Magnox Ltd and Nuclear Waste Services Joint Waste Management Plan

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Photo: Harwell ODP leaves site

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Document Management

Rev.	Issue Date	Description	Prepared by	Checked by	Approved by
Issue 1	25-3-2022	JWMP 20	R Kelsey	J Stephenson	G Rew

Change Log

Page No.	Change	Reason for change
1 to 21	Main Body: Revisions to Magnox LLW Management activities, updates to Benefit Map, transformational projects table and opportunities, also with revisions to waste forecasts and associated benefits table	Alignment with new revision of NWP Benefit Map and inclusion of new project items to reflect progress since previous issue, also as BAU a revised five-year forecast 2022/23 to 2026/27 is included

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Introduction to Joint Waste Management Plans

A Joint Waste Management Plan (JWMP) is a proactive management plan for the next 5 years that has been developed by a Site License Company (SLC) in conjunction with Nuclear Waste Services (NWS). Its purpose is to demonstrate how the SLC is engaging with the National LLW Programme to improve their implementation of and compliance with the UK LLW Strategy, through the delivery of the Programme Blueprint.

This JWMP provides an overview of the waste management activities performed by an SLC over the previous financial year (section 1) and highlights the key transformational activities (section 2) to be undertaken either independently or in collaboration with Nuclear Waste Services, and other organisations. Transformational activities are those that will make a step change in SLC LLW management arrangements to deliver the National Programme Blueprint future state, and ultimately progress the organisation towards integrated waste management as described in the NDA Integrated Radioactive Waste Strategy. Section 3 provides an opportunity to identify specific step change projects that are not within the current scope of work, but which could be undertaken either if funding became available or if internal or collaborative resource could be identified to support the project. Section 4 provides a high-level summary of the information provided in the most recent submission of the Waste Forecast Form, providing a concise summary of the volumes of waste expected to be managed, as well as the routes expected to be employed to facilitate this management over the next five-year period. A consolidated summary of the benefits that the Programme delivers is provided (section 5), which contextualises waste management in the form of three key areas:

- Cost avoidance to the UK taxpayer;
- Disposal capacity of the Repository saved; and
- Environmental benefit (i.e. CO2 avoidance).

This JWMP has been agreed by senior management as a commitment to the delivery of the activities listed within. Key transformational activities will be tracked within the National Programme governance arrangements to:

- Assess performance;
- Highlight success;
- Deliver an integrated approach to dealing with the UK's LLW.

It contains activities and waste forecasts for the 5-year period of 2022/23 to 2026/27.

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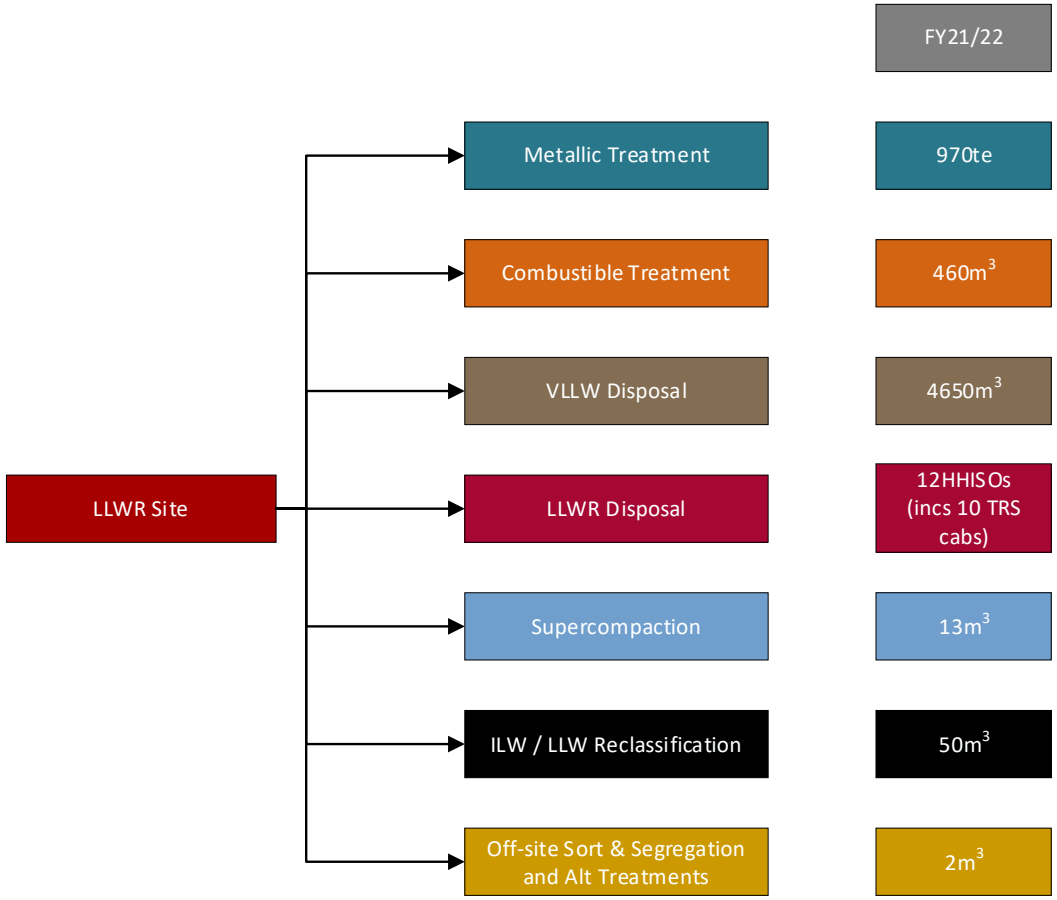
Section 1 – Business-as-usual Summary

1.1 FY21/22 Business-as-usual LLW management and waste flow (Note end of FY2021/22 total estimated)



BAU LLW Management

Magnox Ltd is a subsidiary of the NDA, structured as a waste-informed decommissioning business with Strategy and Delivery directorates responsible for planning, enabling and delivering the waste-generating projects at all eleven active sites and one in Care and Maintenance (C&M). Project waste management plans (PWMPs) are routinely used to define how waste from decommissioning projects is generated and managed and waste management requirements are considered at project gates using the company's Waste Authority Review (WAR) process. Each stage of the waste management lifecycle is overseen by suitably qualified and experienced staff. Site waste operations teams are involved in moving, lifting and size reducing waste as required, and segregating at source where practicable. A Magnox waste assurance programme is in place to support waste compliance. Over the last 12 years there has been a three to five fold decrease in the volume of waste consigned to the LLW Repository despite a three to four-fold increase in total waste arisings from the decommissioning programme, seeing Magnox divert >95% of its LLW away from the repository on an

Case Study

Harwell offsite discharge pipeline (ODP): The pipeline which was removed a few years ago consisted of ~1600 x 5 metre sections (totalling approximately 1800te). After removal from the ground the sections of pipeline were brought to site for temporary storage in a number of buildings. A new treatment route was established for these pipe sections whereby they are taken to the Augean Facility at Port Clarence for high pressure water jetting. This removes most of the contamination resulting in much of the metallic waste being recyclable. So far there have been approximately 65 compliant and safe consignments of pipe sections from site, equating to over 800 te metal. As a result two large storage facilities at Harwell have been emptied and to date, the project has achieved a recycling rate of 99.8%.

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Section 2 – FY2020/21 Transformational Activities

2.1 Transformational Projects List

Transformational projects are activities to be undertaken by the SLC that will make a step change in the management of LLW. They are discrete packages of work, with defined start and end dates, which aim to introduce improvements to work practices, and deliver financial and non-financial benefits. Each transformational activity is also shown as a project on the Benefit Map in section 2.2.

Mx Benefit map links	Mx Project Ref No	Project Description	Contributes to the Delivery of which Business Change? (Note not all Benefit changes are in this Column below so use links A to L on LH – However Priority Business changes are all included)	Start Date	End Date
IWMP/NWP Projects					
E	1	**IWMP (Waste Culture) Metrics, Key Performance Indicators and Incentivisation** Magnox will participate in this IWMP project that is a 4-phase project over 2 years, that started in 2021. This will include workshops, provision of information and review of project outputs. Year 2 (2022-23) will include the development of a cross-estate waste culture metrics survey based on a trial survey completed at the end of year 1.	Waste-informed culture is prevalent across the industry and full LLW management value chain.	1/4/21	31/3/23
B G I	2	**LLWR ESC Development Programme Support** Magnox will participate in a focus group, will provide information/data as required and review project outputs.	Waste management practice enables agile, efficient, and effective waste flow management to support operations, decommissioning and site restoration. Waste management is fully risk-informed, enabling effective management of waste at the LLW / ILW	1/4/21	31/3/24

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			boundary.There is a diverse, resilient supply chain infrastructure with management routes for LLW and waste at the LLW / ILW boundary. Knowledge management – consignors have easy access to up-to-date information or specialist or peer advice to enable ongoing understanding and improvement of the management of waste across the lifecycle and on acceptance criteria for treatment and disposal services.		
D	3	**IWMP Sustainability Project** Magnox will participate in this NWP/NWS project. This will include participation in workshops, provision of information and review of project outputs. Specific work activities for 22/23 will follow from recommendations from the year 1 report.	There is a detailed understanding of the sustainability and environmental impact of LLW management practice and arrangements; and active action is being taken to improve this.	1/4/21	31/3/24
E L	4	**IWMP Metals Project** At spring 2022 the project is in its early stages. Anticipated work includes defining scope via regular engagement with NWS, provision of data on planned volumes of metallic waste including large items.	Waste-informed culture is prevalent across the industry and full LLW management value chain. Reliable and appropriate local and national inventories are available that support and underpin decision making.	1/4/22	31/3/26

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K	5	**IWMP Cost norms project** Magnox will participate in this NWP/NWS project. This will include participation in workshops, provision of information and review of project outputs. Will also include implementation of revised cost norms following their approval by NDA. This is a 2-year project.	Cost norm models for LLW & boundary waste management are up to date and are subject to periodic review. Where needed, these are supported by tools and resources to facilitate their consistent application in decision making.	01/04/21	31/03/23
B C H	6	**IWMP Characterisation project** Magnox will participate in this NWP/NWS project. This will include participation in workshops, provision of information and review of project outputs. Project will cover adequacy of supply chain, new technologies, and guidance & training, over a 3-year project that started in 2021. Scope for year 2 of the project (2022/23) will be dependent on the outcomes and recommendations from the year 1 report	Waste management practice enables agile, efficient, and effective waste flow management to support operations, decommissioning and site restoration. Waste management is fully risk-informed, enabling effective management of waste at the LLW / ILW boundary. A proactive, systemized and streamlined process is used to manage non-standard and problematic wastes.	01/04/21	31/03/24
I H	7	**IWMP (Waste culture) Virtual Mobile waste teams** Magnox will lead in this NWP/NWS project. This will include workshops, and review of project outputs. Year 2 of this project will focus on the development and collation of case studies from	Knowledge management – consignors have easy access to up-to-date information or specialist or peer advice to enable ongoing understanding and improvement of the management of waste across the lifecycle and on acceptance criteria for treatment and	1/10/21	31/3/23

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		across the NDA Group organisations.	disposal services.		
H	8	**IWMP (Waste Culture) Career Pathways** Magnox will lead in this NWP/NWS project. This will include participation in workshops, and review of project outputs. Year 2 of this project will include investigation of waste training opportunities, chartership options, as well as skills and competency gap analysis.	Resourcing (including specialist resource) is resilient across the industry and supports effective waste management. Radioactive waste management is regarded as a desirable career pathway. There is a cross-industry understanding of skill sets, needs, projections, issues, and opportunities. Work is undertaken to mitigate risks to the waste management sector.	1/4/22	31/3/25
Magnox Improvement Projects					
C CC G	9	**Management of Magnox problematic wastes** Includes specific projects including Winfrith SGWHR asbestos, CHX legacy graphite drums, redundant sources and mercury. This project also covers the maintenance of Problematic Waste Inventory (PWI) and ongoing participation in the PW IPT/ Community of Practice (anticipated to become the IWMP Problematic Waste Programme), and relevant Innovation Partnerships e.g. Asbestos.	A proactive, systemised and streamlined process is used to manage non-standard, opportunity and problematic wastes.	1/4/22	31/3/24

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H	10	**Waste Compliance Improvement Plan (WCIP)** The Waste Management Compliance Improvement Plan (WCIP) seeks to set, monitor and deliver actions to drive and consolidate improved compliance in waste management within Magnox. Actions set as part of the Plan have been identified through event trending, common themes in investigations, learning from external bodies or management initiatives e.g. benchmarking exercises. Actions in the WCIP are grouped into topic areas and ownership of these is provided by senior members of the Waste Programme. A summary poster is updated regularly and published on the Magnox Intranet to communicate progress of the WCIP to the wider business.	Resourcing (including specialist resource) is resilient across the industry and supports effective waste management. Radioactive waste management is regarded as a desirable career pathway. There is a cross-industry understanding of skill sets, needs, projections, issues and opportunities. Work is undertaken to mitigate risks to the waste management sector.	1/4/22	31/3/23
H	11	**Implementation of Characterisation training packages** This includes Management of Fingerprints workbook training, Managing characterisation for non-practitioners classroom (Teams) training and Applying the characteristion process (for practitioners) workbook training.	Resourcing (including specialist resource) is resilient across the industry and supports effective waste management. Radioactive waste management is regarded as a desirable career pathway. There is a cross-industry understanding of skill sets, needs, projections, issues and opportunities. Work is undertaken to mitigate risks to the waste management sector.	1/4/22	1/10/22

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B A	12	**Magnox – Rolling Programme of Decommissioning** This scope of work includes assessment and sentencing of all RPD Wastes, across Magnox, via appropriate existing (or opportunity) LAW/HAW routes. An initial Baseline has been established in FY 21-22, which will continue to develop as improved characterisation and further definition of dismantling techniques/waste packaging requirements becomes apparent, in particular for Trawsfynydd. Magnox is working closely with NWS on this.	Waste management processes enable agile, efficient and effective waste flow management to support operations, decommissioning and site restoration. Waste management is fully risk-informed, enabling effective management of waste at the LLW / ILW boundary.	1/4/22	31/3/25
I	13	**Waste Information Management System (WIMS) implementation** This Magnox Project has a goal to replace individual Activity Assessment Spreadsheets with a common data base system which will be adopted across the fleet. Magnox intend to implement WIMS version 1 during 2022/2023 and will then continue to develop the system with the expectation to have some form of interface with the NWS (LLWR) system	Knowledge management – consignors have easy access to up-to-date information or specialist or peer advice to enable ongoing understanding and improvement of the management of waste across the lifecycle and on acceptance criteria for treatment and disposal services.	1/4/22	31/3/26
B C	14	**Procurement of Laboratory Analysis improvement project**	Waste management processes enable agile, efficient and effective waste flow management to support	1/4/22	31/3/23

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		This project includes continuation of collaboration with NWS (LLWR) regarding utilisation of and improvements to the WCASS III characterisation framework, as well as a Magnox review of future analysis requirements	operations, decommissioning and site restoration. Waste management is fully risk-informed, enabling effective management of waste at the LLW / ILW boundary. A proactive, systemised and streamlined process is used to manage non-standard, opportunity and problematic wastes.		
Magnox Specific Projects					
G L	15	**Use of NORM Ultra High-Pressure Cleaning (UHP) treatment for metallic waste** This treatment method will be utilised as part of a FOAK *(First of a Kind)* project to decontaminate sections of the decommissioned Harwell Offsite Discharge Pipeline (ODP). Shipments of pipe sections as well as treatment coimmenced in 21/22. This will continue into the 22/23 FY and will include LFE capture	There is a diverse, resilient supply chain infrastructure with management routes for LLW and waste at the LLW / ILW boundary.	1/4/21	31/3/23
J D L	16	**Winfrith TRS (Treated Rad Store) Drums: Rail Consignment to the LLW Repository** Joint Magnox/NWS *'FOAK Risk Informed Management'* Project: Completion of rail shipments to the LLWR of TRS Drums containing encapsulated sludge from past site reactor	Packaging is developed in a coordinated, cross-industry way; with standardisation introduced where appropriate. There is a flexible and resilient container fleet available for all wastes. There is a detailed understanding of the sustainability of LLW management practice and arrangements; and active	1/4/22	31/7/24

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		decommissioning. The drums will be 'directly emplaced' in gaps around the edge of vault 8 giving a benefit of not using clean material as in-fill and also not using up disposal space in the vault. This also avoids use of steel containers and grout. Identified as a trail-blazer case study / success story to be showcased via the IWMP.	action is being taken to improve this.		
C A G	17	**Management of Boundary Waste** Dungeness Borderline Wet Wastes (BWW) Project – development of disposability cases for phase 1 and 2 waste streams, with support from NWS. This project also links to the IWMP Boundary Waste Project. Learning from DNA BWW will be utilised to help inform decision making on other MX Sites with Borderline Wet Wastes; e.g. Hunterston and Oldbury.	A proactive, systemised and streamlined process is used to manage non-standard, opportunity and problematic wastes.	1/4/22	31/3/25
B L	18	**Characterisation of Harwell Radiochemical Facility** Magnox Project: Characterisation work ahead of decommissioning the facility shall inform the approach to decommissioning and management of resulting wastes. A comprehensive Data Quality Objectives (DQO) characterisation plan has been developed along with detailed plans for surveying and sampling/ analysis. These plans are being used to develop the technical specification for	Waste management processes enable agile, efficient and effective waste flow management to support operations, decommissioning and site restoration. Waste management is fully risk-informed, enabling effective management of waste at the LLW / ILW boundary. Reliable and appropriate local and national inventories are available that support and underpin decision making.	1/4/22	31/3/24

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		execution of characterisation work. Characterisation scope will be significant, and the procurement strategy is currently being developed. In the meantime, opportunities for acceleration of particular characterisation activities are being explored. The complex history of the facility will necessarily require some flexibility in the approach to characterisation. Magnox will be working collaboratively with NWS (LLWR) to develop an optimised model for characterisation of decommissioning wastes within this and other SLC projects.	Reliable and appropriate local and national inventories are available that support and underpin decision making.		
E G J L	19	**Enabling work for potential size reduction or removal and treatment of Dungeness A boilers** Work for the first phase will focus on characterisation and other enabling activities.	Waste-informed culture is prevalent across the industry and full LLW management value chain.	1/4/22	31/3/27
E G J L	20	**Enabling work for Removal and treatment of the Winfrith Discharge Pipeline** Work for the first phase will focus on characterisation and other enabling activities including BAT assessments, including early consultation of the supply chain.	Waste-informed culture is prevalent across the industry and full LLW management value chain.	1/4/22	31/3/25

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G J L **Part of Magnox Internal Group Key Target No3**	21	**Materials Management: Reduction in Legacy LLW aligned to JWMP forecast, this includes the Winfrith TRS drums** Magnox have agreed a group key target with NDA for consignment of legacy wastes from the Magnox sites in the 2022/23 FY. This target is aimed at increasing the profile of legacy waste across the company together with promoting the need to manage this waste effectively.LFE to be shared via the WMS industry waste LFE library.	There is a diverse, resilient supply chain infrastructure with management routes for LLW and waste at the LLW / ILW boundary.	1/4/22	31/3/23
B A	22	**Berkeley Safestore (Blower House) Remediation Sourcing Strategy** Circa 2,400te of potential metallic waste arising from the Safestore project will be characterised, sentenced, and consigned by the supply chain utilising NWS's metallic rad-waste treatment framework by circa 2026 on contract design approval. Supply chain engagement for the contract is ongoing. The contract will include the establishment of a waste compound at Berkeley specifically for this metallic waste to be processed before it leaves site.	Waste management processes enable agile, efficient and effective waste flow management to support operations, decommissioning and site restoration. Waste management is fully risk-informed, enabling effective management of waste at the LLW / ILW boundary.	1/12/22	1/7/26
I	23	**LFE from Harwell LETP land remediation project** The LETP project has completed all consignments in 2021, however the final activity is a joint Magnox/NWS LFE session. The	Knowledge management – consignors have easy access to up-to-date information or specialist or peer advice to enable ongoing understanding and improvement of the management of waste across the	1/4/22	31/9/22

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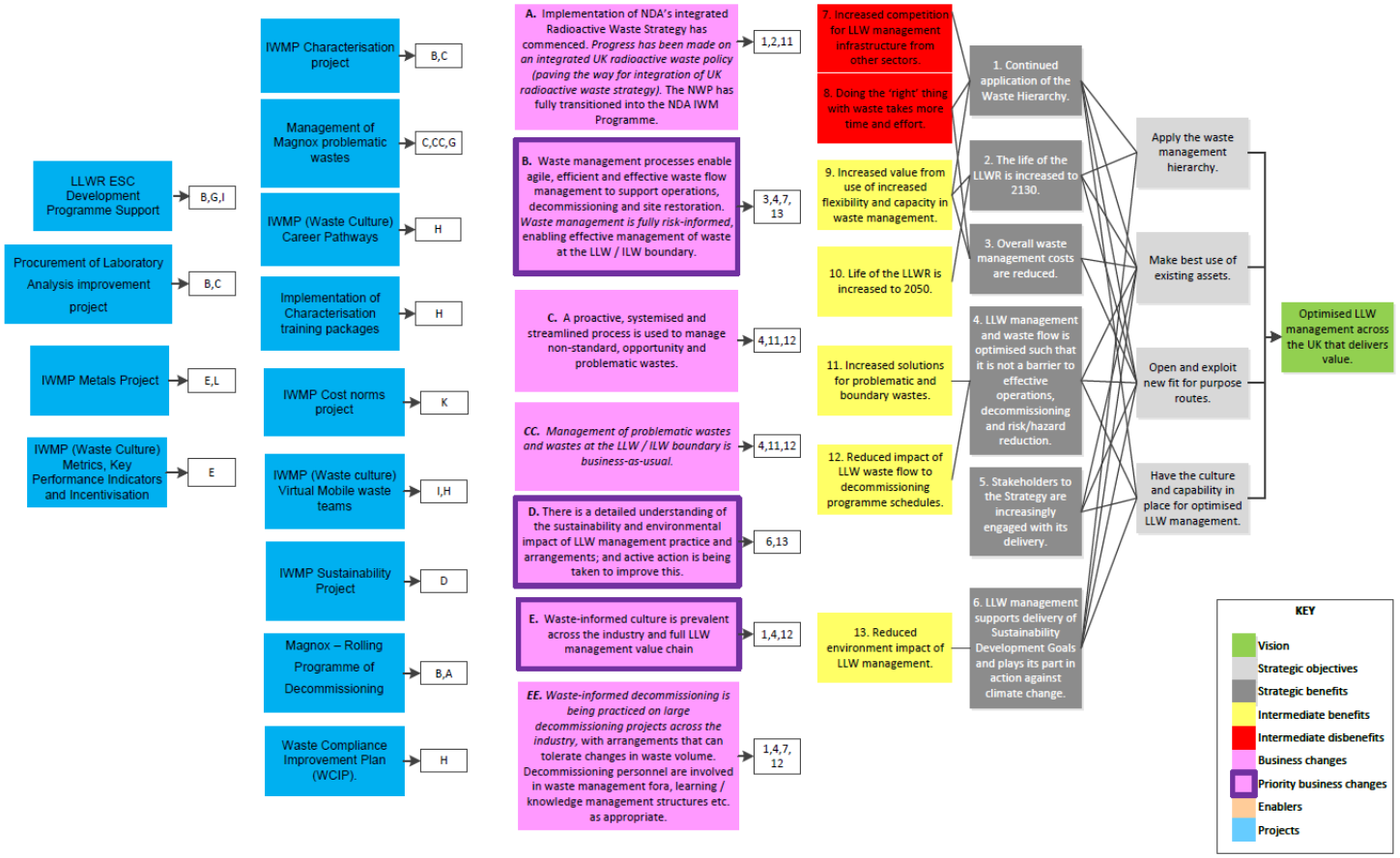
		captured LFE will be reported and made available on the NWS waste management services Hub library.	lifecycle and on acceptance criteria for treatment and disposal services.		

2.2 – Magnox Ltd Benefit Map



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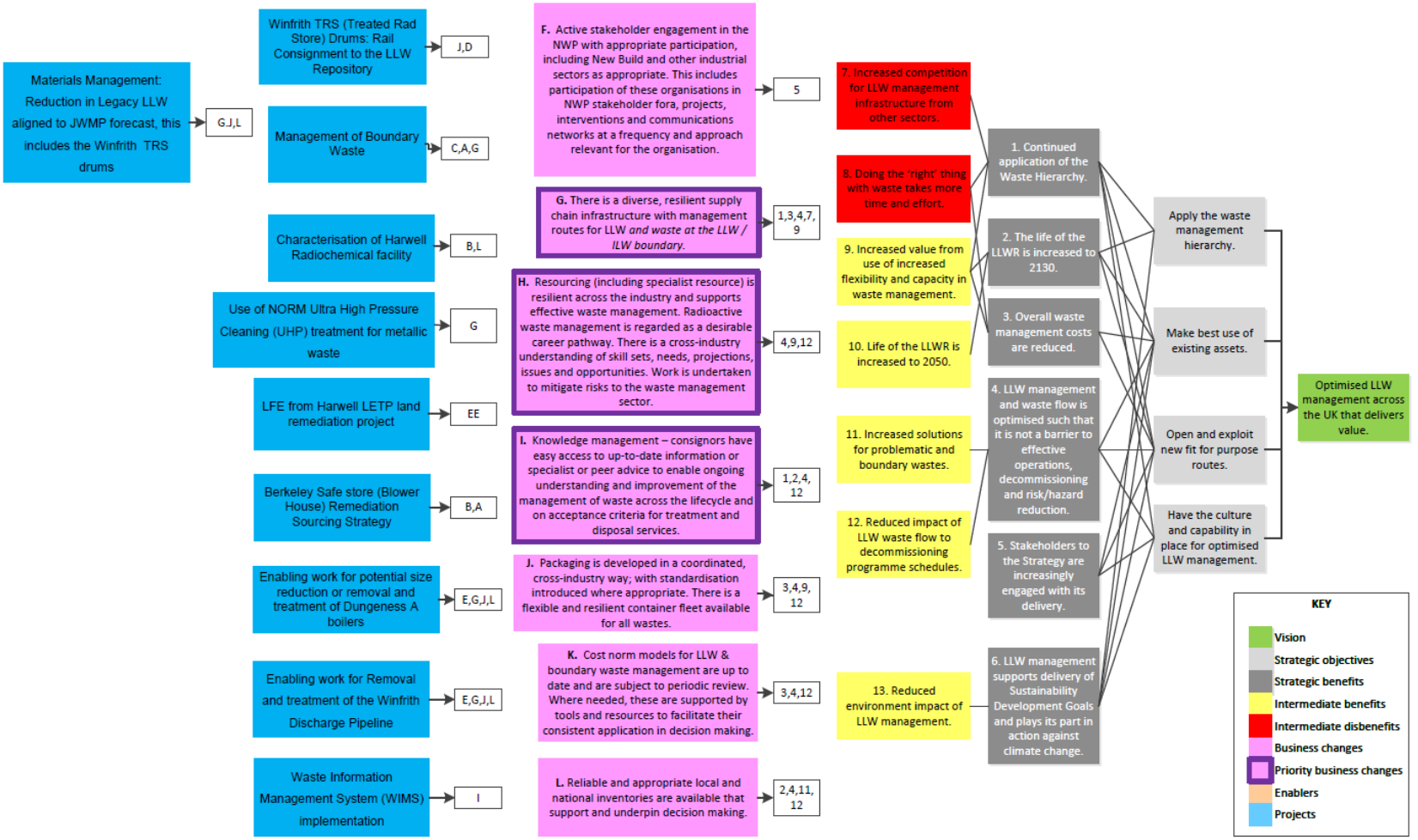

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Section 3 – Non-Resourced Opportunities

Opportunities are those specific step change projects that are not within the current scope of work but which could be undertaken either if funding became available or if internal or collaborative resource could be identified to support the project; and which would further optimise the management of LLW. These may be identified as enablers on the Benefit Map.

Opp. No.	Project Description	Contributes to the Delivery of which Business Change?	Duration	Resources Required	Status
	Magnox have no N-ROs identified at present; this will be reviewed in September.				

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Section 4 – Forecast Summary

The Waste Forecast Form (WFO) is used to capture the estimated 5-year forward view of waste that is expected to be managed via the supply chain, or directly disposed to the LLW Repository. The forecast summary provides a high-level summary of the forecast waste flow and highlights the total waste volumes expected to be consigned via the various waste management routes each year.

	Year 1	Year 2	Year 3	Year 4	Year 5
Metallic Treatment te	987	142	171	1197	1401
Combustible Treatment m3	687	604	725	718	683
VLLW Disposal m3	1168	853	3059	3151	2886
LLWR Disposal HHISO no's including TRS containers	48	67	55	50	41
Supercompaction m3	44	42	86	29	39
ILW / LLW Reclassification m3	200	238	100	0	0
Off-site Sort & Segregation & Alt Treatments m3	0	872	176	0	0

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Section 5 – Benefits Summary

This section provides a summary of the benefits expected to be delivered through execution of the transformational activities and waste management captured in the previous section.

Benefit		Commentary
	Cost avoidance	The cost avoided from managing waste via thermal treatment, metallic waste treatment, VLLW disposal or other alternative waste management route rather than disposing of the waste at the LLWR.
	Environmental benefit (CO_2 avoidance)	The quantity of CO_2 saved from managing waste via thermal treatment, metallic waste treatment, VLLW disposal or other alternative waste management route rather than disposing of the waste at the LLWR.
	Disposal capacity savings	The amount of space in the LLWR, in terms of the number of disposal containers avoided, from managing waste via thermal treatment, metallic waste treatment, VLLW disposal or other alternative waste management route rather than disposing of the waste at the LLWR.