been chosen as the first Chair of Nuclear Waste Services (NWS), which was formed in January 2022. This year marks the start of an exciting and challenging journey, which will set the tone for our direction over the next decades.

A division of the Nuclear Decommissioning Authority (NDA) group, we, at NWS, have the purpose, professionalism, and passion to deliver Government policy to safely manage the UK's nuclear waste innovatively and sustainably. In short, we want to help decommission the country's historical nuclear facilities so that they are safe, sooner. As part of the wider NDA group, we can better integrate planning, change and delivery to make the best use of finite public funds. No doubt some tough choices will be required, and it is key that NWS can demonstrate its vision for change so as to influence those choices.

By working inclusively to become a coherent organisation we can and will – with NDA support – tackle old problems with new thinking, and help turn a past liability into a future asset.

## Our people

NWS comprises three teams – the team from Low Level Waste Repository Limited (LLWR), which manages the Low Level Waste Repository, Radioactive Waste Management Limited (RWM), which is working to deliver geological disposal, and the team managing the Integrated Waste Management Programme (IWMP). Their expertise spans many areas such as nuclear science, engineering, and community engagement, backed up with corporate enabling functions, and NDA support.



**Adrienne Kelbie CBE**  
Independent Chair  
Nuclear Waste Services



A key part of the team is our Board. In addition to me, as the Independent Chair, this comprises three independent non-executive directors, two NDA-nominated non-executive directors, and four executive directors. I am most grateful for their excellent support, as I am to our highly capable Chief Executive, Corhyn Parr, who has acted as Chief Executive designate since July 2021.

But our team goes wider. NWS's role in the wider NDA family provides access to specialist shared resources, a wide-ranging archive of information and first-class knowledge and expertise. Together, this 'corporate spine' offers greater alignment and strength across the four operating divisions, and should benefit the public by offering greater value for money.

I have thoroughly enjoyed meeting and learning from so many of the team already, and engaging with wider NDA group stakeholders. They are keen to bring an open-minded approach to shaping how we work, develop each other, and use our collective knowledge to nurture the best team possible.

This said, from personal experience, I understand how challenging it can be to bring together different legacy organisations, and to navigate the intricacies of working in a wider group where individual drivers cannot always be wholly aligned.

We will need to develop new ways of working which focus on maintaining operational stability while leading change in every area. This is a key leadership challenge not just for the Board and for the

Executive, but for the whole NWS staff – and we are well placed to make huge strides in this over the next few years.

I am clear that our focus cannot be solely on processes, targets, and quotas. It must also be on creating a culture which demonstrates openness, harnesses creativity, and trusts and holds people to account to do their jobs to the best of their abilities.

***This year, we'll work collaboratively with governments, partners in the supply chain, and community stakeholders to assess how we can make Britain safe, sooner – and at less cost.***

## Safe, sooner

Last year's operating environment was not easy. We have all had to deal with the impacts of COVID-19, and I'm particularly proud that we maintained an enviable safety record.

We also achieved other significant progress: the saving of taxpayers millions of pounds by providing advice and guidance to waste producers; active engagement with four communities about hosting a Geological Disposal Facility (GDF); and innovative projects to sustainably manage radioactive waste.

This year, we'll work collaboratively with governments, partners in the supply chain, and community stakeholders to assess how we can make Britain safe, sooner – and at less cost.

I'm particularly looking forward to working with the NWS Board and the NDA Group Chairs to explore potential options and solutions for how the NDA could deal with radioactive waste management, and jointly secure investment to achieve this vision.

Thank you for your interest in Nuclear Waste Services. If you'd like to offer feedback or ideas about this report, or any other element of our work, please get in touch at [nuclearwasteservices@nda.gov.uk](mailto:nuclearwasteservices@nda.gov.uk).

With best wishes,  
**Adrienne Kelbie CBE**  
Independent Chair

# Chief Executive's Review

By NWS Chief Executive Corhyn Parr



**Corhyn Parr**  
Chief Executive  
Nuclear Waste Services

## Stronger, combined

I'm thrilled and proud to be leading NWS at such an exciting time, not just in the UK but also globally where we are seeing real innovation and progress in the safe and secure management of nuclear waste.

NWS is part of the NDA group and brings together the expertise of LLWR, which manages the LLW Repository site in west Cumbria and associated range of services, RWM, which is responsible for delivering the GDF Programme, as well as the NDA's Integrated Waste Management Programme (IWMP), which looks across all activities and explores innovative approaches to managing nuclear waste.



Industry



Powerplant



Research



Medicine



Defence



Reprocessing

**1,318**  
radioactive  
waste streams<sup>1</sup>

<sup>1</sup> UK Radioactive Waste Inventory 2019

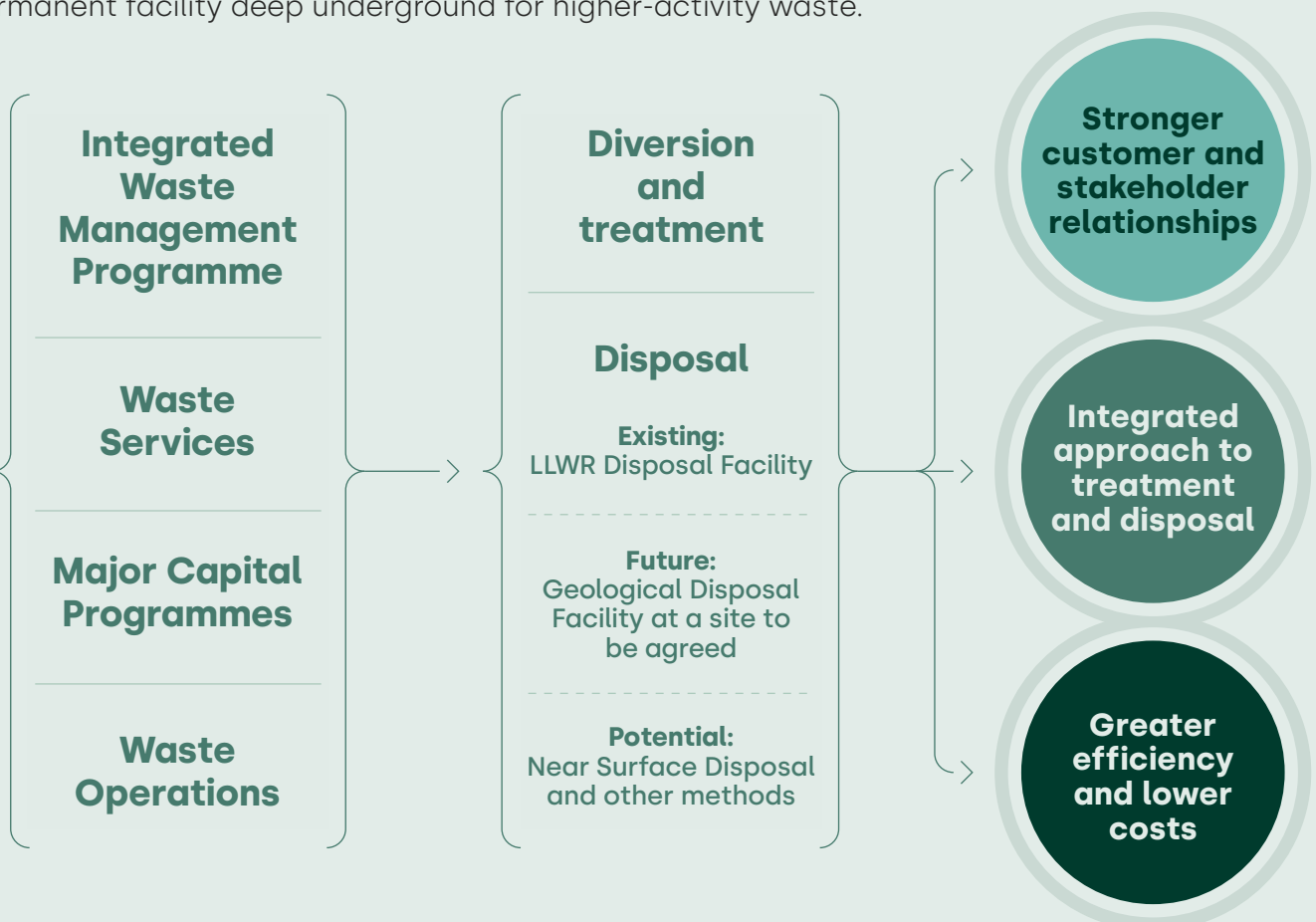
Our mission is fundamental to the UK nuclear decommissioning journey: there are more than 4 million cubic metres of waste still to be recovered and treated, comprising more than 1,300 different streams of radioactive waste.

Coming together combines our strengths and creativity, enabling us to provide better answers to these challenges than was possible as individual organisations.

The expertise of NWS is central to ensuring we protect people and the environment both now and for thousands of years into the future.

***"Coming together combines our strengths and creativity, enabling us to provide better answers to these challenges than was possible as individual organisations."***

As separate organisations, we have, for decades, been delivering a whole range of services in the radioactive waste management sector. This includes advising on treatment and packaging, to providing more sustainable disposal options for lower-activity waste, as well as working on one of the most significant environmental and infrastructure programmes the UK has seen: a permanent facility deep underground for higher-activity waste.



Our goal is to achieve greater efficiency, improved sustainability, greater speed, and reduced costs. We'll do this by harnessing our combined expertise to think differently about waste, enabling a more flexible approach to managing all waste streams in the long term. This will all be undertaken while maintaining the required high standards of safety, security, and environmental protection.

## Our work

The NWS transition is now well under way and it's a testament to every member of every team that we're embracing change while performing at the highest level across all our functions.

Shaping a new business from the outset also allows us a sense of freedom to revisit and dismantle our previous assumptions, to challenge long-established ways of working in waste management, and to start thinking differently.

Through this approach, we're aiming to provide an enhanced and more flexible service to customers, redrawing the boundaries between waste consignors and waste organisations, collaborating to address challenges, and leading across the whole UK waste landscape.

Our work covers four key areas:

- Integrated Waste Management Programme, which promotes innovation and efficiencies in new waste management capability and identifies opportunities to manage waste better.
- Waste Services, which provides waste management services and solutions to customers throughout the UK, covering the full waste lifecycle.
- Waste Operations, which manages and operates the national Low Level Waste Repository in Cumbria.
- Major Capital Programmes, which delivers large-scale capital projects, starting with siting and construction of the UK's Geological Disposal Facility Infrastructure.





## Achievements and progress

Alongside the organisational transition, this past year (1 April 2021-31 March 2022) we have seen some extraordinary successes:

- An outstanding safety record – with zero reportable incidents at the LLW Repository Site throughout at very busy Covid impacted year.
- Real progress in the search for a suitable site and willing community for a GDF – with four search areas and community engagement in different parts of the country.
- Achieving multi-million pound savings through innovative management of nuclear waste, such as the treatment of plutonium-contaminated materials.

Looking ahead, we are focused on performance, efficiency, and delivering value for the taxpayer.

The next 12 months is about continuing to deliver, and making progress in transforming NWS into an organisation that can carry on delivering now and also building a new future. We will start to set out our plans, cementing our organisation as one team, and creating an ambitious strategy.

***“The next 12 months is about continuing to deliver, and making progress in transforming NWS into an organisation that can carry on delivering now and also building a new future.”***

# Year at a glance

## 3 teams become one: NWS



Completion of a £35 million multi-year Security Enhancement Programme at the LLWR site, including a new Site Emergency Control Centre.



## 4 GDF Community Partnerships

 **Mid Copeland**  
GDF Community Partnership

 **South Copeland**  
GDF Community Partnership

 **Allerdale**  
GDF Community Partnership  
Let's talk about geological disposal

 **Theddlethorpe**  
GDF Community Partnership

# £2.3

IWMP savings target across NDA group

# Billion

850 employees skills cover science, technology, engineering, safety, security, and community engagement.



# About Us

NWS is part of the NDA group, the non-departmental public body responsible for clean-up of the UK's historical nuclear sites.

At NWS, we specialise in managing and disposing of the radioactive waste produced from the nuclear technologies that have been part of our lives for more than 60 years and will continue to play a role in the UK's energy mix during the decades ahead.

Electricity generation, defence programmes, industrial, medical, and research activities have created an accumulated legacy of diverse waste materials that need careful management.

Looking ahead, we will also ensure the safe management of nuclear waste from the next generation of nuclear power stations that are set to be built as part of the UK Government's new Energy Security Strategy.

Our goal is to ensure that all this waste is managed safely and securely, through adopting more innovative and sustainable approaches to better protect people and the environment, both now and for the future.

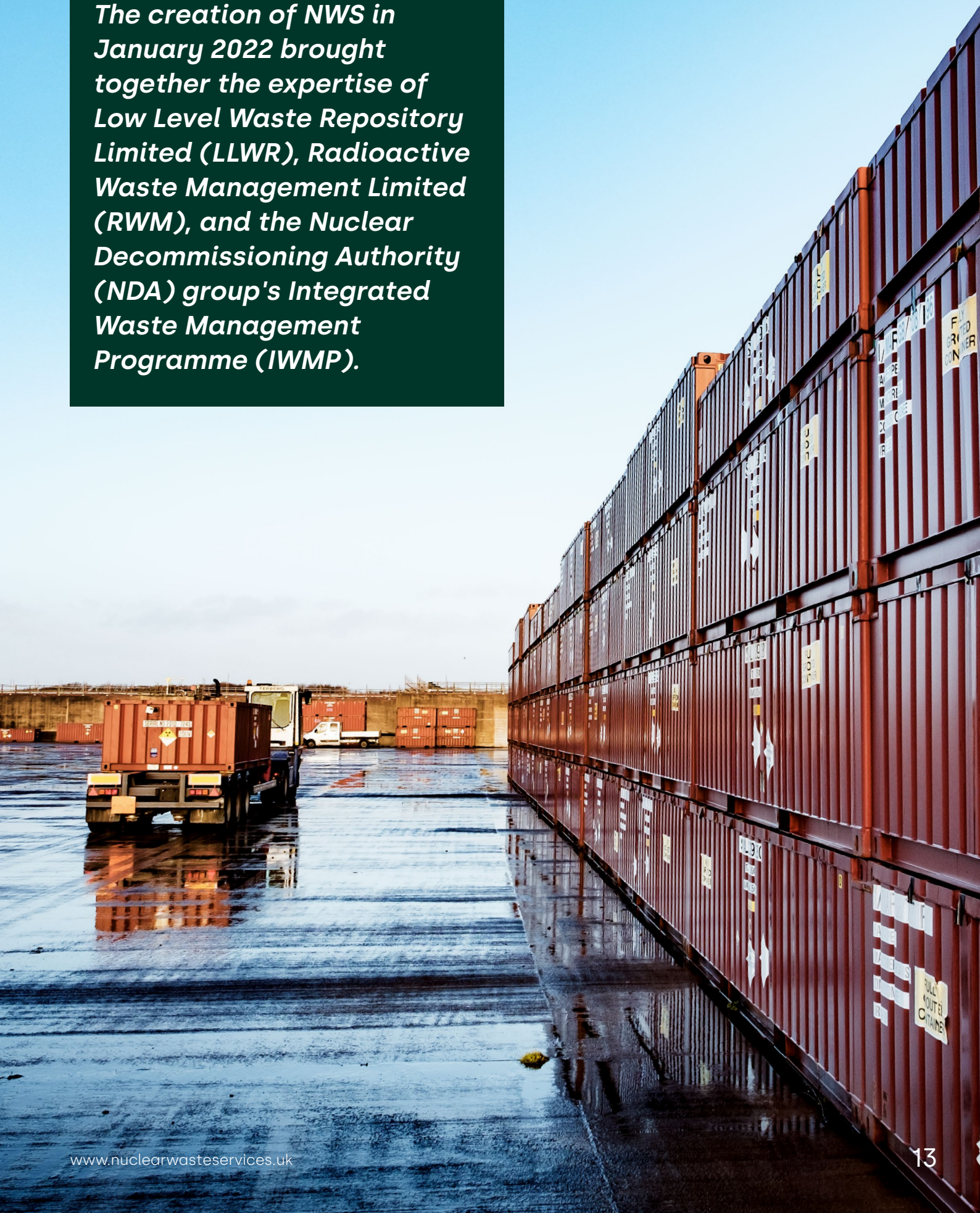
The creation of NWS in January 2022 brought together the expertise of LLWR, RWM, and the NDA group's IWMP.

As a combined and highly specialised business, we are focused on achieving enhanced efficiency, improved sustainability, greater speed, and reduced costs.

We're committed to working alongside UK waste producers to overcome a range of challenges and capitalise on the latest technological opportunities. We'll do this by harnessing our combined expertise to think differently about waste, enabling a more flexible approach to managing all waste streams in the long term.

This new approach is the responsibility of the Integrated Waste Management Programme within NWS, an initiative that spans the whole NDA group and the wider UK nuclear industry. Working collaboratively will be crucial for delivering our ambitions, which includes a £2.3 billion savings target across NDA group.

*The creation of NWS in January 2022 brought together the expertise of Low Level Waste Repository Limited (LLWR), Radioactive Waste Management Limited (RWM), and the Nuclear Decommissioning Authority (NDA) group's Integrated Waste Management Programme (IWMP).*



We are already building on many years of innovative work by LLWR, where wide-ranging waste expertise and solutions have been developed for Low Level Waste (LLW), including characterisation, treatment, recycling, volume reduction, packaging, and disposal.

Today, waste is only disposed of at the LLW Repository site if it cannot be redirected to alternative and more sustainable treatments and disposal options. This marks a huge improvement and an environmental success over the last decade: in 2009, 98% of LLW was disposed of at the Repository but that figure is now reduced to just 2% as materials are diverted elsewhere, very often recycled and re-used.

One of our key responsibilities is to develop a GDF as a permanent solution for UK higher-activity radioactive wastes. At an estimated cost of £20-£53 billion, this represents one of the UK's largest environmental and infrastructure programmes.

Higher-activity wastes are longer lived and more hazardous than Low Level Waste (LLW), with some materials remaining radioactive for many thousands of years. These wastes require the safe, secure isolation of a facility built deep in a stable rock formation.

The search for a suitable site is based on consent from a willing community and includes a right to withdraw from the process right up until a test of public support.

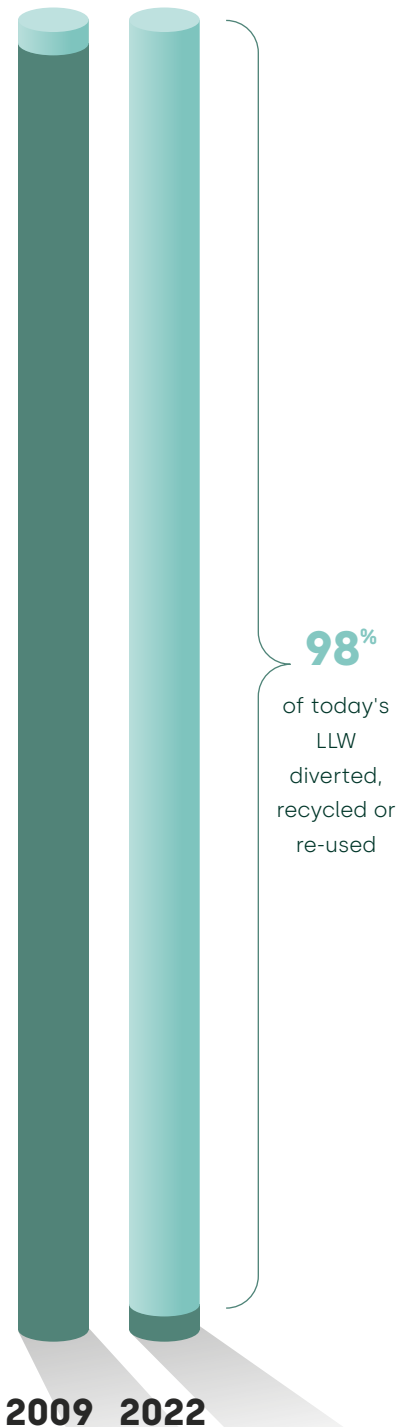
Our activities provide the endpoint in the nuclear journey and are critical to the NDA's environmental clean-up mission, the largest of its kind in Europe.

To support our activities, we also carry out wide-ranging research, often in collaboration with international partners and academic institutions, into all technical details of geological disposal and waste management. We aim to achieve world-leading environmental and safety standards supported by the best available technologies.

We're supported by a combined team of around 850 people whose skills cover nuclear science, technology, engineering, safety, security, programme management, environmental protection, and community.

We will grow significantly in the next few years as we work closely with partners in the nuclear industry, engineering, and construction sectors to deliver all our major programmes.

in 2009, 98% of LLW was disposed of at the Repository but that figure is now reduced to just 2% as materials are diverted elsewhere, very often recycled and re-used.



## Our vision

To secure a safer future for us all.

## Our mission

Protecting people and the environment by managing the UK's nuclear waste innovatively and sustainably.

## Our four core values

underpin how we conduct our business. They are ...



**Action orientated.**

We will deliver for our customers, communities, partners, safely and securely.



**Ambitious.**

We are problem solvers who embrace and act upon new challenges.



**Collaborative and inclusive.**

We have greater success when we work together.



**Acting with integrity.**

We can be trusted to build a safe, secure, and sustainable future.

# Our Corporate Strategy

We are developing a corporate strategy that will take us into the future. This will be published by the end of March 2023.

We are now one organisation, which opens opportunities for how we optimise waste management.

Our strategy will cover the full spectrum of radioactive wastes and set out how we will deliver our mission sooner and at less cost.

It will focus on how we will deliver high levels of performance and efficiencies; the development of our people, skills, and culture; and where we can achieve value for the NDA mission through new capabilities and services.

With our expert and holistic view of waste management, we'll be thinking differently about the best options. An integrated approach to our work will help ensure that we put the right waste in the right place, at the right time and at the right cost.

As a 'one-stop shop' for waste management, we'll be enablers for our waste partners, Sellafield, Magnox, and Dounreay, and other waste producers – either diverting or disposing of the waste they produce. We will work closely with our Nuclear Transport Solutions colleagues to act seamlessly in the transport of our waste.

As part of our approach, we'll identify and develop opportunities to manage waste better. We'll be looking at innovations in the way we treat and dispose of radioactive metals, developing a standardised approach to waste packaging, and supporting the NDA in exploring disposal options, such as near-surface disposal for final disposal of some less hazardous intermediate-level waste, recognising that a GDF will always be required for some higher-activity wastes.



## NWS Priorities

NWS is made up of four priority areas of work:

### Integrated Waste Management Programme

Developing new NDA-wide capability and opportunities as part of a broader integration programme to underpin a more joined-up approach to waste management across the UK.

### Waste Services

Working with customers across the UK to provide an extensive range of services, solutions, and equipment that address their waste management challenges. As well as providing expertise directly, we manage contracts and supply chain relationships across the waste lifecycle.

Managing and operating the LLW Repository nuclear licensed site and supporting our service offering. Focusing on safe, compliant, and effective waste management infrastructure, including design and construction of future disposal facilities on the site – and delivering the necessary closure engineering in accordance with the Environmental Safety Case.

Managing the delivery of large-scale capital projects, initially focused on a GDF. This GDF programme involves working with communities to find a suitable site and a willing community.

### Waste operations

### Major Capital Programmes

2021-22 year in review

# Integrated Waste Management Programme

Claire Gallery-Strong, NWS Director of Strategy and Integrated Waste Management Programme (IWMP), is leading the One Nuclear Decommissioning Authority (NDA) initiative to transform the approach to waste across all group businesses, as well as the wider nuclear industry.

Both radioactive and conventional materials form part of the Integrated Waste Management Programme (IWMP), which is being delivered by NWS as the single waste division, placing waste at the heart of the NDA's nuclear clean-up mission.

Our years of experience and expertise in treating, packaging, and disposing of radioactive waste mean NWS is ideally placed to drive forward the changes envisaged by IWMP.

By harnessing our expertise, growing our capability, and simplifying how we operate, we'll bring greater value to the taxpayer and transform waste management in the UK. Our work includes developing innovative treatments, packaging, and disposal solutions, leading to early hazard reduction and the most sustainable outcomes for the environment.

***"By harnessing our expertise, growing our capability, and simplifying how we operate, we'll bring greater value to the taxpayer and transform waste management in the UK."***

Claire Gallery-Strong describes some of the key areas of focus ahead, including a more efficient approach for waste packages and containers, exploring the development of near-surface disposal, and working with the industry to develop our focus on sustainability.

IWMP re-positions the whole of the waste lifecycle as a priority, bringing it to the forefront of our planning as an opportunity to excel, rather than a by-product of other activities.

## In Conversation with Claire Gallery-Strong

When the NDA committed to creating an integrated programme to deliver its 2019 Radioactive Waste Strategy, the ambition was to drive changes in overall approaches, including creating a culture that allows greater flexibility for waste producers to manage their waste more effectively and develop proportionate solutions.

The IWMP was established as the vehicle to implement the strategy, with identification and development of early activities, re-affirmed in the NDA's subsequent group-wide Strategy 4, published in 2021.

To achieve the IWMP vision, we laid out a 15-year roadmap with milestones in both the near term and longer term, plus an initial five-year plan.

The prioritisation of waste reflects the One NDA approach, which brought group businesses closer together and removed commercial barriers which had resulted in more individual site-focused strategies. Now, we're able to take a holistic full lifecycle view across the group and achieve greater flexibility and efficiency by fundamentally re-visiting how we've previously managed both conventional and radioactive waste.



Greater collaboration and integration are already breaking down barriers across our organisations, and with waste producers. Although we've dealt with waste for many years, it has moved centre-stage thanks to the NDA's progress in dismantling facilities at sites and Sellafield's transition from reprocessing to full-scale decommissioning, along with the Magnox rolling programme of decommissioning.

Establishing NWS is a logical step, uniting our waste expertise in a single organisation and as a longer-term enabler for the programme.

A number of projects are now under way, including how waste-focused career pathways can create a powerful, professional waste workforce, attracting talent, and growing the capability we need to deliver the decades of waste management yet to come.

Other projects define how we can implement an approach that reframes our perspective on waste to focus on the risk associated with the chemical and physical properties of the waste. We call this a 'risk informed' approach to waste management.

The prize is significant – Sellafield alone has identified that billions of pounds could be saved by managing waste differently over its lifecycle, without compromising safety.



## The 2021-22 focus:

- **Packages and containers:** We're working with colleagues in the NDA's specialist transport business, Nuclear Transport Solutions (NTS), to co-ordinate activity and determine the most effective way to achieve future efficiencies. Our approach to packages and containers is a key focus, particularly in standardising our containers and moving from multiple variants to a standard catalogue.
- **Waste characterisation:** Understanding waste properties is vital in planning treatment and disposal, and there's more we can do to enable early characterisation. We're assessing the benefits of making a group-wide 'mobile' capability available to different sites. We already use a range of characterisation techniques and are working on a pilot to test new assay (metal testing) techniques and deepen our understanding of the waste characteristics.
- **Boundary wastes:** In line with NDA Strategy 4 and recommendations made by the Committee on Radioactive Waste Management (CoRWM), we're exploring the potential concept of near-surface disposal as an option for final disposal of some less hazardous ILW, recognising that a GDF will always be required for some higher-activity waste.
- **Sustainability:** We're working in collaboration with the supply chain to determine what sustainability means for IWM and how we can secure the capabilities that are essential to delivering waste management well into the future.
- **Waste records:** Good, accurate information is essential to understanding waste and providing the most appropriate treatments or solution. Our Waste Records Programme involves working with the NDA group and the wider nuclear industry to ensure we find, organise, and keep the right information about waste and packages. We're also working with the NDA specialist archive (Nucleus) where the records will remain protected for the future and easy to access.

There are so many exciting innovations in the pipeline, including thermal treatment for some wastes to reduce volumes and packaging requirements, new forms of encapsulation, or dispensing with cement entirely. These innovations could be game-changing for the industry.

## Thermal treatment case study

We're developing plans for three pilot facilities at Sellafield, where some types of higher activity wastes will undergo thermal treatment, and hope the first could start operating from 2023/24. These would cover plutonium-contaminated material (PCM), Intermediate Level Waste (ILW) sludges, and a range of mixed wastes.

We currently manage most of our higher-activity waste through tried and tested techniques such as encapsulation in cement-based grout. However, this approach has challenges and leads to an increase in the volume of packaged waste to manage, store and eventually dispose of. For example, a 500-litre drum of encapsulated sludge might include just 25 litres of radioactive material.

Thermal treatment could significantly reduce such volumes, reducing the need for storage and disposal, while also leading to major cost savings. Ultimately, this means less waste to manage.

The new £100 million thermal treatment programme now being developed could deliver £multi-billion lifetime savings across the NDA group.

Thermal treatment technologies apply high temperatures to waste to destroy reactive components, reduce overall volumes, and produce a stable waste form.

Technical investigations first began in 2005, along with strategic and economic analysis, leading to the start of trials 10 years later as part of NDA's Research and Development portfolio. Now, a Sellafield team evaluated implementation of thermal treatment technology in 2019 and developed an understanding of the capability that is required and the best way to deliver that, to achieve the strategic and economic benefit.

David Connolly has recently joined the team as Head of the thermal treatment programme. He said:

"This could be the most exciting technological innovation at Sellafield in a generation, potentially seeing a new treatment method become routine.

"We're delivering this programme on behalf of the NDA and the country as a whole. Our plan is to develop the technology and also the skills, mindset and capability required to succeed in a new method of waste treatment."

***"Thermal treatment could significantly reduce such volumes, reducing the need for storage and disposal, while also leading to major cost savings."***



## 2021-22 year in review

# Waste Services

Chief Operating Officer Martin Walkingshaw is responsible for waste services at NWS, working hand-in-hand with waste operations, and overseeing the wide-ranging services provided to customers who generate radioactive waste through their businesses. These include operators of the current fleet of nuclear power stations and NDA group sites, as well as defence, medical and research clients.



## In conversation with Martin Walkingshaw

### A 'one-stop' shop

Our wide-ranging services for all producers of radioactive waste are an important element in the country's nuclear infrastructure. We provide advice and treatment or disposal options to decommissioning sites, operating nuclear power stations, defence, medicine, and research industries – in fact, wherever radioactive waste is produced.

Our remit has expanded over the last decade in support of the Government policy which emphasises the waste hierarchy, with disposal at the LLW Repository site now the last resort after other treatments have been explored. The aim is to divert waste to more environmentally sustainable options wherever possible, such as recycling of contaminated metals which we achieve through a variety of means, including chemical treatment, abrasive surface treatment, and metal melting. The radioactive contamination removed by these processes is packaged and sent to the Repository for disposal, the clean metal is then recycled.







Our 'one-stop' service takes care of everything, from advice through to waste characterisation support and selecting the right packaging. We offer integrated transport services, together with treatments that range from metallic waste recycling, super-compaction, and incineration, to disposal in specially licensed landfill sites or our Repository.

We work closely with customers on packaging, with a range of containers for wastes including those that are re-usable, while our site teams provide inspection and maintenance for those packages. The pace is intense and our phones ring daily with new customer projects to support, which is exactly how we like it.

***"The aim is to divert waste to more environmentally sustainable options wherever possible, such as recycling of contaminated metals."***

### 2021-22 key highlights:

- The first consignment of drums from the Treatable Radwaste Store (TRS) at the Winfrith site in Dorset has arrived at the repository site. These stainless-steel drums, each weighing around a tonne, contain waste from one of the research site's experimental reactors, originally stored as Intermediate Level Waste (ILW) while awaiting transfer to Harwell's ILW store. However, because the radioactivity has decayed, Magnox Ltd and NWS were able to demonstrate that the drums could be safely reclassified to Low Level Waste which allows for early disposal at the Repository and generates significant financial savings to the UK taxpayer. The project, which has been several years in the planning, is a prime example of working in co-operation across the NDA group and with suppliers, safely enabling an early, fit-for-purpose transport and disposal solution that supports ongoing decommissioning at Winfrith.

As the Magnox team continues to retrieve drums from Winfrith, we'll be preparing for the first emplacements of these drums in our own Vault 8, an engineered disposal facility, later this year, using otherwise unusable space and reducing the amount of infill material needed to close it. We will also be applying the learning from the first deliveries to successive transports, continually building and improving our knowledge for the future.

- Our metallic waste treatment service has provided for the recycling of decontaminated pipework from the Harwell nuclear site. The process, a proven technology commonly used in the oil and gas industries, was specially adapted for our purposes, and involved ultra-high pressure water jetting via Augean Ltd's Port Clarence Facility. This enabled the cleaning of 1.2 tonne sections of pipework contaminated with low levels of radioactive scale. Harwell was storing the pipeline sections excavated from its offsite discharge route, pending treatment and disposal. Quantities of waste that would otherwise need consignment to the LLW Repository were drastically reduced, generating multi-million pound savings to the UK taxpayer.

We're also working closely with the Integrated Waste Management Programme (IWMP) to ensure that the opportunities being identified become part of our service offering as soon as possible. The IWMP operates across the entire NDA group and UK nuclear industries, so we're looking at considerable opportunities to grow our capability both within the site and in services for customers.

## Recycling of Multi-Element Bottles case study

*By Senior Waste Services Consultant and Relationship Manager Laura Dixon*

We've been working with Sellafield Ltd for a number of years to manage the recycling of large stainless-steel 'bottles' which held spent Advanced Gas-cooled Reactor (AGR) fuel assemblies arriving at the site for reprocessing.

Multi-Element Bottles (MEBs), each weighing around three tonnes, were transported over a period of decades to Sellafield's Thermal Oxide Reprocessing Plant (THORP) from customers in the UK and overseas, allowing the spent fuel to be reprocessed.

Once at Sellafield, the MEBs were transferred to a THORP storage pond and emptied of fuel. The MEBs, which vary in weight and design, then had water removed, and were placed in half-height International Standard Organisation (ISO) containers and moved on to an on-site store.

Sellafield needed a treatment and disposal route, to free up storage space and provide a reliable long-term solution for the UK's AGR Operating Plan, ensuring that the UK's remaining nuclear power stations can continue to send spent fuel to Sellafield for storage now that the reprocessing has ceased. In total, around 1,000 of these multi-element bottles require treatment.

***"This process maximises metals recycling and diverts a further population of waste away from the LLW Repository."***

Our waste services team ran a competitive procurement process under our highly successful Metallic Waste Treatment Services Framework and contracted with Cyclife Ltd, who provide specialist waste management across the UK and Europe.

At the company's Cumbria facility, 120 MEBs will be sorted, segregated, and treated by shot-blasting to remove surface contamination before some of the waste is sent onto their Swedish facility for further recycling via melting. Treatment residues are consigned to Low Level Waste Repository (LLWR) for disposal. This process maximises metals recycling and diverts a further population of waste away from the LLW Repository.

The latest programme for treatment of the 120 MEBs will run over three years and we will be working with Sellafield to define the scope for treatment of the remaining MEBs when they become available.

2021-22 year in review

# Waste Operations

Chief Operating Officer Martin Walkingshaw is also responsible for operations at the UK's Low Level Waste (LLW) Repository site in Cumbria.

Waste operations are focused on the LLW Repository nuclear licensed site itself and on ensuring safe, compliant, and effective management of materials needing disposal in the engineered vaults. The site is a unique national facility that began receiving waste for disposal in 1959 and will continue to support UK customers until at least the year 2130, when the final stages of decommissioning at Sellafield are planned to be complete.

In the last 12 years, increasing quantities have been managed more sustainably, through alternative options such as re-use, recycling, decontamination, combustion, and specialised landfill for some waste with the very lowest levels of radioactivity. This has increased confidence that the site can comfortably accommodate all the lower activity waste forecast to be generated so attention is shifting towards making use of the site for a wider range of waste and carrying out new activities to support the NDA's mission.

## In conversation with Martin Walkingshaw

### A time of change

It's been a hugely successful and transformative year for the team, as we've undergone two major transitions which inevitably placed additional workload and responsibility on people at all levels in the organisation.

First, LLW Repository Ltd, which was owned by a private-sector Parent Body Organisation under contract to the NDA, transferred into the group to become a wholly-owned subsidiary of the NDA. This was followed six months later, in January this year, by the launch of NWS which brought us together with RWM (and the NDA's IWMP) into a single organisation focused on managing UK radioactive waste safely and securely for generations to come. As NWS, we're now responsible for all categories of waste, bringing the benefits of all our shared expertise and the experience we've gained since LLWR was formed in April 2007.

As part of the wider NDA group, we play a critical role in one of the largest long-term nuclear clean-up programmes in the world. Our work covers all aspects of waste management – from initial safety, through optioneering, characterisation, packaging, transport, treatment, and disposal.

Staff from each organisation have worked collaboratively during these major transitions to ensure we've continued to deliver waste solutions, on schedule, while also maintaining our excellent record on nuclear and conventional safety, environmental performance, and security. Each transition is subject to regulatory scrutiny by the Office for Nuclear Regulation and the Environment Agency. We continue to work closely with our site inspectors and their colleagues as we further develop our NWS target operating model.

All of this took place under our COVID-19 response arrangements, and during a time of intense activity on the LLWR site as we continued to deliver our project work, operations, maintenance, and environmental programmes. I'm incredibly proud of these achievements, delivered by a team that has performed at the highest level throughout the year and with absolute commitment.

***"The LLWR site is a unique national facility that began receiving waste for disposal in 1959 and will continue to support UK customers until at least the year 2130."***

## 2021-22 key highlights:

### Continuing to deliver

At the LLW Repository site, we've come to the end of two major programmes in the last year.

After a journey stretching back to the 1990s, we're demolishing the last of the five WW2 era 'magazines' (concrete bunkers) where plutonium-contaminated material (PCM) from sites across the UK was stored from the 1960s onwards.

Following removal of the bulk of PCM to Sellafield during the 2000s, the magazines and the associated retrieval facilities built to facilitate PCM retrieval, size reduction, and repackaging needed a lengthy programme of remediation and decontamination.

Through a process of learning from experience and continuous improvement, we saved around four years from the original 10-year programme, reducing the cost of the work by £20 million from the original estimate of £100 million.

Notably, on this hazardous work, we also achieved 400,000 hours without a single lost-time accident. This achievement is simply immense, and is the result of close collaboration with our contractors, careful forward planning, and attention to detail.

We have also completed a series of major security enhancements and officially opened the site's new Site Emergency Control Centre (SECC). The work included a new perimeter security fence and a re-designed reception area to allow vehicle searches and visitor management before entry to the site's secure area.

## Safety first

Our Total Reportable Incident rate, or TRI, stands at zero at 31 March '22 – no incidents or accidents at all, across a rolling 12-month target.

This achievement comes at a busy time for us. We've just passed 300,000 hours on the Repository Development Programme (RDP), one of our major developments that will include construction of a final engineered cap over Vault 8 and adjacent section of the trench cap. As part of the RDP, we've been constructing roads, bridges and installing drainage, which involves heavy equipment and moving around large quantities of material. Trains are also constantly arriving loaded with aggregates to be unloaded and transported to different site locations.

This is also hazardous work, so achieving that safety milestone is excellent.

To reinforce our commitment to safety, we introduced a Perfect Day concept in 2015, an initiative that allows us to measure performance across a range of criteria, covering the fine detail of both operations and services. A Perfect Day is achieved only if everything goes to plan on any single day, no harm is suffered by anyone on the site, security is maintained, the environment is protected, and local community and stakeholders remain satisfied with our activities.

***"We've continued to deliver waste solutions, on schedule, while also maintaining our excellent record on nuclear safety and security."***





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## PCM drums case study

We've been proud to pioneer the UK's first use of ultra-sensitive new scanning equipment to identify radioactivity levels in sealed drums of material – and potentially save taxpayers £9 million.

The equipment is allowing us to more accurately analyse the content of drums containing wastes arising from our lengthy programme to decontaminate and clean up five plutonium-contaminated material (PCM) storage facilities. So far, around 1,000 drums have passed through the process, confirming that the vast majority are low-level waste, contrary to the initial assessment that they would be intermediate-level waste.

If still classed as Intermediate Level Waste (ILW), the drums would be transported to Sellafield for processing and interim storage until eventual disposal in a GDF, at a full cost of £12-£14 million. However, because we now know they are Low Level Waste (LLW) this means the drums can be processed for vault disposal at our repository site, reducing the cost to around £3-£4 million.

The drums contain a diverse range of wastes including personal protective equipment, machine parts, lighting, and other items contaminated during their use on the PCM Programme.

The new process was introduced through a collaborative effort within the business and our supply chain partners to take advantage of technological advances to reassess the radiological content of the waste.

Simon Martin, Head of Infrastructure for Waste Operations and Waste Services, said: "This project is a testbed opportunity for innovation and new technology, and it is valuable work for the NDA estate and Nuclear Waste Services, in terms of delivery and sustainability goals."

***"The new process was introduced through a collaborative effort within the business and our supply chain partners to take advantage of technological advances to reassess the radiological content of the waste."***

## 2021-22 year in review

# Major Capital Programmes

Deputy CEO and Major Capital Programmes Director Karen Wheeler welcomes the formation of NWS as a leading UK waste management organisation harnessing the expertise of LLWR, RWM, and IWMP. Karen is also delighted with progress in engaging with communities where there is interest in finding out more about geological disposal, while we also prepare for the first site investigations.

Between 1 April 2021 and 31 March 2022, three Community Partnerships have been formed in Mid Copeland, South Copeland, and Allerdale, Cumbria, and a Working Group in Theddlethorpe, Lincolnshire, which also became

a partnership in June 2022. These partnerships are a critical foundation for engaging with the community about a GDF and all the benefits such a major and long-term infrastructure programme can bring to the local communities. We continue talking to other organisations and individuals across the country, which gives us confidence that more Working Groups and Community Partnerships could emerge in the years ahead.

In parallel, we are already preparing for the site investigations which will provide more evidence about the geology of the respective areas and underpin the extensive technical work, informing the choice of a site and the design of a GDF. This summer we are carrying out exploratory marine geophysical surveys of deep geology beyond the Cumbrian coast. We're also building a strong team of technical experts to deliver all the work associated with evaluating potential areas for a GDF.

Developing a GDF is a vital part of the NDA's decommissioning mission and a key priority for NWS – and the journey to find a suitable site and willing community is well under way.

***"The journey to find a suitable site and willing community is well under way."***



## In conversation with Karen Wheeler

### Engaging with communities

Our major highlight was the creation of a Working Group in Lincolnshire (which became a Community Partnership in June 2022) and the progress of discussions in west Cumbria, where there are now three longer-term Community Partnerships, each based on a different search area.

In these areas, we're beginning to forge strong relationships with people and our dialogue is moving forward at pace as we hold more community engagement events.

A GDF will create at least 4,000 jobs over the next 25 years during the early stages of siting and initial construction. And we would

aim to recruit many of the roles – such as construction, engineering, science – from the region local to the site chosen for a GDF. This would follow the approach adopted by other major infrastructure projects, such as Crossrail, which have demonstrated that it's possible to train and recruit locally.

From personal conversations, I am pleased to see that many local residents acknowledge the need for a GDF. We welcome all views and are always pleased to respond to questions or point to independent sources of information.

We're delighted to see the first allocations of grant funding for local initiatives, such as mid Copeland GDF Community Partnership's support for a new BMX track at Seascale. This kind of funding is available once a Community Partnership forms and requires no commitment to host a GDF. I very much look forward to seeing more funds distributed for local projects that will have a positive impact on the lives of people in the area for years to come.

In Lincolnshire, the community around Theddlethorpe is new to nuclear, and we're hearing a wide range of views. We've held several series of public events where our specialists have been answering many questions and conversations are starting to open up. A search area has been identified and, with the formation of the Community Partnership, we're hoping to continue building on those early discussions.

We continue talking to other organisations and individuals across the country, which gives us confidence that more Working Groups could emerge in time.



We've also achieved some fantastic milestones in sharing our work with the wider UK stakeholder community. In particular, we held a successful first supplier event as well as our first national GDF conference, which raised our profile across governments, regulators, the supply chain, academic institutions, and other professional organisations interested in our programme.

Looking ahead, it's important to continue raising the profile of this vital UK project, one that deals with the legacy of the past and protects the future. We need to address the many questions about nuclear waste, provide reassurance, and build understanding of why a GDF is both critical and beneficial for the country.

### Technical expertise

Looking at the technical preparations now required, we're making real progress with steps that will show us whether sites are really suitable for a GDF, including a marine geophysical survey taking place off the coast of Copeland this summer. We're well placed thanks to the huge amount of work over the last year in ensuring the business case, associated approvals, funding, planning, and procurement are all set up.

The survey will provide valuable information about the potential of an area to host a GDF, allowing us to plan further investigations such as borehole drilling.

Meanwhile, we're building a strong team of technical experts to ensure we have the capability to procure and deliver all the work associated with evaluating potential areas for a GDF.

We will also continue collaborating with international organisations who are on a similar journey to find disposal sites for their own wastes. It has been encouraging to see overseas progress, particularly in Sweden, where the government has now endorsed the Forsmark site, in Finland where construction is under way, and in Canada where borehole drilling has been completed. We have much to learn from their experiences and much to share from our own.

***"We're beginning to forge strong relationships with people and our dialogue is moving forward at pace as we hold more community engagement events."***

## Where could a GDF be built?

Agreeing where a GDF may be built is a long-term process.

No decision has been made about where in the country a GDF will be built

### Theddlethorpe search area



- The Theddlethorpe GDF will be subject to further consideration. As the search area is defined using district electoral wards of Theddlethorpe, and Mablethorpe.
- The former gas terminal site is being considered for the GDF surface facilities. The site (beyond the coast) will be considered.
- The ward of Mablethorpe has been the boundary of the gas terminal site and associated developments, such as the gas terminal.
- If a Community Partnership is formed, it will be narrowed down until a specific site is identified. The community will be directly affected by the facility. The community is known as the 'Port of Mablethorpe' and the people living within this area will be given Public Support.

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## Theddlethorpe GDF Working Group case study

By Community Engagement Manager Kate Atha

Since the Theddlethorpe GDF Working Group was established in October 2021, we've had teams of NWS experts out and about in the community, talking to local people at public events, answering questions and sharing information about geological disposal.

Understanding is growing but in an area that's completely new to the nuclear industry, unlike in Cumbria, we're acutely aware of the huge ongoing thirst for detail and the concerns associated with such a large development involving hazardous radioactive waste. It's hard to overstate just how different our approach to working with this community needs to be because of this.

What is very clear is just how important it is that local residents, and the community as a whole, are right at the heart of the conversation. Equally, it's clear that our voice needs to be authentic and we need to provide people with the information they're asking for and do so in a way that's clear and easy to understand, question, and engage with. This will be central to how we build trust in the process and the programme. It's for these reasons that the team is committed to ensuring the local community is at the centre of our thinking and our planning for engagement as we move forward.

Local people have also been incredibly open with us from the outset. They've asked thoughtful questions and expressed their concerns in the main with respect and care. I really admire and have a huge amount of respect for how they are engaging on the topic and challenging us to explain why we're here, what a GDF is and what the development could contribute to the region in terms of jobs and investment.

It's still very early days and we're on a journey together that we hope will stretch over a number of years to come. The community will decide if it wants to host a GDF – and we're listening.

***"Local residents, and the community as a whole, are right at the heart of the conversation."***

# Forward Look

## Priorities for 2022-2023

Our future priorities:

- **Creating Nuclear Waste Services**
- **Integrated Waste Management Programme**
- **Delivering waste services**
- **Delivering waste operations**
- **Delivering the GDF Programme**

- **Creating Nuclear Waste Services**

We will continue to integrate and transform our new business.

A new corporate strategy will support the delivery of the NWS mission and set out future opportunities, which we will develop alongside consideration of risk, value, and return.

Our team is central to our success, and we are committed to establishing nuclear waste management as part of a structured and exciting career pathway (see case study) and providing a supportive, inclusive work environment that enables all our people to realise their potential. We will work to improve our diversity and use our significant expansion to recruit using more diverse candidate pools, including wider use of NDA group secondments and early career schemes.



***"A new corporate strategy will support the delivery of the NWS mission and set out future opportunities, which we will develop alongside consideration of risk, value, and return."***

- **Integrated Waste Management Programme**

Following the establishment of NWS, our 2022-23 objective is to develop an enterprise-level model and implementation strategy for the management and disposal of the UK's radioactive waste inventory, recognising the associated priority of delivering a GDF. This strategy will demonstrate how to deliver the IWMP £2.3 billion savings target, plus identify opportunities to achieve them.

On thermal treatment, we are looking to initiate lab-scale experiments; separately we will also develop a plan which demonstrates the connection between waste production, store logistics, waste transport and disposal availability across the group.

We will also develop a plan to standardise waste packaging and continue to explore the business case for near-surface disposal for some less hazardous intermediate-level waste.

- **Delivering waste services**

We will continue to support risk and hazard reduction across the NDA estate, enabling alternative uses for assets freed up and exploring the waste treatment and disposal options with potential wide-ranging benefits.

We will continue preparations for operations to compact and dispose of drums containing PCM from Sellafield's Engineered Drum Store, which have been reclassified as LLW. We will undertake a disposability assessment before moving to compact the drums pending disposal as LLW. We will also deliver a new and enhanced metals disposal and treatment programme, building on the success of our current metals service.





- **Delivering waste operations**

Our key objectives include delivering the next planned operational campaign along with the associated maintenance, asset care, and project delivery work on the Low Level Waste Repository Site.

We will also ensure that sustainable disposal capacity is available for waste producers across all sectors and maintain compliance with all regulatory requirements. We will engage openly to enhance stakeholder confidence at local and national level, encourage business efficiencies, and help to drive value for money within NWS.

We will complete analysis work on the Winfrith waste drums to allow subsequent consignment as LLW to the Repository and submit a programme options review to the NDA for the Repository Development Programme.

We will also develop the underpinning data to support a Site Strategic Development Plan for accommodation, facilities, and infrastructure for known and future missions on the Repository site.

- **Delivering the GDF Programme**

Our priorities are to maintain progress with the Community Partnerships and explore whether to form additional Working Groups. We will continue working to build strong relationships and trust across whole communities and support them to develop a vision for their area, which reflects their needs and priorities.

Marine geophysical surveys have been accelerated to provide communities and the GDF programme with greater understanding of the deep rock structures associated with specific search areas, which will support discussions on site-specific options. This will be the first time physical investigations will be carried out in the siting process, and the first studies of this kind carried out by NWS.

Our work also includes continued awareness-raising of the siting process across England. We will focus our efforts with potential interested parties where there is some confidence in the underlying geology, based on the published National Geological Screening, and in those communities already engaging with us.

We will progress site evaluation activities and surveys, and development of the technical programme, providing input to the design management arrangements for a GDF with principles that drive technological innovation and sustainability.

Further work will be undertaken to develop more detailed plans for the commercial arrangements and preparations for the early design, application for the necessary permissions, and safety case.



## Waste careers pathway case study

Hannah Jordan leads a project to transform waste management into a positive, attractive career option with a structured pathway to sought-after professional qualifications, backed by standards agreed and acknowledged by accredited industry bodies.

"The NDA's decommissioning mission creates waste as its end product, so it's very much all of our business wherever we are in the process. Waste is also inevitably the business of other industries that need to dismantle their infrastructure and take apart redundant facilities," said Hannah, who works in the Magnox waste standards and assurance team.

"Dealing with waste is closely linked to our approach to sustainability and protecting the environment, so is a key focus.

"Our project is aiming to encourage and promote the development of waste professionals, attracting people into roles that provide opportunities to work on exciting technologies, to innovate, to collaborate across the UK and succeed at the highest level.

"Much work is already being done but across an incredibly broad spectrum of waste management activities and through different professional organisations.

"Our cross-NDA group is carrying out a skills and competency gap analysis, understanding what is already in place to promote and attract people. Then we'll work alongside industry bodies to identify chartership options (a qualification awarded to recognise competence in a professional field) and training courses. This will allow us to agree on, for example, accreditation standards for charterships as well as degrees and other training courses – plus much more.

"We're drawing in NDA group businesses, but also those working with skills and training organisations. Eventually, we plan to involve the operators of nuclear power stations that are still generating electricity, the defence sector and other players in the nuclear industry.

"We have a clear development route to attract more people to our mission and contribute to the retention of staff by providing routes to future promotion and job satisfaction."



## Longer-term planning

Looking further ahead and out to 2024 and beyond, many of these priorities will continue. The NWS transformation programme will help to shape our organisation as a world-leading waste specialist providing services across the NDA group and wider nuclear industry.

We will continue to build relationships with communities in our GDF Community Partnership areas. Working alongside local communities, we expect to carry out further site investigations and use the information collected to prepare evaluations which will eventually feed into our site recommendations.

Our Operations and Services business lines will continue to deliver safe, secure, and cost-effective solutions for waste producers and become the 'implementation partner' of choice for the Integrated Waste Management Programme (IWMP) – leveraging existing customer and supply chain relationships to deliver the IWMP's desired outcomes as soon as possible. Operations and Services will also support the GDF programme by sharing experience and resources related to managing work in the field and building effective community relations.

In parallel, we will build and embed our safety, security, and sustainability culture and key capabilities, such as managing the supply chain, programme management, and site evaluation.

The IWMP will become a fundamental, transformational part of our work, nurturing innovation, exploring new technologies and delivering efficiencies in the management of UK radioactive waste, sooner and safer with reduced costs to the taxpayers







[www.nuclearwasteservices.uk](http://www.nuclearwasteservices.uk)

Nuclear Waste Services is a joint trading name of LLW Repository Limited (Company Registration No. 05608448) and Radioactive Waste Management Limited (Company Registration No. 08920190). Both of these companies are registered in England and Wales with their registered office located at Pelham House, Pelham Drive, Calderbridge, Cumbria CA20 1DB.

Part of the NDA group

