NORTH LONDON WASTE AUTHORITY

REPORT TITLE: NORTH LONDON HEAT AND POWER PROJECT – CARBON MANAGEMENT STRATEGY

REPORT OF: PROGRAMME DIRECTOR

FOR SUBMISSION TO: PROGRAMME COMMITTEE MEMBERS FOR CONSULTATION AND DECISION BY CLERK OR MANAGING DIRECTOR

DATE: 11 MAY 2021

SUMMARY OF REPORT:

This report sets out a strategy for the management of carbon emissions on the North London Heat and Power Project, leading to net zero carbon during the life of the planned Energy Recovery Facility at the Edmonton EcoPark.

RECOMMENDATIONS:

Members of Programme Committee are recommended to comment on and note the Carbon Strategy set out at Appendix A.

SIGNED: ..... Programme Director

DATE: 27 APRIL 2021

1. INTRODUCTION

1.1. This report presents the strategy for carbon management for the North London Heat and Power Project (NLHPP). The draft strategy is attached at Appendix A. The purpose of the NLHPP Carbon Strategy is to set out the project's commitment to the management of carbon emissions across the whole lifecycle of the project including design, construction, operations and end of life.

1.2. North London Waste Authority (NLWA) recognises the increasing need to decarbonise the waste sector, from waste collection through to disposal. The Climate Change Committee's (CCC's) Sixth Carbon Budget states that by 2050, the carbon emissions levels of the waste sector can be reduced by 75% relative to today's carbon emissions levels. Through the 'Zero carbon London: 1.5^{o}C compatible plan', the Mayor of London declared a Climate Emergency and set an ambition for London to be a net zero carbon city by 2050. In addition, six out of the seven north London boroughs declared a Climate Emergency and/or have set out a carbon reduction strategy.

1.3. The NLHPP is instrumental to tackling the Climate Emergency declared by north London boroughs. The new Energy Recovery Facility (ERF) will be a vital piece of infrastructure for managing north London's non-recyclable waste in a way that tackles the Climate Emergency. The most effective way of reducing carbon emissions from waste management is by following the waste hierarchy, which prioritises waste prevention, reuse and recycling. NLWA's key priority is to prevent the production of waste in the first place in line with the waste hierarchy. NLWA is committed to working with the north London boroughs to reduce the generation of waste and increase reuse and recycling in the area.

1.4. The environmental principles underpinning the design and delivery of the project are set out in key documents associated with the Development Consent Order which authorised the development. These include:

1.4.1. the Design Code Principles (here), website hyperlink: http://www.northlondonheatandpower.london/media/0zngoga5/ad02-02-dcp-lo-res.pdf;

1.4.2. the Code of Construction Practice (here), website hyperlink: http://www.northlondonheatandpower.london/media/yrvbtkdk/ad05-12_code_of_construction_practice_lores.pdf; and

1.4.3. the Sustainability Statement (here), website hyperlink: http://www.northlondonheatandpower.london/media/mxvotgf3/ad05-13_sustainability_statement_lores.pdf.

1.5. The environmental principles established during the early development stage have underpinned the design and delivery of the project.

1.6. The Carbon Strategy builds on these environmental principles, setting out the aspirations and expectations for the delivery of the NLHPP in the context of carbon. The project is currently at the stage of carrying out the enabling works on site; detailed design and delivery of the EcoPark South Construction contract, and the procurement of the Energy Recovery Facility (ERF) works contract. These stages of the project are reflected in the strategy, which identifies the approach to carbon reduction at design, construction and operations of the project and facilities.

1.7. The strategy brings together the key initiatives to drive carbon avoidance and reduction previously incorporated into the design with the aspiration to deliver a sustainable EcoPark which responds to current and future impacts associated with climate change. The Authority commits to take action on avoiding and reducing carbon emissions for the Edmonton EcoPark aiming to achieve Net Zero Emissions for operations by 2050.

1.8. This Carbon Strategy is a live document. It will be reviewed and updated as necessary in response to the dynamic nature of the carbon assessment and the NLHPP. It will be reinforced by an implementation plan, which is referred to in more detail below.

2. WHOLE LIFE CARBON APPROACH

2.1. The strategy follows the carbon management hierarchy, which prioritises carbon avoidance and reduction, to inform decisions and drive whole life (known as "cradle to cradle") carbon management across all built elements.

2.2. The project has adopted a whole life carbon approach in this Carbon Strategy, recognising the importance of managing carbon throughout the whole life cycle of the NLHPP. Whole life carbon includes embodied and operational carbon emissions throughout the life cycle of a project including design, construction, operation and end of life. Embodied emissions are the total emissions generated to produce a built asset i.e. those emissions released prior to operation including raw material extraction, manufacture, transportation, construction, maintenance, repair and end of life. Operational emissions are those generated during the use of the asset e.g. energy to heat, cool and power the building.

2.3. For each stage of the project (design, construction, operation and end of life) the strategy sets out the guiding principles to reduce whole life carbon in line with four focus areas: transportation; energy; materials and resources; and resilience. Within the strategy examples are included to demonstrate how these principles have already been incorporated into the design and construction stages of the NLHPP. Some examples include the design of the Resource Recovery Facility (RRF) roof to

maximise the production of renewable energy from solar photovoltaics (PV), mixed mode ventilation to reduce energy consumption and future proofing for electric vehicle infrastructure.

2.4. The NLHPP infrastructure is delivered, operated and maintained by a wide range of organisations including the asset owner, designers, contractors and material/product suppliers. Responsibility varies for different aspects of the project delivery and carbon management and these responsibilities are set out within the strategy. The Authority has a responsibility to ensure the Carbon Strategy is communicated and implemented across the programme from delivery through to operations.

3. CARBON STRATEGY TARGETS

3.1. The NLHPP Carbon Strategy includes carbon reductions target for delivery of the NLHPP and a longer-term target to reach net zero in operations by 2050.

3.2. As part of the delivery of the NLHPP, the RRF, EcoPark House and the ERF have been set a target to reduce embodied carbon by a minimum 10%. This is reflected in the construction contractual requirements. The contractors are required to undertake a detailed embodied carbon analysis and are encouraged to realise further reductions in embodied carbon beyond the 10% target. The EcoPark South Construction (EPSC) contractor has already achieved this target through innovative design solutions. The Authority will re-examine this target and set a target which will challenge the project contractors to deliver even more carbon savings.

3.3. The strategy includes a target to reach net zero by 2050. The implementation plan will explore the opportunities and barriers to achieving net zero for operation of the EcoPark by 2050. The Authority recognises the challenges, as well as the opportunities, that such an ambitious target presents, and will systematically address these challenges following the carbon management hierarchy and carbon principles described in the Carbon Strategy.

4. IMPLEMENTATION

4.1. An implementation plan will be developed to provide details on the processes, governance and actions to ensure that the Carbon Strategy is embedded and implemented across the project and throughout the NLHPP lifecycle. It will guide the project through training, measuring, monitoring and reporting on carbon avoidance and reduction initiatives.

4.2. During the construction phase, sufficient evidence will be collected to verify that the 10% reduction in embodied carbon has been achieved and delivered. A reporting and monitoring system will be established, which will document any efforts towards decarbonisation, as well as a system of continuous improvement that will be communicated. This will link in with the broader NLHPP environmental

and sustainability reporting. NLWA commit to reporting annually on the Authority's performance against this Carbon Strategy.

4.3. To ensure that operational carbon emissions of the NLHPP are reduced throughout the lifecycle of each building element, NLWA will undertake regular (six-monthly) horizon scanning reviews for site operations and asset management. These reviews will identify potential initiatives that may be applied at the Edmonton EcoPark in the future (0 to 30+ years from now) to ensure that its operations respond to current and future environmental challenges.

4.4. Recognising the challenges achieving net zero will present the Authority will also investigate opportunities for carbon offsetting or sequestration. Carbon offsetting is an approach to be considered for managing the carbon emissions, which cannot be otherwise eliminated. The Authority will continue in its active investigation of the potential for Carbon, Capture, Use and Storage (CCUS) and how such technology could be deployed at the EcoPark. CCUS is considered to be a potential long-term opportunity (i.e. over 15 years from now) for the ERF. This solution would capture some or all of the operational carbon emissions of the ERF, helping to make it a net zero or a carbon negative facility in the future.

5. EQUALITIES IMPLICATIONS

5.1. This report does not give rise to any equalities implications. Equalities implications will be taken into account in considering actions arising from the strategy.

6. COMMENTS OF THE LEGAL ADVISER

6.1. The Legal Adviser has been consulted in the preparation of this report and comments have been incorporated.

7. COMMENTS OF THE FINANCIAL ADVISER

7.1. The Financial Adviser has been consulted in the preparation of this report and comments have been incorporated.

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APPENDIX A NLHPP CARBON STRATEGY

North London Heat and Power Project
Carbon Strategy

Sign-Off Sheet

Document Details	
Document Number	NP-ARP-XXXX-ZZZ-ST-TA-090001
WBS Ref	
Confidentiality Level	• Confidential (top confidentiality level) • Restricted (medium confidentiality level) • Internal use (lowest level of confidentiality) • Public once finalised (everyone can see the information)
Revision No:	2.3

Assurance Record			
	Author	Check & Review	Approval for Use
Name	Annie Gibbons Erato Panayiotou	Natasha Connolly	Rainer Zimmann
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Signature			
Date	13/04/2021	13/04/2021	13/04/2021

Engagement Confirmation		
Function	Role	Notes
Programme Director	C	Consulted (David Cullen)
SRO	C	Consulted
SHE&W	N/A	
LEL	N/A	
Technical Advisor	C	Consulted (Arup)
Technical Authority	C	Consulted
Programme Office	N/A	
Project Delivery	N/A	
Commercial	N/A	
Financial	N/A	
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Revision Record		
Revision no	Date	Description of Revision
1.0	16/12/2020	Preliminary draft
2.0	22/03/2021	First complete draft
2.1	30/03/2021	Changes to first complete draft upon client comments
2.2	13/04/2021	Changes to second complete draft upon client comments
2.3	13/04/2021	Further minor changes to second complete draft

Table of Contents

1. Our climate action

1.1 Contributing to national and regional carbon targets

North London Waste Authority (NLWA) recognises the increasing need to decarbonise the waste sector, from waste collection through to disposal. The Climate Change Committee's (CCC's) Sixth Carbon Budget states that by 2050, the carbon emissions levels of the waste sector can be reduced by 75% relative to today's carbon emissions levels.

Through the 'Zero carbon London: 1.5°C compatible plan', the Mayor of London declared a climate emergency and set an ambition for London to be a net zero carbon city by 2050. In addition, six out of the seven north London boroughs declared a climate emergency and/or have set out a carbon reduction strategy.

We commit to take action on avoiding and reducing carbon emissions for the Edmonton EcoPark (EcoPark) aiming to achieve Net Zero Emissions for operations by 2050.

This Carbon Strategy articulates our commitment to avoid and reduce whole life carbon throughout the design, construction, operation and end of life stages of the North London Heat and Power Project (NLHPP).

Climate emergency declarations and Climate Action Plans by north London boroughs

2. North London Heat and Power Project (NLHPP)

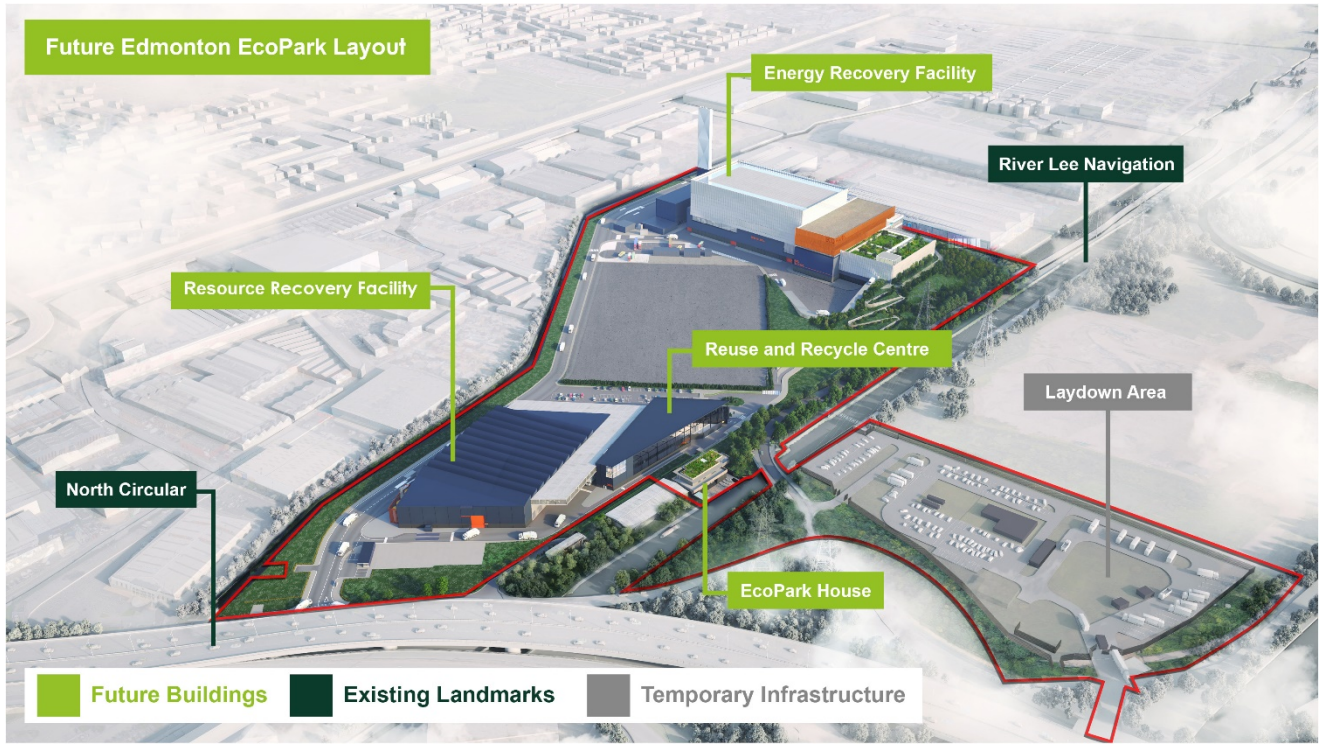
2.1 Overview of the NLHPP

NLHPP is NLWA's plan for a new sustainable waste management hub. It is a nationally significant infrastructure project providing brand new recycling and waste management facilities for north London's two million residents.

Over the next 10 years, NLWA will construct flagship recycling and waste management facilities at Edmonton EcoPark (EcoPark) in Enfield, north London.

The NLHPP is essential to manage north London's waste in a sustainable and cost-effective way for generations to come.

The new facilities at EcoPark are integral to NLWA's wider waste strategy, which prioritises waste reduction and recycling in line with the waste hierarchy.



Indicative site layout plan of the NLHPP

2. North London Heat and Power Project (NLHPP)

2.2 Contributing to carbon reduction through sustainable waste management – ERF

We are replacing the existing Energy from Waste (EfW) facility with a world-class Energy Recovery Facility (ERF), which will have the capacity to manage 700,000 tonnes/annum of residual (i.e. non-recyclable) waste. The ERF will operate in combined heat and power (CHP) mode, providing enough low carbon heat and power to serve the needs of up to 127,000 homes.

The design of the ERF is being optimised to provide CHP as efficiently as possible, recognising the carbon benefit of this approach. To support this, NLWA has been liaising regularly with the Greater London Authority to discuss planned and likely future heat demand in the vicinity of the EcoPark and account for this ambition in heat off-take levels. This includes the opportunity for a low-carbon district heating network connected to 10,000 new homes at Meridian Water.

The Energy Recovery Facility

2. North London Heat and Power Project (NLHPP)

2.2 Contributing to carbon reduction through sustainable waste management – ERF (continued)

Recovering energy from waste at the ERF will prevent residual waste from going to landfill. This will reduce the release of methane gas which results from residual waste disposal at landfill, thereby reducing the carbon footprint of NLWA's waste management operations. Methane, on a weight basis, has 25 times the global warming potential of carbon dioxide.

NLWA's wide-reaching activities include the UK's first Low Plastic Zones, which support businesses to eradicate single-use plastics. As plastics are gradually removed from the residual waste produced in north London, the ERF will be able to operate on less fossil-based materials in the residual waste.

The Energy Recovery Facility

2. North London Heat and Power Project (NLHPP)

2.3 Contributing to carbon reduction through sustainable waste management – RRF

As part of NLWA's commitment to increase household recycling rates in north London from 30% to 50%, we are also building a Resource Recovery Facility (RRF).

The RRF will be one of the largest publicly owned facilities of its kind in London and will have the capacity to manage up to 135,000 tonnes/annum of recyclable materials, such as wood, plastic and metal.

The RRF will also comprise of a new public Reuse and Recycling Centre (RRC). The RRC will enable residents in north London for the first time ever to bring their recyclables directly to the EcoPark.

Recycling contributes to carbon reduction as it helps to reduce resource consumption associated with sourcing and processing new raw materials.

The Resource Recovery Facility

2. North London Heat and Power Project (NLHPP)

2.4 Contributing to carbon reduction through sustainable waste management – EcoPark House

EcoPark House will be an education and visitors' centre where people can find out more about heat, power, and how to reduce their carbon impact through waste reduction, reuse and recycling, as well as a transition to a circular economy.

The two-storey building will face onto the River Lee Navigation and will also provide a long-term space for Edmonton Sea Cadets, who currently use the site.

The EcoPark House

2. North London Heat and Power Project (NLHPP)

2.5 Our carbon management journey

Carbon management is a journey and NLWA is committed to driving carbon reduction at all stages of the NLHPP.

This Carbon Strategy is first issued during the enabling works on site, the detailed design stage of the RRF, RRC, EcoPark House, and the procurement of the ERF. However, initiatives to drive carbon reduction have previously been incorporated into the designs and the contract specifications for the new infrastructure.

This Carbon Strategy is a live document. It will be reviewed and updated as necessary in response to the dynamic nature of the carbon assessment and the NLHPP.

"Projects like the NLHPP need to be part of the net zero roadmap. Within one site we are bringing together the necessary strands of sustainable waste management – waste reduction, recycling and energy recovery with district heating.

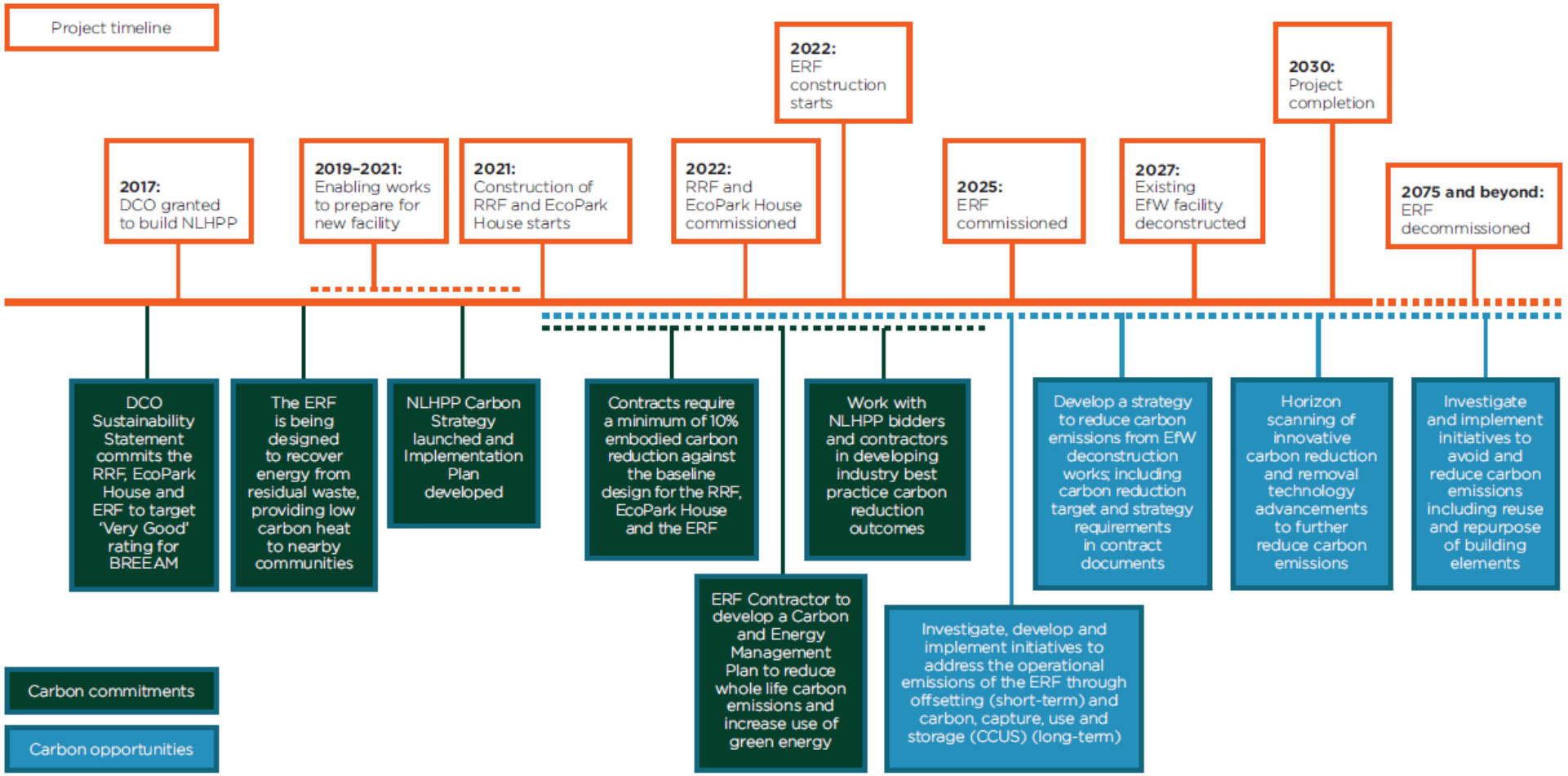
We are also part of the wider regeneration of Enfield, helping to unlock life changing job, training and apprenticeship opportunities, local spending and extensive supply chain opportunities for SMEs."

David Cullen

Programme Director, NLHPP

2. North London Heat and Power Project (NLHPP)

2.6 Our journey towards net zero carbon by 2050 for the NLHPP



3. Carbon strategy approach

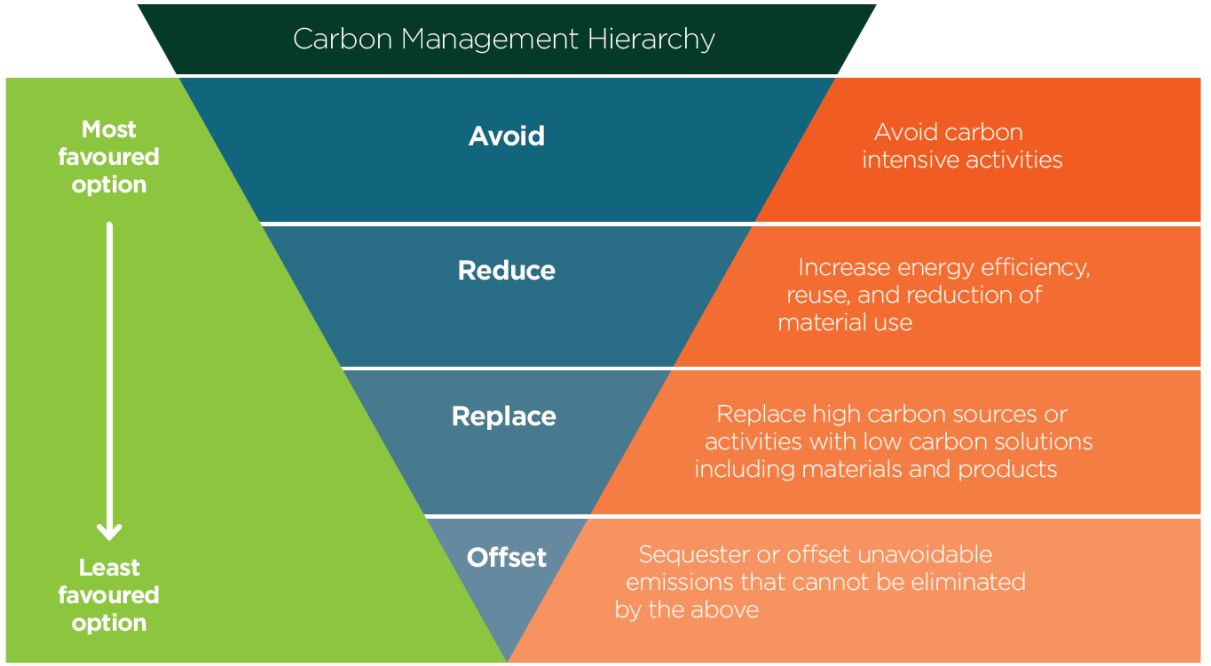
3.1 Carbon management hierarchy

This Carbon Strategy articulates NLWA's commitment to carbon management and outlines the holistic approach adopted to avoid and reduce carbon across the whole lifecycle of the NLHPP.

This Carbon Strategy also provides a mandate for carbon management principles and targets. It sets out the aspirations and expectations for sustainable delivery of the NLHPP.

Our approach follows the carbon management hierarchy, which prioritises carbon avoidance and reduction, to inform decisions and drive whole life carbon management across all built elements.

In the context of the NLHPP, it is recognised that the most effective way of reducing emissions from waste management is by following the waste hierarchy, which prioritises waste prevention, reuse and recycling. NLWA's key priority is to prevent the production of waste in the first place in line with the waste hierarchy. NLWA is committed to working with the North London boroughs to reduce the generation of waste and increase reuse and recycling rates.

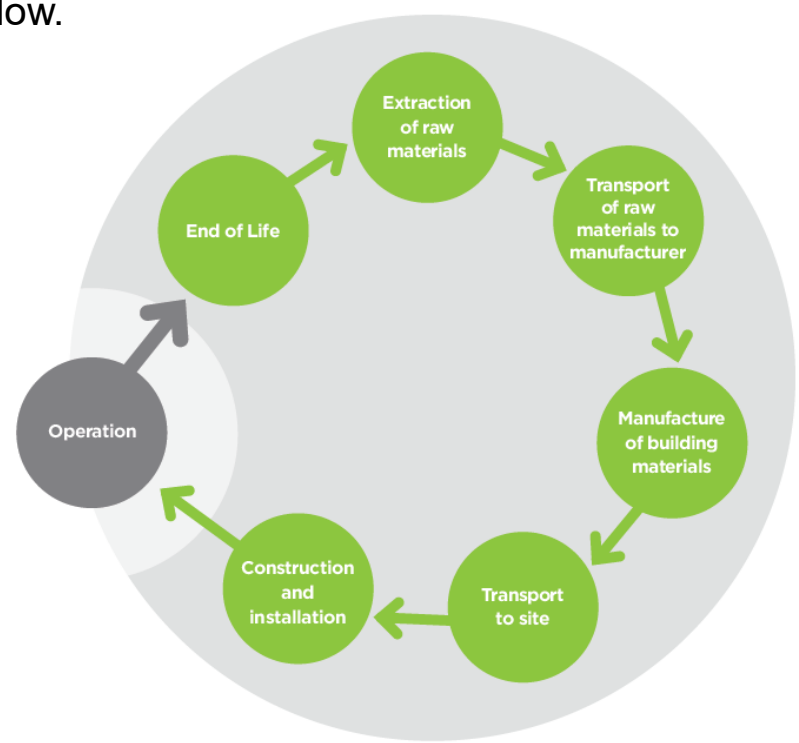


The carbon management hierarchy

3. Carbon Strategy approach

3.2 Whole life carbon

Whole life carbon includes embodied and operational carbon emissions throughout the life cycle of a project. Embodied carbon arises at various stages of the project life cycle, as shown on the graphic below.



Embodied carbon arising across the project life cycle (in green)

NLWA adopted a whole life carbon approach in this Carbon Strategy, recognising the importance of managing carbon throughout the whole life cycle of the NLHPP:

1. Design: Design out inefficiencies and embodied carbon, design to reduce operational emissions through efficiency, be flexible and adaptable to future changes.

2. Construction: Construction, demolition and excavation works will follow the principles of the circular economy as well as opportunities to reduce material and energy use, where possible.

3. Operation: Ensure the use and maintenance of the EcoPark is as efficient as possible, to minimise the consumption of materials, energy and water, and capture or mitigate unavoidable emissions.

4. End of Life: Ensure the infrastructure of the EcoPark at the end of its operational life will be managed following a cradle-to-cradle approach including repurpose and reuse. In addition, ensure that decommissioning works will be carried out in a resource efficient way.

3. Carbon Strategy approach

3.3 Carbon targets

Specific carbon management targets have been set for the design and construction of the NLHPP. These include:

- A minimum 10% embodied carbon reduction against the baseline design for the RRF and EcoPark House, which is a construction contractual requirement. The contractors are to undertake a detailed embodied carbon analysis and, as a minimum, meet a 10% reduction in embodied carbon during the design and construction of the works. We are working closely with contractors to realise further reductions in embodied carbon and set stretch targets beyond 10%, particularly for the ERF.

  Embodied carbon has been targeted during design and construction of NLHPP to drive carbon emission reductions. The relative significance of embodied carbon - carbon that is 'locked in' after construction - is increasing, as both the grid decarbonises, and emissions decrease in buildings due to increased operational efficiency. Embodied carbon is critical to make a significant difference in the whole life carbon of the NLHPP.

- The RRF, EcoPark House and the ERF are all targeting a 'Very Good' rating for BREEAM, including the reduction of energy use and the adoption of low carbon technologies. BREEAM is a leading sustainability assessment method, which aligns with the net zero carbon agenda and encourages buildings to aspire to a high level of design performance.
- The following BREEAM credits are also mandated for the RRF, EcoPark House and the ERF to promote the reduction of energy use and carbon emissions, and encourage low carbon energy:
  - Man02 Life cycle cost and service life planning
  - Ene01 Reduction of energy use and carbon emissions
  - Ene04 Low carbon – low zero carbon technologies
- Carbon targets for the decommissioning of the existing EfW facility, in addition to the operation and end of life phases of the project, will be developed and agreed as the project progresses.

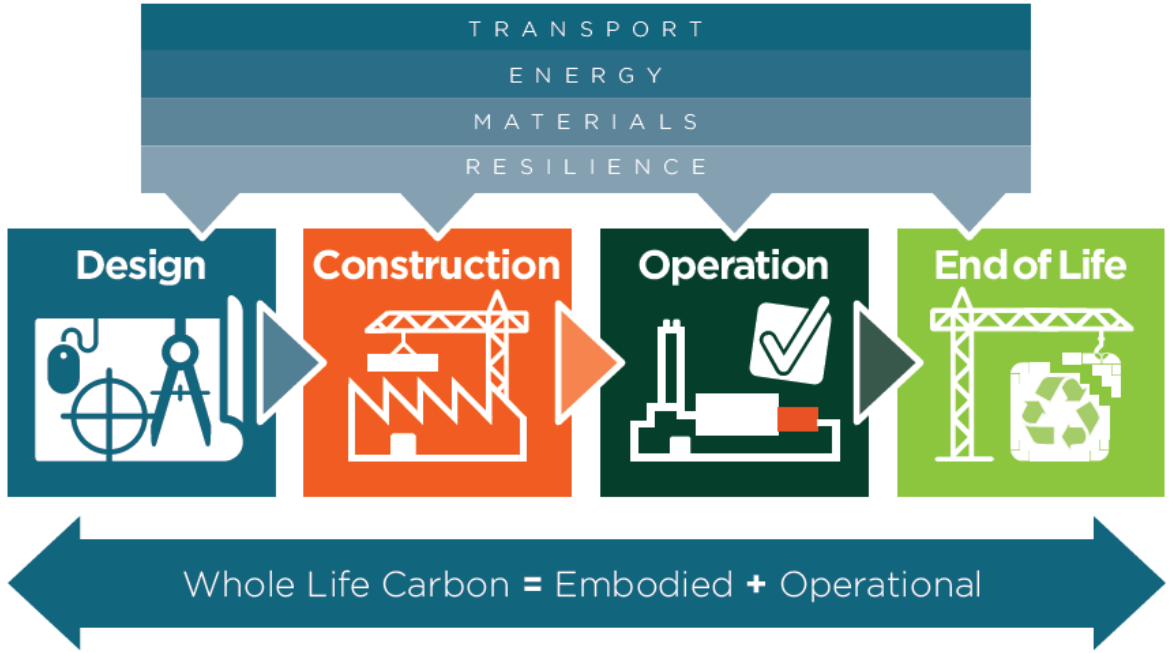
4. Carbon management principles

4.1 Carbon management focus areas and principles

This Carbon Strategy identifies four focus areas:

1. **Transportation**: Minimise mileage and support sustainable modes of transport.
2. **Energy**: Apply the principles of the energy hierarchy (i.e. use less, be more efficient and use renewables where possible).
3. **Materials and resources**: Reduce material use where possible and ensure high quality and robust materials are used, without compromising the life expectancy of the infrastructure.
4. **Resilience**: Future-proof the EcoPark by designing for flexibility, adaptability, deconstruction and reuse.

For each of the stages of the project (Design, Construction, Operation and End of Life) we have set out the guiding principles to reduce whole life carbon in line with the four focus areas. In addition, we have highlighted key examples to demonstrate how these principles have already been incorporated into the design and construction stages of the NLHPP.



Four carbon focus areas across the stages of the project and whole life carbon

4. Carbon management principles

4.2 Principles guiding carbon management across the Design stage

Focus area	Guiding principle
Transport	• Design the EcoPark to enable sustainable modes of transport through the provision of appropriate infrastructure such as cycle paths. • Use of digital technologies supporting the avoidance and reduction of travel.
Energy	• Apply the principles of the energy hierarchy (i.e. use less, be more efficient and use renewables where possible) in the design of all building elements. • Prioritise 'use less' on the energy hierarchy, by making optimised use of natural energy sources in the design (e.g. natural lighting). • Incorporate and specify the most energy efficient equipment, fixtures and fittings in design to minimise energy use during operations. • Enable the use of fully electric equipment through appropriate design. • Design to achieve minimum BREEAM rating of Very Good, and mandatory credits addressing energy use and carbon emissions. • Optimise the ERF design such that heat and power is generated as efficiently as possible, including such aspects as the timing of supply, use of thermal stores, and anticipated demands as the network is established.
Materials and resources	• Design out waste, where possible, without compromising the use of high quality and robust materials and subsequently, the life expectancy of building elements and other infrastructure. • Consider the cradle-to-cradle journey of materials in design without compromising the life expectancy of components. • Incorporate flexible and adaptable design, minimising refurbishments and achieving waste minimisation, where feasible. • Specify materials with reduced embodied carbon where permitted under appropriate standards and codes. • Minimise the use of resources, such as water, through designs that maximise efficiencies.
Resilience	• Future proof the EcoPark by designing for flexibility, adaptability, deconstruction and reuse. • Implement modular and adaptable design (e.g. for cladding), to enable refurbishments and material reuse, where feasible. • Future proof the EcoPark to support sustainable operations, such as urban mining of residues from the ERF (e.g. extracting useful metals from the bottom ash) and developing activities that support the circular economy and respond to future requirements of the north London Boroughs (e.g. through community reuse and refurbishment programmes). • Future proof the ERF by minimising its operational carbon footprint through enabling the future implementation of carbon capture, use and storage (CCUS). • Adapt to climate change through designing for specified flood levels.

Design

4. Carbon management principles

4.3 Principles guiding carbon management across the Construction stage

Construction

Focus area	Guiding principle
Transport	• Encourage sustainable modes of transport for construction workers, such as cycling facilities and car sharing. • Source materials and products locally, where appropriate, to reduce mileage. • Fulfil staffing locally, where possible, to minimise commuting mileage and aim for a local employment of 25%, in line with the NLHPP Social Value Strategy, which has a focus on creating opportunities for local and disadvantaged people. • Incorporate direct reuse and recycling of demolished materials to minimise transportation. • Use low emissions vehicles, where practical or available, such as electric vehicles and construction equipment.
Energy	• Apply the principles of the energy hierarchy (i.e. use less, be more efficient and use renewables, where possible) during construction, demolition and excavation works. • Achieve minimum BREEAM rating of Very Good, and mandatory credits addressing energy use and carbon emissions. • Use energy efficient equipment, such as energy efficient lighting, to reduce the energy demand during construction, demolition and excavation works. • Source renewable energy during construction, demolition and excavation works, where feasible.
Materials and resources	• Source low carbon materials where the design and standards allow, including the sourcing of 100% timber from recycled or sustainable sources, and low carbon concrete. • Source key materials verified by third party certification schemes, including FSC/PEFC for timber, BES6001 for concrete and plasterboard, and the eco-reinforcement scheme for reinforced steel. • Reduce materials brought onto site including packaging of construction materials. • Divert a minimum of 85% of non-hazardous waste from landfill, through maximised material reuse, recycling and recovery, with the aspiration of diverting over 95% non-hazardous waste from landfill. • Minimise the use of resources, such as water, during construction, demolition and excavation works.
Resilience	• Adapt processes and approaches to reduce resources during construction which will bring resilience into the construction program through reducing reliance on resources (e.g. potable water).

4. Carbon management principles

4.4 Principles guiding the carbon management of the Operation stage

Focus area	Guiding principle
Transport	• Minimise mileage and support sustainable modes of transport. • Source products (e.g. consumables used at the ERF) locally, where appropriate, to reduce mileage. • Fulfil staffing locally, where possible, to minimise commuting mileage. • Use low emissions vehicles, where practical or available, such as electric vehicles and equipment. • Encouraging sustainable modes of transport, especially cycling, through the provision of on-site cycling infrastructure.
Energy	• Apply the principles of the energy hierarchy; use less, be more efficient and use renewable energy sources where possible. • Use less energy, where feasible, through the optimised use of natural lighting. • Optimise the monitoring of equipment and operations to increase efficiency where possible and reduce energy demand. • Supply any additional operation needs by renewable energy, where feasible.
Materials and resources	• Minimise the use of resources, such as water and other consumables, during operations across the EcoPark. • Work with the north London boroughs to reduce the generation of waste and increase reuse and recycling rates.
Resilience	• Contribute to the needs of the local community in north London through treating waste locally and generating heat and power generation locally.

Operation

4. Carbon management principles

4.5 Principles guiding carbon management across the End of Life stage

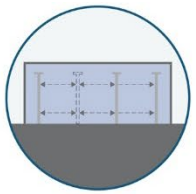
Focus area	Guiding principle
Transport	• Minimise mileage and support sustainable modes of transport during decommissioning works. • Prioritise the direct reuse and recycling of demolished materials locally to minimise transportation. • Use low emissions vehicles, where practical or available, such as electric vehicles.
Energy	• Apply the principles of the energy hierarchy: use less, be more efficient and use renewables, where possible. • Use energy efficient equipment, such as energy efficient lighting, to reduce the energy demand during demolition works. • Carry out demolition works by purchasing renewable energy, where feasible.
Materials and resources	• Apply the waste management hierarchy; prioritising the avoidance of demolition works, where appropriate, followed by the direct reuse of demolition materials. • Divert a minimum of 85% of non-hazardous waste from landfill, through maximised material reuse, recycling and recovery, with the aspiration of diverting over 95% non-hazardous waste from landfill, where feasible. • Minimise the use of resources, such as water, during decommissioning works.
Resilience	• Maximise reusing, refurbishing and repurposing building elements (e.g. the EcoPark House), where possible, to prolong their useful life to continue providing services to the community in the future.

End of Life

5. Carbon management initiatives

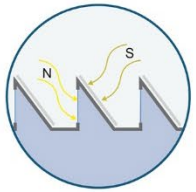
5.1 Design

The detailed design of the RRF, RRC, and EcoPark House is underway. Measures to drive carbon avoidance and reduction have been incorporated into the design of the facilities and the contract specifications for the new infrastructure, as shown on the graphic.



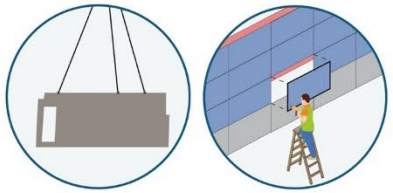
Design for Flexibility

The RRF design incorporates flexible spaces and moveable walls.



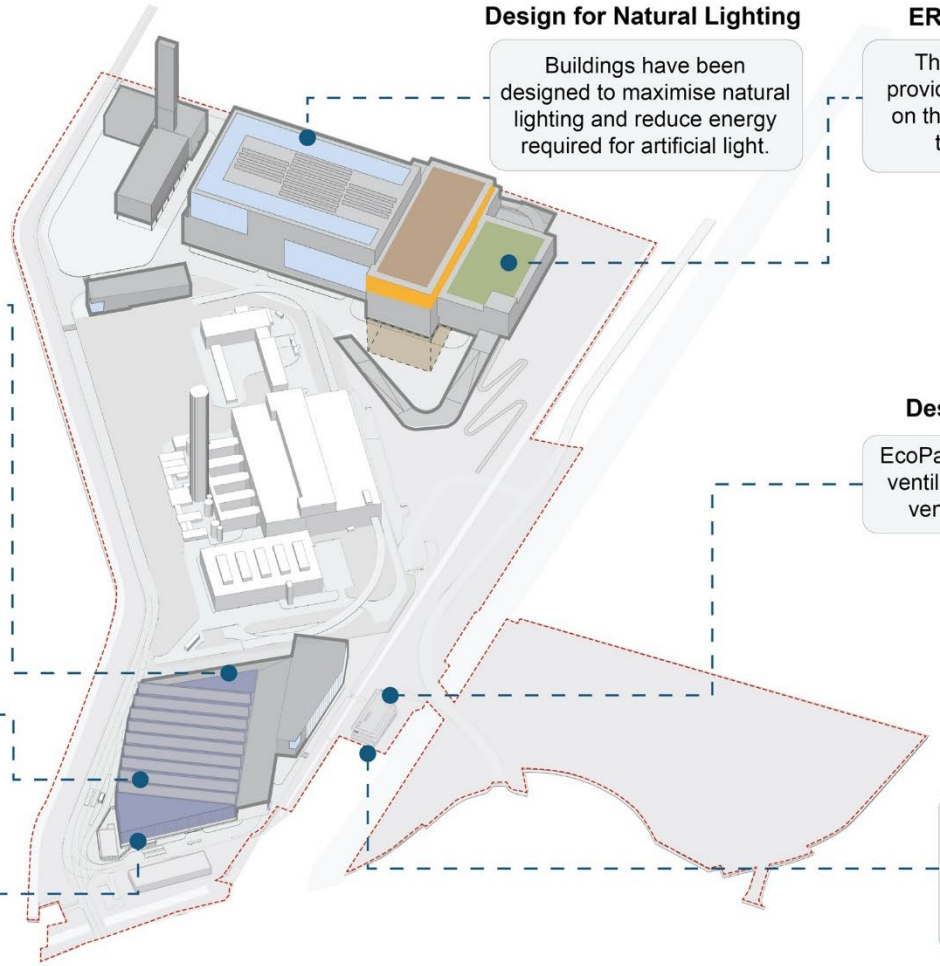
Design for Renewable Energy

Saw tooth roof design for RRF, designed specifically for PV cells.



Pre-fabrication and Reduced Cladding Materials

Specified interchangeable cladding systems across all contracts maximising efficiency of materials and products. The façade of the RRF is part pre-cast and part made of composite materials.

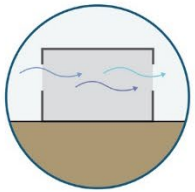


Design for Natural Lighting

Buildings have been designed to maximise natural lighting and reduce energy required for artificial light.

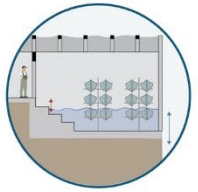
ERF Green Roof and Brown Roof

The combination of the green roofs will provide a continuation of the landscape area on the eastern side of the ERF and insulate the roof to reduce energy demand.



Design for Mixed Mode Ventilation

EcoPark House was designed for mixed mode ventilation to minimise the use of mechanical ventilation and maximise natural air flow.



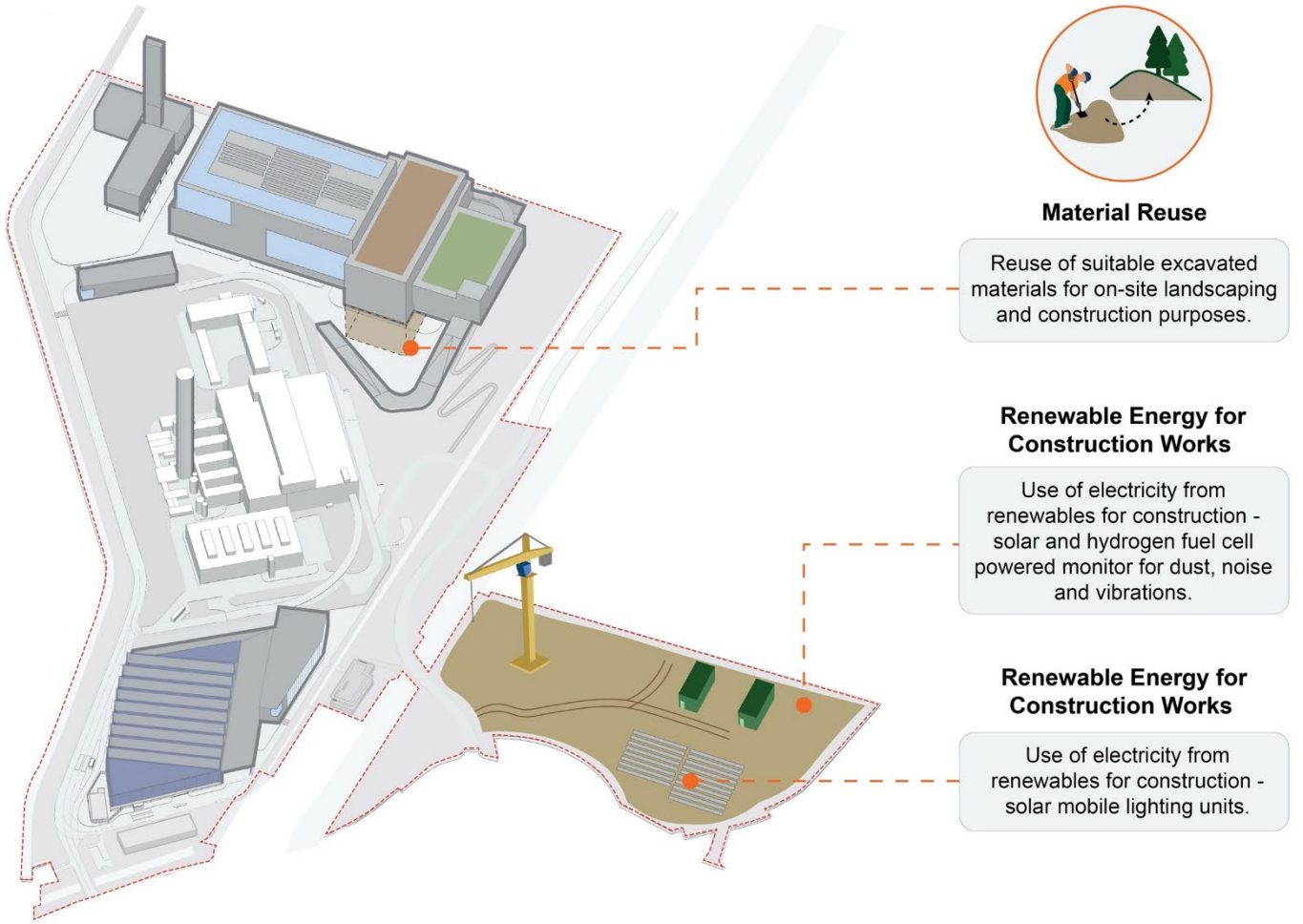
Climate Change Adaptation

All buildings are designed to consider future climate risk, e.g. the boat shed at EcoPark House is future proofed for flooding caused by climate change.

5. Carbon management initiatives

5.2 Construction

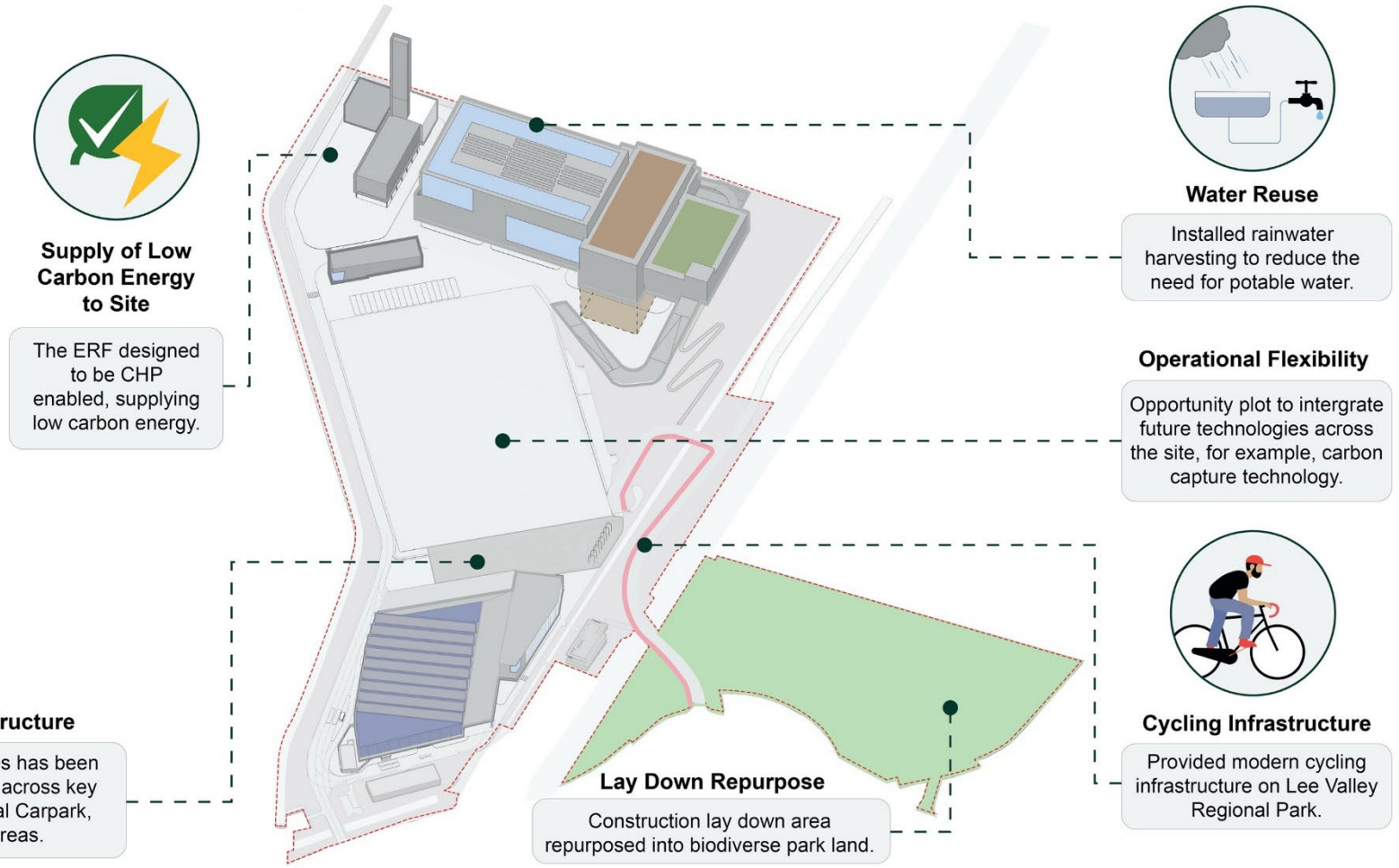
The enabling works on-site, as well as the works for the RRF and EcoPark House are underway, and a number of carbon management principles are being applied in these works, as shown on the graphic.



5. Carbon management initiatives

5.3 Operation

The design of the building elements and other infrastructure, will enable carbon avoidance and reduction during the operation of the EcoPark in the future, as shown on the graphic.

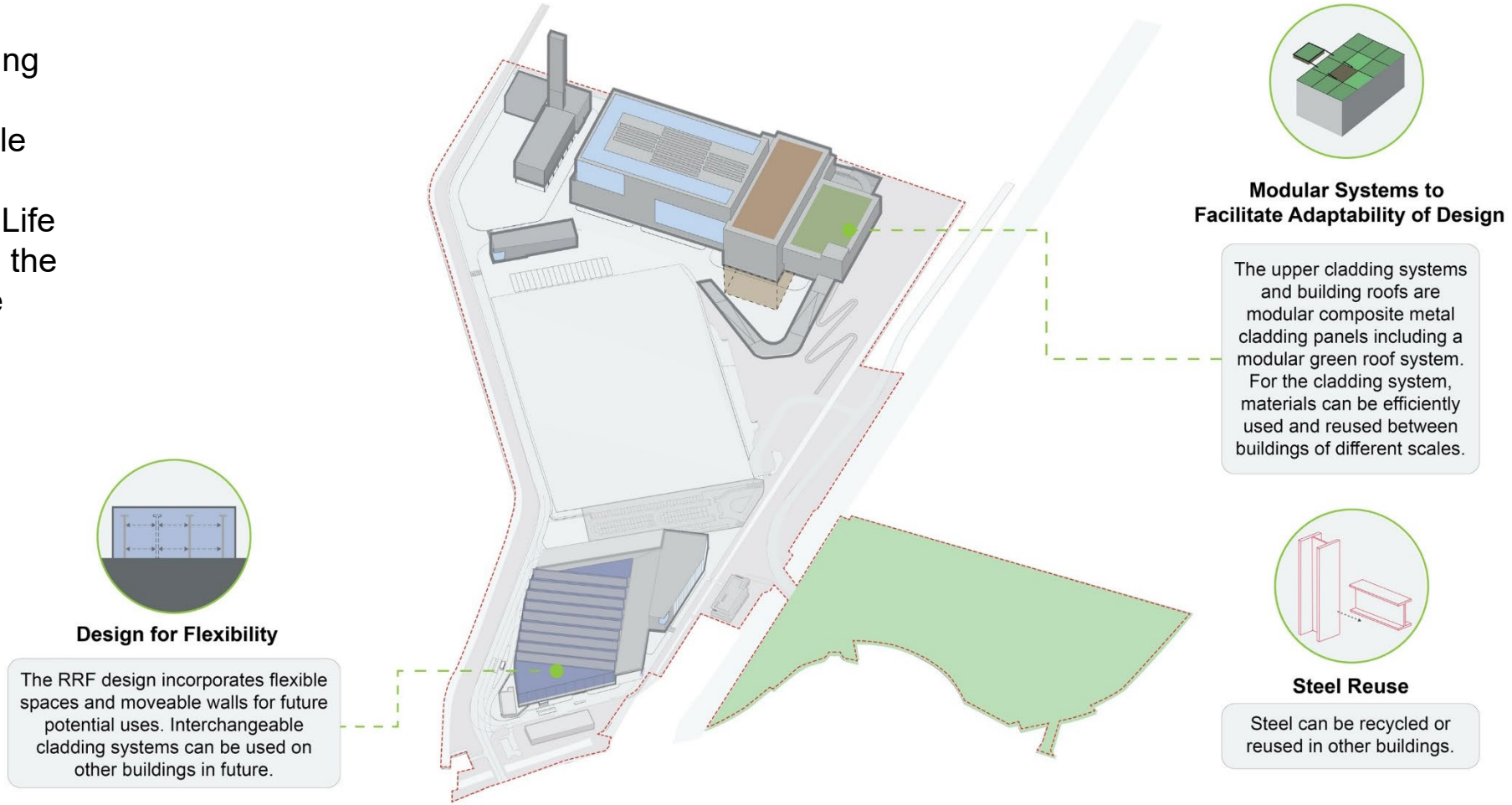


5. Carbon management initiatives

5.4 End of Life

The design of the building elements and other infrastructure, will enable carbon avoidance and reduction at the End of Life stage of the EcoPark in the future, as shown on the graphic.

End of Life



Modular Systems to Facilitate Adaptability of Design

The upper cladding systems and building roofs are modular composite metal cladding panels including a modular green roof system. For the cladding system, materials can be efficiently used and reused between buildings of different scales.

Design for Flexibility

The RRF design incorporates flexible spaces and moveable walls for future potential uses. Interchangeable cladding systems can be used on other buildings in future.

Steel Reuse

Steel can be recycled or reused in other buildings.

6. Engaging our value chain

6.1 Contribution of the value chain to carbon management

The value chain members for whom this Carbon Strategy is particularly relevant include:

- Asset owners and managers;
- Designers;
- Constructors; and
- Product/Material suppliers.

The NLHPP infrastructure is delivered, operated and maintained by a wide range of organisations, and therefore responsibility varies for different aspects of the project delivery and carbon management. It is important that effective leadership and governance structures are in place throughout the infrastructure lifecycle to ensure all value chain members are managing their works in line with the carbon management hierarchy.

We recognise that all our value chain members are important partners in delivering our carbon ambitions. We expect our value chain to work collaboratively and take a proactive approach to carbon avoidance and reduction through the selection of sustainable products, works and services, use of innovative approaches and implementation of best practice.

Our approach includes:

- All the NLHPP value chain members understand the NHLPP carbon management commitments and aspirations.
- The NLHPP carbon targets and commitments are reflected in contracts and reporting requirements. Where possible, carbon should be a considered and weighted factor when awarding contracts.
- The NLHPP contractors are to engage with sustainable material suppliers to examine the feasibility of low carbon solutions including low carbon materials and implement, where feasible.
- All value chain members are to report on their carbon avoidance and reduction efforts, capturing and sharing successes and lessons learnt.

6. Engaging our value chain

6.2 Value chain member roles and responsibilities

Value chain member	Organisation	Role	Carbon management responsibilities
Asset owners and managers	NLWA	• Owner of NLHPP assets	• Setting of principles and targets • Carbon footprint baseline & quantification • Improvement, monitoring & reporting
	London Energy Limited (LEL)	• Operator of ERF	• Implementing principles and targets • Responsible for and contributing to improvement, monitoring & reporting
Designers and technical advisors	Arup	• Programme and project management • Environmental assurance (including carbon)	• Implementing setting of principles and targets • Contribution to carbon footprint baseline & quantification • Responsible for and contributing to improvement, monitoring & reporting • Promote sustainable materials and products
	Grimshaw	• Architectural design	
	Ramboll	• ERF design and procurement advisory	
	Wood	• NLHPP non-thermal design and procurement advisory services	
Constructors	NLHPP contractors	• Construction, demolition and excavation works	
Product / material suppliers	Various suppliers procured by the NLHPP constructors	• Provision of materials, products and services for construction, demolition and excavation works	• Understanding principles and targets • Awareness of carbon footprint baseline & quantification • Contributing to improvement, monitoring & reporting

7. Ensuring Carbon Strategy implementation

7.1 Continual improvement, reporting and monitoring

Carbon management is the responsibility of the project leadership as well as the entire NLHPP delivery team.

During the construction phase, evidence will be collected to verify that the minimum 10% reduction in embodied carbon has been achieved and delivered. We are working closely with contractors to realise further reductions in embodied carbon and set stretch targets in line with industry best practice, particularly for the ERF.

Data will be collected and recorded during the design and construction of the works to enable whole life carbon assessments to be undertaken by NLWA in the future using operational data.

A reporting and monitoring system will be established, which will document any efforts towards decarbonisation, as well as a system of continuous improvement that will be communicated.

This will link in with the broader NLHPP environmental and sustainability reporting. The NLHPP Project Managers monthly project status reports collate information reported from the contractors and this will include carbon reduction reporting.

Training and engagement is essential to upskilling our delivery teams to highlight the importance of meeting our carbon emission reduction targets and enable this to happen.

NLWA commit to reporting annually on our performance against this Carbon Strategy.

7. Ensuring Carbon Strategy implementation

7.2 Reporting responsibilities

General role	Reporting responsibility
Asset owners and managers	• Report whole life carbon emissions during the delivery of works, relevant to the objective of the carbon emissions quantification. • Set out and communicate to all value chain members the reporting requirements for the programme of work. • Set out the requirements of each value chain member and the roles and responsibilities they must fulfil as part of the asset and programme of work reporting process. • Set out the frequency of reporting during the delivery of assets and programmes of work. • Disseminate the reporting requirements to all value chain members. • Report results of carbon emissions quantification to relevant stakeholders at a frequency sufficient to allow carbon reductions to be implemented and to inform the continual improvement process.
Designers and technical advisors	• Report carbon emissions according to requirements and frequency defined by asset owner/manager during delivery of works. • Recommend opportunities to improve NLWA's approach to reporting and, where accepted, assist in the implementation in the delivery of the works. • Document in evidence when reporting improvement proposals are made to the asset owner/manager, supported by identification of the anticipated benefits to the quantification and record of the outcome.
Constructors	• Report carbon emissions according to the requirements and frequency defined by NLWA during the delivery of the works. • Recommend opportunities to improve NLWA's approach to reporting and, where accepted, assist in the implementation in the delivery of the works. • Document in evidence when reporting improvement proposals are made to the asset owner/manager, supported by identification of the anticipated benefits to the quantification and record of the outcome. • Track and report all the waste leaving the site according to the waste Duty of Care requirements and reporting on efforts to maximise the materials identified for reuse, recycling or recovery.
Product and material suppliers	• Report carbon emissions according to the requirements and frequency defined by the asset owner/manager during the delivery of the works. • Recommend opportunities to improve NLWA's approach to reporting and, where accepted, assist in the implementation in the delivery of the works. • Document in evidence when reporting improvement proposals are made to the asset owner/manager, supported by identification of the anticipated benefits to the quantification and record of the outcome.

8. Next steps

8.1 Implementation plan

An implementation plan will be developed to provide details on the processes, governance and actions to ensure that this Carbon Strategy is embedded and implemented across the value chain and throughout the NLHPP lifecycle. It will articulate the change process and actions required to be implemented in order to meet the objective of this Carbon Strategy. It will guide the project through training, measuring, monitoring and reporting on carbon avoidance and reduction initiatives.

The implementation plan will also set out clear responsibilities and a governance structure to ensure that actions are carried out. Continual improvement approach will be adopted to challenge our approach and ensure that best practice is implemented throughout the life of the NLHPP.

The implementation plan will explore the opportunities and barriers to achieving net zero for operation of the EcoPark by 2050. We recognise the challenges, as well as the opportunities, that such an ambitious target presents. We will systematically address these challenges following the carbon management hierarchy and carbon principles described in this Carbon Strategy.

At the time of writing, the current stage of the NLHPP program means that embodied carbon is a key priority area of focus. As such, the key areas that will be explored further include:

- We will set further stretch targets on embodied carbon to improve on the 10% reduction target. We will challenge our contractors to deliver even better embodied carbon savings in design and construction.
- We will explore opportunities to use low carbon concrete with admixtures and novel cement mixtures that can be specified using PAS 8820. Where cement additives do not currently conform with British Standards we will explore how we can safety utilise these during design.
- The delivery programme will be considered in light of sourcing alternative materials locally and on time, in addition to factors such as longer setting times.

8. Next steps

8.1 Implementation plan (continued)

- We will seek to refine the structural design such that the use of steel is optimised and reduced, and identify how the overall tonnage can be reduced.
- Embodied carbon factors for process equipment, such as boilers systems, flue gas treatment systems, turbine etc. are challenging. We will work with the contractor to seek opportunity to reduce the embodied carbon and share lessons with the broader industry.
- Opportunities for maximising efficiency will be explored in the design stages including improving reliability and durability in order to reduce whole of life carbon.

8.2 Further plans for reducing carbon at decommissioning

A decommissioning strategy will be prepared to ensure that the existing EfW facility can be disassembled, and the materials reused, reclaimed or recycled with minimal waste being disposed at landfill, as much as possible. The decommissioning strategy will focus on setting carbon avoidance and reduction targets for the deconstruction of the existing EfW facility as the project progresses. According to the project programme for the NLHPP, the decommissioning of the existing EfW facility is expected in 2027.

8. Next steps

8.3 Further plans for reducing carbon at the operation stage

Horizon Scanning

By following the carbon management hierarchy we aim to reduce embodied carbon emissions as far as practically possible. However, we recognise there will be residual emissions which cannot be avoided.

To ensure that operational carbon emissions of the NLHPP are reduced throughout the lifecycle of each building element, NLWA will undertake regular (six-monthly) horizon scanning reviews for site operations and asset management.

The key objective of the horizon scanning reviews is to provide a list of potential initiatives that may be applied at the EcoPark in the future (0 to 30+ years from now) to ensure that its operations respond to current and future impacts associated with climate change, as well as changes in environmental legislation, value chains, digital technology, urban planning and governance structures.

Early horizon scanning workshops have already identified opportunities to address these challenges including:

- Artificial intelligence-based (AI-based) operations and expertise sharing.
- Digital information and asset management for enhancement of energy systems.
- AI-based furnace combustion tuning system.
- Urban mining to extract materials (mainly metals) from ERF ash residues using electric pulse fragmentation and separation.
- CCUS for post-combustion carbon capture from the ERF.

8. Next steps

8.3 Further plans for reducing carbon at the operation stage (continued)

Carbon Offsetting

As discussed in Section 3.1, our Strategy adopts the carbon hierarchy which prioritises avoiding and reducing emissions. We recognise that during the operation of the EcoPark there will be unavoidable emissions that unfortunately cannot be eliminated. Carbon offsetting or sequestration is an approach that could be adopted.

Carbon offsetting is the action of compensating for carbon emissions resulting from the release of fossil-derived carbon, by participating in carbon reduction schemes designed to reduce the overall carbon emissions in the atmosphere.

Carbon offsetting is an approach to be considered for managing the carbon emissions, which cannot be otherwise eliminated.

NLWA has undertaken a preliminary study and will further assess the feasibility of offsetting the ERF emissions in the short-term (i.e. for the first 10-15 years of operation) as part of the carbon strategy implementation plan. Any decisions made on offsetting will be in line with the carbon management hierarchy (i.e. deciding to offset emissions, only where carbon avoidance/reduction/capture is not deemed to be feasible).

Any chosen offsetting schemes will be accredited and will be able to provide carbon credits meeting the principles of the Publicly Available Specification (PAS) 2060 Carbon neutrality standard. This ensures that the offsets are:

- Additional – verify that the project would not have occurred without finance from offsets.
- Permanent – emissions reduction must be permanent or for a minimum time (e.g. 100 years).
- Measurable – able to quantify the carbon saving accurately.
- Independently audited and verified – for transparency, and to ensure the offset is traceable and cannot be double counted.

8. Next steps

8.3 Further plans for reducing carbon at the operation stage (continued)

Carbon Capture Use and Storage (CCUS)

NLWA is taking action towards gaining a leading role in the implementation of CCUS for EfW facilities by actively investigating the deployment of this technology. CCUS is considered to be a potential long-term opportunity (i.e. over 15 years from now) for the ERF. This solution would capture some or all of the operational carbon emissions of the ERF, helping to make it a net zero or a carbon negative facility in the future.

Global carbon emissions are reducing too slowly. There is a broad international consensus that CCUS is essential in meeting the Paris Agreement climate targets. The Government is supporting the development of CCUS clusters for a deep decarbonisation of the UK economy, and without CCUS net zero is not achievable.

Shared infrastructure hubs, clean hydrogen supply, and economic incentives are required to scale up CCUS and reduce the investment risk into carbon dioxide transport and storage infrastructure.

Specifically, in the waste sector, the CCC states that all new EfW plants and extensions to plants from today should be fitted with carbon capture plants or be carbon capture ready, with CCUS fitted to all facilities by 2050.

A CCUS study is being prepared to assess the opportunities and challenges of implementing a solution for the ERF considering the technical, environmental and financial viability. The CCUS study is investigating:

- CCUS readiness requirements for enabling a carbon capture plant within the EcoPark.
- Establishing the overall approach by identifying and forming collaborations with stakeholders, as appropriate.
- Setting boundaries and targets including exploring a carbon negative target.
- Considering environmental impacts associated with the required infrastructure.
- Business case development in line with BEIS recommended models.
- Determining the feasibility of a CCUS hub for London and the South East of England.

Glossary

Term	Description
Global warming potential (GWP)	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas; carbon dioxide, which is assigned a value of one.
Embodied carbon	Carbon emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure.
Municipal waste	Household waste and business waste collected by a local authority and which is similar in nature and composition as required by the EU Landfill Directive.
Net zero carbon	Balancing the amount of emitted greenhouse gases with the equivalent emissions that are either offset or sequestered.
Operational carbon	The amount of carbon emitted during the operational or in-use phase of a structure. This includes the use, management, and maintenance of a structure.
Residual waste	Non-hazardous, solid, and combustible mixed waste, which remains after recycling activities have been carried out.
Whole life carbon	Whole life carbon emissions are directly related to the type and quantity of the resources used to create, maintain, use and decommission a structure.