



# One Earth Solar Farm

**Volume 6.0 Environmental Statement [EN010159]**

**Volume 3: Technical Appendices Supporting ES Volume 2**

**Materials and Waste Impact Assessment**

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# 1. Materials and Waste

## 1.1 Introduction

- 1.1.1 This materials and waste impact assessment presents the findings of an assessment of the likely significant effects on materials and waste as a result of the Proposed Development. For more details about the Proposed Development, refer to **ES Volume 1, Chapter 5: Description of the Proposed Development [EN010159/APP/6.5]**.
- 1.1.2 The document references have not been updated from the original submission. Please refer to the **Guide to the Application [EN010159/APP/1.3.4]** for the list of current versions of documents.
- 1.1.3 As outlined in Overarching National Policy Statement for Energy EN-1 (NPS EN-1)<sup>1</sup> paragraph 5.15.9 “The arrangements described and a report setting out the sustainable management of waste and use of resources should include information on how re-use and recycling will be maximised in addition to the proposed waste recovery and disposal system for all waste generated by the development. They should also include an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation.”
- 1.1.4 As outlined in NPS EN-1 paragraph 5.15.15 the Secretary of State should be satisfied that: “the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area. ”This assessment discusses the expected waste streams from the Proposed Development and how they will be managed. Design life, replacement frequency and recyclability of key Proposed Development components are also considered.
- 1.1.5 This assessment identifies and proposes measures to address the potential impacts and likely significant effects on Materials and Waste, during the construction, operation (including maintenance), and decommissioning phases of the Proposed Development.
- 1.1.6 This assessment of the impact of the waste arising from the Proposed Development is undertaken in accordance with the requirements of NPS EN-1 above, the Planning Inspectorate Scoping Opinion and the Institute of

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<sup>1</sup> Institute of Environmental Management and Assessment (IEMA). 2020. IEMA guide to: Materials and Waste in Environment Assessment, Guidance for a Proportionate Approach. Available at: <https://www.iema.net/media/0t5fwyhi/iema-materials-and-waste-in-eia-march-2020.pdf> [Accessed 12 February 2025].

Environmental Management and Assessment (IEMA) guide to: Materials and Waste in Environmental Impact Assessment, Guidance for a Proportionate Approach (referred to herein as the 'IEMA Guidance' ).

1.1.7 For the purposes of this assessment, materials and waste comprise:

- > The consumption of materials (key construction materials only); and
- > The generation and management of waste.

1.1.8 Materials are defined in the IEMA Guidance as “physical resources that are used across the lifecycle of a development. Examples include key construction materials such as concrete, aggregate, asphalt and steel”. Other material assets considered include built assets such as landfill void capacity and allocated/safeguarded mineral and waste sites.

1.1.9 Waste is defined as per the Waste Framework Directive<sup>2</sup> as “*any substance or object which the holder discards or intends or is required to discard*”. The legal definition of waste covers substances or objects which fall outside of the commercial cycle or out of the chain facility. In particular, most items that are sold or taken off-site for recycling are wastes, as they require treatment before they are reused or resold. In practical terms, wastes include surplus spoil, scrap, recovered spills, unwanted surplus materials, packaging, office waste, and broken, worn-out, contaminated or otherwise spoiled plant, equipment, and materials.

1.1.10 This Chapter is supported by the following appendices:

- > Appendix A Materials and Waste Legislation, Planning Policy and Guidance; and
- > Appendix B Materials and Waste Methodology and Baseline.

## 1.2 Consultation

1.2.1 The scoping opinion adopted by the Planning Inspectorate (on behalf of the Secretary of State) pursuant to Regulation 10 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 was received on 22 December 2023 (**ES Volume 3: Scoping Opinion [EN010159/APP/6.23]**). The feedback received from the Planning Inspectorate is summarised in **Table 1-1**.

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<sup>2</sup> European Commission. 2008. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and repealing certain Directives (Waste Framework Directive). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705> [Accessed 30 October 2024].

Table 1-1. Scoping Opinion Response (Materials and Waste)

Consultee	Summary of comment	How matter has been addressed	Location of response
Planning Inspectorate ID 3.13.3	<p>It is stated that a standalone chapter on waste is not proposed although the production of waste and its transportation will be considered where relevant in the ES, such as the traffic and transport chapter.</p> <p>Noting that the operational life of the Proposed Development is not proposed to be specified, the Inspectorate considers that the ES should assess the likely significant effects from waste during the operation phase, as well as the decommissioning phase to the extent that is possible at this time. The ES should include estimates, by type and quantity, of expected residues and emissions and quantities and types of waste produced during the construction and operation phases in line with Schedule 4 of the EIA Regulations. As such, the Inspectorate is not content to scope this aspect out.</p>	<p>An assessment of the likely significant effects for construction, operation and decommissioning, to the extent that is practicable at this time, is outlined in this assessment.</p> <p>Estimated types and quantities (where available) of waste produced during construction, operation and decommissioning are outlined in this assessment.</p>	<p>Assessment of Likely Effects within Section 1.9 of this assessment.</p> <p>Table 1-3, within Section 1.9 of this assessment.</p> <p>Table 1-5, within Section 1.9 of this assessment.</p>

## 1.3 Legislation, Planning Policy and Guidance

### Legislation

- 1.3.1 A summary of relevant legislation, planning policy and other guidance documents relating to the assessment of Materials and Waste is provided below.
- 1.3.2 Full details of the legislation, policy, and guidance of relevance to the assessment of Materials and Waste is provided in full in **Appendix A: Materials and Waste Legislation, Policy and Guidance**.
- 1.3.3 Applicable legislation to inform the Materials and Waste assessment includes:
- > The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) (2017 No. 572)<sup>3</sup>;
  - > Waste Framework Directive 2008 (2008/98/EC)<sup>2</sup>;
  - > The Waste (England and Wales) Regulations 2011<sup>4</sup>;
  - > The Environmental Permitting (England and Wales) Regulations 2016<sup>5</sup>;
  - > Environmental Protection Act 1990<sup>6</sup>;
  - > Environment Act 2021<sup>7</sup>;
  - > The Hazardous Waste Regulations (England and Wales) 2005<sup>8</sup>;
  - > The Waste Electrical and Electronic Equipment (WEEE) Regulations<sup>9</sup>; and

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<sup>3</sup> The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'). Available at: <https://www.legislation.gov.uk/ukxi/2017/572/contents> [Accessed 30 October 2024].

<sup>4</sup> The Waste (England and Wales) Regulations 2011 (as amended). Available at: <https://www.legislation.gov.uk/ukxi/2011/988/contents/made> [Accessed 30 October 2024].

<sup>5</sup> The Environmental Permitting (England and Wales) Regulations 2016. Available at: <https://www.legislation.gov.uk/ukxi/2016/1154/contents> [Accessed 30 October 2024].

<sup>6</sup> Environmental Protection Act 1990 (as amended). Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents> [Accessed 30 October 2024].

<sup>7</sup> Environment Act 2021. Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted> [Accessed 30 October 2024].

<sup>8</sup> The Hazardous Waste (England and Wales) Regulations 2005 (as amended). Available at: <https://www.legislation.gov.uk/ukxi/2005/894/contents/made> [Accessed 30 October 2024].

<sup>9</sup> The Waste Electrical and Electronic Equipment (WEEE) Regulations 2013. Available at: <https://www.gov.uk/guidance/regulations-waste-electrical-and-electronic-equipment> [Accessed 30 October 2024].

- > The Waste Batteries and Accumulators (Amendment) Regulations 2015<sup>10</sup>.

### National Planning Policy

- 1.3.4 The National Policy Statements (NPSs) that are relevant to the Proposed Development are:
- > Overarching National Policy Statement for Energy (EN-1)<sup>11</sup>;
  - > National Policy Statement for Renewable Energy Infrastructure (EN-3)<sup>12</sup>; and
  - > National Policy Statement for Electricity Networks Infrastructure (EN-5)<sup>13</sup>.
- 1.3.5 The NPSs listed above came into effect on 17 January 2024. These NPSs set out the Government's energy policy for the delivery of nationally significant energy infrastructure, the need for new energy infrastructure, and guidance for the determination of an application for a DCO.
- 1.3.6 The relevant NPS requirements, together with an indication of where in the Report the information is provided to address these requirements, are provided in **Appendix A: Materials and Waste Legislation, Policy and Guidance**. NPS EN-3 and EN-5 do not contain specific requirements relevant to the materials and waste assessment for the Proposed Development.
- 1.3.7 The National Planning Policy Framework (NPPF)<sup>14</sup> does not contain specific waste policies as these are detailed within the revised Waste Management Plan for England<sup>15</sup> and the National Planning Policy Guidance (NPPG) documents

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<sup>10</sup> The Waste Batteries and Accumulators (Amendment) Regulations 2015. Available at: <https://www.legislation.gov.uk/ukxi/2015/1935/contents> [Accessed 20 December 2024].

<sup>11</sup> Department for Energy Security & Net Zero (DESNZ). 2023. Overarching National Policy Statement for Energy (EN-1). Available at: <https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1> [Accessed 30 October 2024].

<sup>12</sup> DESNZ. 2023b. National Policy Statement for Renewable Energy Infrastructure (EN-3). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-renewable-energy-infrastructure-en-3> [Accessed 30 October 2024].

<sup>13</sup> DESNZ. 2023c. National Policy Statement for Electricity Networks Infrastructure (EN-5). Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-electricity-networks-infrastructure-en-5> [Accessed 30 October 2024].

<sup>14</sup> Ministry of Housing, Communities & Local Government (MHCLG). 2024. National Planning Policy Framework. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2> [Accessed 20 December 2024].

<sup>15</sup> Department for the Environment, Food and Rural Affairs (DEFRA). 2021a. The Waste Management Plan for England 2021. Available at: <https://www.gov.uk/government/publications/waste-management-plan-for-england-2021> [Accessed 30 October 2024].

for Waste<sup>16</sup> and Minerals<sup>17</sup>, however the two overarching policies are relevant to materials and waste are provided in full in **Appendix A: Materials and Waste Legislation, Policy and Guidance**.

1.3.8 Additional national policy relevant to Materials and Waste includes:

- > The Waste Management Plan for England 2021<sup>18</sup>;
- > A Green Future: Our 25 Year Plan to Improve the Environment 2018<sup>19</sup>;
- > Our Waste, Our Resources: A Strategy for England 2018 (Resources and Waste Strategy for England)<sup>20</sup>;
- > Environmental Improvement Plan 2023<sup>21</sup>; and
- > The Waste Prevention Programme for England: Maximising Resources, Minimising Waste 2023<sup>22</sup>.

### Local Planning Policy

1.3.9 Local planning policies that are relevant to the Proposed Development and Materials and Waste are:

- > Central Lincolnshire Local Plan<sup>23</sup>;

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<sup>16</sup> MHCLG. 2015. National Planning Policy Guidance (NPPG) for Waste. Available at: <https://www.gov.uk/guidance/waste> [Accessed 30 October 2024].

<sup>17</sup> MHCLG. 2014. National Planning Policy Guidance (NPPG) for Minerals. Available at: <https://www.gov.uk/guidance/minerals> [Accessed 30 October 2024].

<sup>18</sup> DEFRA. 2021b. The Waste Management Plan for England. Available at: <https://www.gov.uk/government/publications/waste-management-plan-for-england-2021> [Accessed 30 October 2024].

<sup>19</sup> DEFRA. 2018a. A Green Future: Our 25 Year Plan to Improve the Environment. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan> [Accessed 30 October 2024].

<sup>20</sup> DEFRA. 2018b. Our Waste, Our Resources: A Strategy for England. Available at: <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england> [Accessed 30 October 2024].

<sup>21</sup> DEFRA. 2023. Environmental Improvement Plan. Available at: <https://www.gov.uk/government/publications/environmental-improvement-plan> [Accessed 30 October 2024].

<sup>22</sup> DEFRA. 2023c. The waste prevention programme for England: Maximising Resources, Minimising Waste. Available at: <https://www.gov.uk/government/publications/waste-prevention-programme-for-england-maximising-resources-minimising-waste/the-waste-prevention-programme-for-england-maximising-resources-minimising-waste> [Accessed 30 October 2024].

<sup>23</sup> Central Lincolnshire Local Plan Team. 2023. Central Lincolnshire Local Plan (Adopted April 2023). Available at: <https://www.n-kesteven.gov.uk/central-lincolnshire/adopted-local-plan-2023> [Accessed 30 October 2024].



- > Bassetlaw Local Plan 2020-2038<sup>24</sup>;
- > Newark and Sherwood Amended Core Strategy Development Plan Document<sup>25</sup>;
- > Nottinghamshire and Nottingham Replacement Waste Local Plan: Part 1 Waste Core Strategy<sup>26</sup>;
- > Nottinghamshire and Nottingham Joint Draft Waste Local Plan<sup>27</sup>;
- > Nottinghamshire Minerals Local Plan<sup>28</sup>; and
- > Lincolnshire Minerals and Waste Local Plan<sup>29</sup>.

### Other Guidance

1.3.10 Other guidance documents relevant to the assessment of the impacts of the Proposed Development on Materials and Waste include:

- > NPPG for Waste<sup>16</sup>;
- > NPPG for Minerals<sup>17</sup>;
- > IEMA Guidance;
- > Waste & Resources Action Programme (WRAP) Designing Out Waste: A Design Team Guide for Civil Engineering<sup>30</sup>;

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<sup>24</sup> Bassetlaw District Council. 2024. Bassetlaw Local Plan 2020-2038. Available at: <https://www.bassetlaw.gov.uk/planning-and-building/bassetlaw-local-plan-2020-2038/bassetlaw-local-plan-2020-2038/> [Accessed 30 October 2024].

<sup>25</sup> Newark and Sherwood District Council. 2019. Amended Core Strategy DPD. Available at: <https://www.newark-sherwooddc.gov.uk/amendedcorestrategy/> [Accessed 5 November 2024].

<sup>26</sup> Nottinghamshire Country Council & Nottingham City Council. 2013. Nottinghamshire and Nottingham Replacement Waste Local Plan: Part 1 Waste Core Strategy. Available at: <https://www.nottinghamshire.gov.uk/planning-and-environment/waste-development-plan/waste-core-strategy> [Accessed 30 October 2024].

<sup>27</sup> Nottinghamshire Country Council & Nottingham City Council. 2023. Nottinghamshire and Nottingham Joint Draft Waste Local Plan. Available at: <https://www.nottinghamshire.gov.uk/planning-and-environment/waste-development-plan/new-waste-local-plan> [Accessed 30 October 2024].

<sup>28</sup> Nottinghamshire County Council. 2021. Nottinghamshire Minerals Local Plan. Available at: <https://www.nottinghamshire.gov.uk/planning-and-environment/minerals-local-plan/adopted-minerals-local-plan> [Accessed 5 November 2024].

<sup>29</sup> Lincolnshire County Council. 2016. Lincolnshire Minerals and Waste Local Plan. Available at: <https://www.lincolnshire.gov.uk/planning/minerals-waste> [Accessed 30 October 2024].

<sup>30</sup> Waste & Resources Action Programme (WRAP). 2010. Designing out Waste: A design team guide for civil engineering. Available at: <https://www.ciria.org/Resources/REK/Guidance/Designing%20out%20waste%20guidance%20a%20design%20team%20guide.aspx> [Accessed 30 October 2024].

- > Contaminated Land: Applications in Real Environments (CL:AIRE)  
Definition of Waste: Development Industry Code of Practice (DoW CoP)<sup>31</sup>;
- > Waste Duty of Care Code of Practice<sup>32</sup>;
- > Defra Guidance on Applying the Waste Hierarchy<sup>33</sup>;
- > Solar Power Europe Lifecycle Quality Best Practice Guidelines<sup>34</sup>; and
- > Department for Business and Trade UK Battery Strategy<sup>35</sup>.

## 1.4 Assumptions, Limitations and Uncertainties

1.4.1 The materials and waste assessment has been undertaken on the basis of information available at the time of the assessment. Any assumptions made for the assessment and the limitations this presents are reported including:

- > The future baseline is assumed to be the same as the current baseline as outlined in Appendix B: Materials and Waste Methodology and Baseline.
- > Materials and waste estimates are based upon project-specific information provided by the design team and other similar Nationally Significant Infrastructure Project (NSIP) solar schemes (500 megawatt (MW) extrapolated up to 740MW).
- > The solar panels, inverters, transformers, switchgear and other supporting equipment will be manufactured off-site to specified sizes.

1.4.2 A waste recovery rate of 70% is assumed to be achievable for construction, operation, and decommissioning for the purpose of the waste assessment. This is in line with the national target for recovery of construction and demolition (C&D) waste of 70% by weight, as set out in the Waste Framework Directive<sup>2</sup> and the Waste Management Plan for England<sup>18</sup>. A good practice landfill diversion target of 90% has been achieved and exceeded by major UK

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<sup>31</sup> Contaminated Land: Applications in Real Environments (CL:AIRE). 2011. Definition of Waste: Development Industry Code of Practice (DoW CoP). Available at: <https://www.claire.co.uk/projects-and-initiatives/dow-cop/28-framework-and-guidance/111-dow-cop-main-document> [Accessed 30 October 2024].

<sup>32</sup> DEFRA. 2018c. Waste Duty of Care Code of Practice. Available at: <https://www.gov.uk/government/publications/waste-duty-of-care-code-of-practice> [Accessed 30 October 2024].

<sup>33</sup> DEFRA. 2011. Guidance on Applying the Waste Hierarchy. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69403/pb13530-waste-hierarchy-guidance.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69403/pb13530-waste-hierarchy-guidance.pdf) [Accessed 30 October 2024].

<sup>34</sup> Solar Power Europe. 2015. Lifecycle Quality: Best Practice Guidelines Version 1.0. Available at: <https://www.solarpowereurope.org/insights/thematic-reports/lifecycle-quality-best-practice-guidelines-version-1-0> [Accessed 30 October 2024].

<sup>35</sup> Department for Business and Trade. 2023. UK Battery Strategy. Available at: <https://www.gov.uk/government/publications/uk-battery-strategy> [Accessed 30 October 2024].

developments as outlined in the IEMA Guidance<sup>1</sup>. In 2020, the most recent year for which data is available, the UK generated 59.4 million tonnes of non-hazardous C&D waste, of which 55 million tonnes was recovered. This represents a recovery rate of 92.6%<sup>36</sup>. The applicant has a commitment to achieve 100% reuse and recycling of solar panels<sup>37</sup> for construction, operation and decommissioning. This commitment is outlined in Orsted's latest updates from 2023 which states *"we expanded our commitment to achieving 100% reuse and recycling of solar panels to encompass our entire global portfolio."*

## 1.5 Study Area

- 1.5.1 The study areas for the assessment of impacts related to Materials and Waste have been defined in line with the IEMA Guidance. Two study areas are defined: a Proposed Development Study Area (within which waste associated with the Proposed Development is generated, construction materials are used and allocated/safeguarded mineral and waste sites are present), and an Expansive Study Area (within which landfills and other waste management facilities that manage waste generated by the Proposed Development are likely to be located and construction materials are available). Together the Proposed Development Study Area and Expansive Study Area are referred to as 'the Study Areas'.

### Proposed Development Study Area

- 1.5.2 The Proposed Development Study Area for construction, operational (including maintenance) and decommissioning waste generation, and for use of construction materials (key construction materials only), comprises the Proposed Development Site (i.e., the footprint of the proposed works, together with any temporary land requirements during permitted preliminary works and construction). This includes temporary offices, compounds and storage areas.
- 1.5.3 The Proposed Development Study Area for impacts on allocated/safeguarded mineral and waste sites during construction, operation and decommissioning is aligned to the Proposed Development Boundary.

### Expansive Study Area

- 1.5.4 The Expansive Study Area (within which landfills and other waste management facilities that manage waste generated by the Proposed Development are likely to be located and construction materials are available) for non-hazardous and inert waste management is the East Midlands region. The Expansive Study

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<sup>36</sup> DEFRA. 2024. UK Statistics on waste. Available at: <https://www.gov.uk/government/statistics/uk-waste-data/uk-statistics-on-waste#recovery-rate-from-non-hazardous-construction-and-demolition-cd-waste> [Accessed 12 February 2025].

<sup>37</sup> Orsted, 2021. Circular Resource Use. Available at: <https://orsted.com/en/who-we-are/sustainability/nature/circular-resource-use> [Access 13 November 2024].

Area and regions include the following sub-regions, as outlined in the Environment Agency's 2023 Waste Summary Tables for England - Version 1<sup>38</sup>:

- > Derbyshire;
- > Leicestershire;
- > Lincolnshire;
- > Northamptonshire; and
- > Nottinghamshire.

1.5.5 The Expansive Study Area for hazardous waste management is England.

1.5.6 The Study Area for hazardous waste management is defined based on professional judgement and informed by consideration of the proximity principle. The proximity principle for hazardous waste in England is outlined in Principle 2 - Infrastructure Provision in the Strategy for Hazardous Waste Management in England, and states: *"we look to the market for the development of hazardous waste infrastructure, which implements the hierarchy for the management of hazardous waste and meets the needs of the UK to ensure that the country as a whole is self-sufficient in hazardous waste disposal, facilities are put in place for hazardous waste recovery in England, and the proximity principle is met"*<sup>39</sup>. Planning for hazardous waste management is also undertaken at a national level.

1.5.7 The Expansive Study Areas for the availability of key construction materials (aggregates, asphalt, concrete and steel) are national (United Kingdom (UK) or Great Britain (GB), depending upon baseline information availability), and the East Midlands region.

## 1.6 Assessment Methodology

### Scope of Assessment

1.6.1 The assessment of materials and waste considers the following:

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<sup>38</sup> Environment Agency. 2024. 2023 Waste Data Interrogator, 2023 Waste Summary Tables for England – Version 1. Available at: <https://www.data.gov.uk/dataset/59ab8448-3905-49c6-9122-ae762f96f66b/2023-waste-data-interrogator> [Accessed 31 October 2024].

<sup>39</sup> DEFRA. 2010. A Strategy for Hazardous Waste Management in England. Available at: [https://www2.richmond.gov.uk/docs/arlington/CDE10\\_hazardous\\_waste\\_strategy\\_england\\_2010.pdf](https://www2.richmond.gov.uk/docs/arlington/CDE10_hazardous_waste_strategy_england_2010.pdf) [Accessed 31 October 2024].

- > waste producers have a legal duty of care to manage their waste in accordance with regulations and to ensure that any waste leaving the site where it is generated is transferred to a suitably licensed facility for further treatment or disposal;
- > facilities transferring, treating or disposing of waste must be either licensed or apply for an exemption from a licence, and impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for these facilities themselves;
- > as part of their planning function, Waste Planning Authorities (WPAs) are required to ensure that sufficient land is available to accommodate facilities for the treatment of all waste arising in the area, either within the WPA area, or through export to suitable facilities in other areas; and
- > Mineral Planning Authorities are similarly required to ensure an adequate supply of minerals, sufficient to meet the needs of national and regional supply policies, and local development needs.

1.6.2 provides the outline scope of the materials and waste assessment.

*Table 1-2. Outline Scope of Materials and Waste Assessment*

Proposed Development Phase	Potential Effects	Scope In / Out
<b>Construction, Operation and Decommissioning</b>	Waste arising from extraction, processing and manufacture of construction components and products.	Scoped out – This assumes that these products and materials are being developed in a manufacturing environment with their own waste management plans, facilities, and supply chain, which are potentially in different regions of the UK or the world and therefore outside of the geographical scope of this study. Such matters cannot be accurately predicted and assessed as they relate to procurement decisions that cannot be assured.

Proposed Phase	Development	Potential Effects	Scope In / Out
		Other environmental impacts associated with the management of waste from the Proposed Development.	Scoped out – Other environmental impacts associated with the management of waste from the Proposed Development (e.g. on water resources, air quality, noise or traffic resulting from the generation, handling, on-site temporary storage or off-site transport of materials and waste) are not included in this assessment, as they are addressed separately in other relevant chapters of the ES.
		Changes to allocated/safeguarded mineral site	Scoped out – There are no allocated/safeguarded mineral sites within the Proposed Development Boundary.
		Changes to allocated/safeguarded waste site	Scoped out – There are no allocated/safeguarded waste sites within the Proposed Development Boundary.
<b>Construction</b>		Changes in the availability of materials	Scoped in (qualitative assessment only).
		Changes in available landfill void capacity	Scoped in.
<b>Operation (including maintenance)</b>		Changes in the availability of materials	Scoped out – Effects on the availability of materials during the operation of the Proposed Development. Forecast materials are (using professional judgement) considered negligible in relation to the scale and nature of the Proposed Development.

Proposed Phase	Development	Potential Effects	Scope In / Out
		Changes in available landfill void capacity	Scoped in.
Decommissioning		Changes in the availability of materials	Scoped out – Effects on the availability of materials during the decommissioning of the Proposed Development. Forecast materials are (using professional judgement) considered negligible in relation to the scale and nature of the Proposed Development.
		Changes in available landfill capacity	Scoped in.

## Impact Assessment Methodology

### Receptor Sensitivity

1.6.3 The sensitive receptors for the assessment of materials and waste impacts are:

- > Landfill void capacity in the Expansive Study Area of the East Midlands (non-hazardous and inert landfill void capacity) – as defined in the IEMA Guidance **Error! Bookmark not defined.** “landfill is a finite resource, and hence – through the ongoing disposal of waste – there is a continued need to expand existing and develop new facilities, This requires the depletion of natural and other resources which, in turn, adversely impacts the environment.”; and
- > Materials, national and regional availability of key construction materials – as outlined in the IEMA Guidance “materials are, in their own right, sensitive receptors. Consuming materials impacts upon their immediate and (in the case of primary material) long-term availability; this results in the depletion of natural resources and adversely impacts the environment.”

### Materials

1.6.4 The sensitivity of materials relates to the availability and type of construction materials to be consumed by the Proposed Development. The IEMA Guidance criteria described within Table 1-8 of **Appendix B: Materials and Waste Methodology and Baseline** is used to determine the sensitivity of materials.



- 1.6.5 Material receptor sensitivity is determined as “low”. On balance, the key construction materials required for the construction of the Proposed Development are forecast (through trend analysis and other information e.g. material sales) to be generally free from known issues regarding supply and stock. Key materials required for construction and operation (including maintenance) are likely to be available comprising a high proportion of sustainable features and benefits (e.g. recycled content).
- 1.6.6 Potential recycled content for the main construction materials is outlined in Table 1-18 of **Appendix B: Materials and Waste Methodology and Baseline**.

### Waste

- 1.6.7 The sensitivity of waste relates to availability of landfill capacity in the absence of the Proposed Development as outlined in the IEMA Guidance “*landfill capacity is recognised as an unsustainable and increasingly scarce option for managing waste.*” The sensitivity of landfill capacity is assessed based on a review of historic landfill void capacity trends where available and information from relevant policy documents.
- 1.6.8 The criteria used to determine the sensitivity of landfill capacity is described within Table 1-9 and Table 1-10 of **Appendix B: Materials and Waste Methodology and Baseline**.
- 1.6.9 Waste receptor sensitivity is determined as “very high”. There is no publicly available information on any potential changes to landfill capacity by the time of the construction, operation and decommissioning of the Proposed Development, therefore a worst-case scenario for sensitivity is considered (e.g. landfill capacity is assumed to remain the same but a very considerable reduction in capacity cannot be excluded). A scenario in which no landfill void space is available is deemed to be unrealistic as outlined in the future baseline section in **Appendix B: Materials and Waste Methodology and Baseline**
- Magnitude of Impacts
- 1.6.10 The IEMA Guidance for assessing the magnitude of impact from materials comprises a percentage-based approach that determines the influence of construction materials’ use on the baseline national demand from the construction of the Proposed Development. The criteria used to assess the magnitude of impact for materials are provided in Table 1-11 of **Appendix B: Materials and Waste Methodology and Baseline**.
- 1.6.11 The IEMA Guidance offers two methods to assess waste effects methods, method W1 has been selected for this assessment:



- > W1 – Void Capacity, a detailed methodology where the magnitude of impact from waste is assessed by determining the percentage of the remaining landfill void capacity that will be depleted by waste produced during construction and/or operation. In a worst case, where landfill sensitivity is very high, a significant effect would occur at a magnitude of minor, which for non-hazardous and inert waste generated by the Proposed Development is more than 1% of landfill capacity and for hazardous waste is more than 0.1% of landfill capacity. The criteria used to assess the magnitude of impact for inert and non-hazardous and hazardous waste is provided within Table 1-12 and Table 1-13 respectively of **Appendix B: Materials and Waste Methodology and Baseline**.
- > W2 – Landfill Diversion, a simpler approach where developments are compared to a good practice landfill diversion rate (waste recovery rate) of 90%.

### Significance Criteria

- 1.6.12 The effect thresholds and the associated significance of effects are described within Table 1-14 and Table 1-15 of **Appendix B: Materials and Waste Methodology and Baseline** respectively. Materials and Waste specific criteria in the IEMA Guidance are used for the assessment.
- 1.6.13 Where a significance of effect could fall into two categories (i.e. neutral or slight, slight or moderate), professional judgement has been used to justify and determine which category a receptor falls into, to arrive at a single rating. Where professional judgement has been used in these cases, a justification has also been provided.

### Sources of Information/Data

- 1.6.14 The following sources of information have been reviewed and have informed the assessment of Materials and Waste:
- > Environment Agency's 2023 Waste Summary Tables for England - Version 1 - Remaining Land Capacity<sup>38</sup>;
  - > Environment Agency's 2023 Waste Data Interrogator<sup>40</sup>;

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<sup>40</sup> Environment Agency. 2024. 2023 Waste Data Interrogator – Wastes Received (Excel) – Version 1. Available at: <https://www.data.gov.uk/dataset/59ab8448-3905-49c6-9122-ae762f96f66b/2023-waste-data-interrogator> [Accessed 31 October 2024].

- > Environment Agency's Permitted Waste Sites - Authorised Landfill Site Boundaries<sup>41</sup>;
- > Environment Agency's Historic Landfill Sites<sup>42</sup>;
- > Environment Agency's Environmental Permitting Regulations - Waste Sites<sup>43</sup>;
- > Steel UK's Key Statistics Guide May 2023, 2022 data<sup>44</sup>;
- > Mineral Products Association's Profile of the UK Mineral Products Industry, UK production of minerals and mineral products, 2021 and estimated production/sales in Great Britain, 2022 data<sup>45</sup>;
- > Project-specific information provided by the design team; and
- > Relevant legislation and national policy, as detailed in Appendix A: Materials and Waste Legislation, Policy and Guidance.

## 1.7 Baseline Conditions

### Existing Baseline

#### Regional and National Availability of Key Construction Materials

- > The national consumption and sales (providing an indication of availability) in 2023 for steel and 2021 for aggregates, asphalt and concrete (the most recent years for which data is available) is provided within Table 1-16 of **Appendix B: Materials and Waste Methodology and Baseline**. These are expected to be the key materials used during the Proposed Development's construction. In summary, national availability is:
  - > Steel, 15 million tonnes
  - > Total aggregates, 279.8 tonnes

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<sup>41</sup> Environment Agency. 2024. Permitted Waste Sites - Authorised Landfill Site Boundaries. Available at: <https://www.data.gov.uk/dataset/ad695596-d71d-4cbb-8e32-99108371c0ee/permitted-waste-sites-authorised-landfill-site-boundaries> [Accessed 31 October 2024].

<sup>42</sup> Environment Agency. 2024. Historic Landfill Sites. Available at: <https://www.data.gov.uk/dataset/17edf94f-6de3-4034-b66b-004ebd0dd010/historic-landfill-sites> [Accessed 31 October 2024].

<sup>43</sup> Environment Agency. 2024. Environmental Permitting Regulations - Waste Sites. Available at: <https://www.data.gov.uk/dataset/e2cc8101-d8b7-434d-a26a-9115061bb57c/environmental-permitting-regulations-waste-sites> [Accessed 31 October 2024].

<sup>44</sup> UK Steel. 2023. Steel UK's Key Statistics Guide May 2024. Available at: <https://www.uksteel.org/reports-and-publications> [Accessed 31 October 2024].

<sup>45</sup> Mineral Products Association (MPA). 2023. Profile of the UK Mineral Products Industry: 2023 Edition. Available at: [https://www.mineralproducts.org/MPA/media/root/Publications/2023/Profile\\_of\\_the\\_UK\\_Mineral\\_Products\\_Industry\\_2023.pdf](https://www.mineralproducts.org/MPA/media/root/Publications/2023/Profile_of_the_UK_Mineral_Products_Industry_2023.pdf) [Accessed 31 October 2024].

- > Asphalt, 28.3 million tonnes
- > Total concrete (ready-mixed and concrete products), 24.8 million tonnes

1.7.1 Regional data is presented in Table 1-17 of **Appendix B: Materials and Waste Methodology and Baseline** of construction materials by region are provided for the regions surrounding the Proposed Development. In summary, regional availability is:

- > Total aggregates (crushed rock and sand and gravel), 36.7 million tonnes
- > Ready-mixed concrete, 1.3 million tonnes
- > Asphalt, 3.3 million tonnes

1.7.2 Potential recycled content for the main construction materials is outlined in Table 1-18 of **Appendix B: Materials and Waste Methodology and Baseline**. Good practice rates are derived from WRAP's Designing Out Waste Tool for Civil Engineering<sup>30</sup>.

#### Allocated/Safeguarded Mineral and Waste Sites

1.7.3 There are no safeguarded mineral and waste sites identified within the Proposed Development boundary on the Lincolnshire Minerals and Waste Local Plan<sup>29</sup>, Nottinghamshire Minerals Local Plan<sup>28</sup>, and Nottinghamshire Joint Draft Waste Local Plan<sup>27</sup>.

#### Landfill Capacity

1.7.4 The Environment Agency's Waste Management Information includes information about waste sent to landfills and remaining landfill capacity. Remaining landfill capacities at the end of 2023 are outlined within the Environment Agency's 2023 Waste Summary Tables for England – Version 1<sup>38</sup> for the non-hazardous and inert waste Expansive Study Area (East Midlands) and the hazardous waste Expansive Study Area (England) are shown in Table 1-19 of **Appendix B: Materials and Waste Methodology and Baseline**. In summary the landfill capacity used in the assessment is:

- > East Midlands total non-hazardous landfill capacity, 30.6 million m<sup>3</sup>,
- > East Midlands inert landfill capacity, 18.9 million m<sup>3</sup>, and
- > England hazardous landfill, 9.7 million m<sup>3</sup>.

#### Waste Management Infrastructure

1.7.5 There is one permitted waste site located within the Proposed Development boundary, as outlined in the Environment Agency's Environmental Permitting Regulations – Waste Sites<sup>43</sup>, at High Marnham Power Station, Nottinghamshire:

- > High Marnham Power Station (site reference 43717).

- 1.7.6 There are no waste site applications located within the Proposed Development boundary (Environmental Permitting Regulations – Waste Sites<sup>43</sup>).
- 1.7.7 Some capacity data for waste management infrastructure is publicly available (e.g. Environmental Permitting Regulations – Waste Sites<sup>43</sup>). However, the permitted capacity is not necessarily representative of the actual operational capacity of the infrastructure. Therefore, inputs data are collated from the Environment Agency's Waste Data Interrogator for 2023 – Wastes Received (Excel) – Version 1<sup>40</sup> and presented in Table 1-20 of **Appendix B: Materials and Waste Methodology and Baseline** for the East Midlands region.

#### Historic and Authorised Landfills

- 1.7.8 There are no authorised landfills recorded within the Proposed Development boundary, as outlined in the Environment Agency's Permitted Waste Sites – Authorised Landfill Site Boundaries<sup>41</sup>.
- 1.7.9 There are two historic landfill sites located within the Proposed Development boundary, as outlined in the Environment Agency's Permitted Waste Sites – Historic Landfill Sites<sup>42</sup>. Both of these are close to High Marnham Power Station, Nottinghamshire:
- > High Marnham Power Station (site reference EAHLD22092), inert and industrial waste landfilled 1978-1979; and
  - > High Marnham Power Station (site reference EAHLD22091), industrial waste landfilled 1978-1979.
- 1.7.10 Excavation in the two historic landfills may be required during construction.

#### Waste Recovery Targets

- 1.7.11 The national target for recovery of C&D waste is 70% by weight, as set out in the Waste Framework Directive<sup>2</sup> and the Waste Management Plan for England<sup>18</sup>. The target specifically excludes naturally occurring materials with EWC Code 17 05 04 (17 05 04 soil and stones other than those mentioned in 17 05 03\* (soils and stone containing dangerous substances)). Recovery is deemed to include reuse, recycling, and other recovery (e.g. energy recovery).
- 1.7.12 A good practice landfill diversion target of 90% has been achieved and exceeded by major UK developments as outlined in the IEMA Guidance. In 2020, the most recent year for which data is available, the UK generated 59.4 million tonnes of non-hazardous C&D waste, of which 55 million tonnes was recovered. This represents a recovery rate of 92.6%<sup>36</sup>. A recovery rate of 70% is assumed be achievable for the purpose of the waste assessment.

- 1.7.13 The applicant has committed to achieve 100% reuse and recycling of solar panels<sup>37</sup>.
- 1.7.14 Standard, good and best practice recovery rates by material are provided by WRAP<sup>30</sup>. Recovery rates for key construction materials and other construction wastes relevant to the Proposed Development are provided in Table 1-21 of **Appendix B: Materials and Waste Methodology and Baseline**.

### Future Baseline

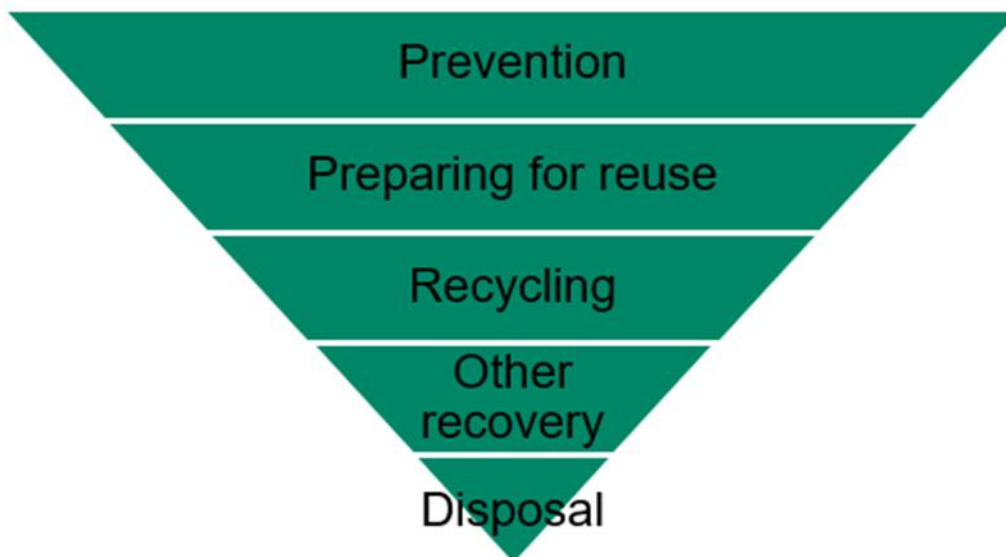
- 1.7.15 There is no publicly available information on any potential changes to national or regional material availability by the time of the construction of the Proposed Development. Construction material demand, such as ready mixed concrete, is closely aligned to both the quantity of construction taking place and the general economy. It is deemed inappropriate to forecast future availability as the demand is unlikely to be linear and it is not possible to set a future baseline for material resources. As such, future availability is assumed to remain the same as the current baseline as outlined in Table 1-14 and Table 1-15 of **Appendix B: Materials and Waste Methodology and Baseline**.
- 1.7.16 There is no publicly available information regarding any potential changes to landfill capacity by the time of the Proposed Development's construction.
- 1.7.17 Due to the cyclic nature of inert landfill capacity (e.g. landfill capacity decreasing, and then new sites or landfill cells being opened with landfill capacity increasing), it is not realistic to forecast future landfill capacity. Therefore, inert and hazardous landfill capacity is assumed to remain the same as the current baseline, as outlined in Table 1-19 of **Appendix B: Materials and Waste Methodology and Baseline**.
- 1.7.18 For non-hazardous waste, using the current rate of decline of landfill capacity and forecasting into the future would lead to the inevitable conclusion that there would be no void space remaining. However, this is not a credible scenario as if there is still a need for landfill, then the waste planning authority will need to consent new landfill capacity to replace that which has been used up. Therefore, non-hazardous and hazardous landfill capacity is assumed to remain the same as the current baseline, as outlined in Table 1-19 of **Appendix B: Materials and Waste Methodology and Baseline**.

## 1.8 Embedded Mitigation

- 1.8.1 Where possible, mitigation measures have been incorporated into the Proposed Development's design and/or construction methodology. Through iterative assessment, potential impacts have been assessed and opportunities to mitigate them identified with the aim of preventing or reducing impacts as much as possible. This approach provides the opportunity to prevent or reduce potential adverse impacts from the outset. This embedded mitigation/mitigation

by design approach has been taken into account when evaluating the significance of the potential impacts of the Proposed Development in terms of materials and waste.

- 1.8.2 The Proposed Development will aim to prioritise waste prevention, followed by preparing for reuse, recycling and recovery and lastly disposal to landfill as per the waste hierarchy, illustrated in Plate 1-1 below.



*Plate 1-1 The Waste Hierarchy, from DEFRA's Guidance on Applying the Waste Hierarchy, recreated by AECOM*

- 1.8.3 All management of waste will be in accordance with the relevant regulations (as outlined in Appendix A: Materials and Waste Legislation, Policy and Guidance) and waste will be transported by licensed waste hauliers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.
- 1.8.4 The construction of the Proposed Development will be subject to measures and procedures defined within a Construction Environmental Management Plan (CEMP) and Site Waste Management Plan (SWMP). The CEMP and SWMP are secured by requirements in the DCO and include the implementation of industry standard practice and control measures for environmental impacts arising during construction, including the approach for materials and waste management on-site. These measures are set out in the Outline CEMP (see **Volume 7, Other Documents [EN010159/APP/7.4]**) and Outline SWMP (**Volume 7, Other Documents [EN010159/APP/7.12]**) submitted with the DCO Application. The construction contractor will use the Outline CEMP and Outline SWMP to produce their CEMP and SWMP respectively, prior to works commencing on-site. Excavated material reuse would be implemented via a Materials Management Plan in accordance with the CL:AIRE DoW CoP<sup>31</sup>, exemption or environmental permit.



- 1.8.5 The operation of the Proposed Development will be subject to measures and procedures defined within an Operational Environmental Management Plan (OEMP) secured by a requirement in the DCO. The OEMP will include the implementation of industry standard practice and control measures for environmental impacts arising during operation, such as the approach for materials and waste management on-site. These measures are set out in the Outline OEMP submitted with the DCO Application (see **Volume 7, Other Documents [EN010159/APP/7.5]**). The Applicant will use the Outline OEMP to produce their OEMP prior to the operation of the Proposed Development.
- 1.8.6 The decommissioning of the Proposed Development will be subject to measures and procedures defined within a Decommissioning Environmental Management Plan (DEMP) secured by a Requirement in the DCO. An Outline DEMP is submitted with the DCO application which includes the approach for materials and waste management on-site (see **Volume 7, Other Documents [EN010159/APP/7.6]**). The decommissioning contractor will use the Outline DEMP to produce their DEMP prior to decommissioning works on-site.
- 1.8.7 The Applicant is committed to 100% reuse and recycling of solar panels during operation and decommissioning.

## 1.9 Assessment of Likely Effects

- 1.9.1 The Proposed Development has the potential to affect Materials and Waste during construction, operation and during decommissioning, in the following ways:
- > Changes in demand for construction materials (construction only); and
  - > Changes in available landfill void capacity.
- 1.9.2 This section considers the potential impacts, taking into account the committed mitigation measures as detailed in **Section 1.8**, assesses the potential for the Proposed Development to generate effects using the methodology as detailed in **Section 1.6** and **Appendix B: Materials and Waste Methodology and Baseline**.

### Construction Effects

#### Materials

- 1.9.3 Material receptor sensitivity is determined as “low” as outlined in paragraph 1.6.5. At “low” material receptor sensitivity, the point of significance is a major magnitude of impact, defined within Table 1-11 of **Appendix B: Materials and Waste Methodology and Baseline** as the “*consumption of one or more materials is >10% by volume of the baseline availability*”.

- 1.9.4 Construction materials required to construct the Proposed Development are not yet confirmed but based on the construction material quantities for other similar proposed developments they are unlikely to be required in large quantities, i.e. more than 10% of regional or national construction material availability (Table 1-16 and Table 1-17 of **Appendix B: Materials and Waste Methodology and Baseline**). Therefore, the magnitude of impact is anticipated to be **negligible or minor**, and the **effect is slight**, which is **not significant**. The impact is direct and the duration of the impact is temporary (construction phase).

### Waste

- 1.9.5 The type of waste generated during construction is likely to comprise:
- > General waste from site offices and welfare facilities;
  - > Small quantities of waste from the maintenance of construction vehicles;
  - > Packaging waste from incoming materials (e.g. cardboard, wood and plastic); and
  - > Other waste from construction of fencing, internal tracks, substations and field stations, construction compounds and other supporting infrastructure.
- 1.9.6 The solar panels, mounting structures, inverters, transformers, switchgear and other supporting equipment will be manufactured off-site to the specified sizes, and therefore wastage during installation is expected to be minimal.
- 1.9.7 Table 1-3 summarises the anticipated waste streams from construction, this information is based upon other similar NSIP schemes' application documents<sup>46</sup> (500 MW) extrapolated up to 740MW for wood, plastic and paper.

Table 1-3. Estimated Construction Waste

Waste Type	Estimated Waste Quantity	Recyclable / Recoverable
General waste from site offices and welfare facilities	Minimal e.g. <100 tonnes	Yes
Waste from the maintenance of construction vehicles	Minimal	Yes

<sup>46</sup> Sunnica Energy Farm, 2022. Environmental Statement Chapter 16: Other Environmental Topics. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010106/EN010106-004253-6.1%20Chapter%2016%20Other%20Environmental%20Topics.pdf>. [Accessed 13 November 2024].



Waste Type	Estimated Waste Quantity	Recyclable / Recoverable
Hazardous waste (e.g. chemicals, batteries, solvents, oils, oily rags aerosols etc.)	Minimal	Yes
Wood (e.g. pallets and cable drums)	41,625 m <sup>3</sup>	Yes
Plastic (e.g. packaging and protective foam layers)	4,163 m <sup>3</sup>	Yes
Paper and cardboard (e.g. packaging)	31,219 m <sup>3</sup>	Yes
Construction material wastage	Assumed as a 5% wastage rate for non-assembled components including concrete, aggregates, and steel. Construction materials required to construct the Proposed Development are not yet confirmed but based on the construction material quantities for other similar proposed developments they are unlikely to be required in large quantities.	Yes
Solar panel wastage	Assumed 0.05% failure rate of panels during construction, 90 m <sup>3</sup> (based on 1.6 million panels, a panel weight of 33.6kg and a density of 0.31 tonnes/m <sup>3</sup> (based on panel dimensions).	Yes

1.9.8 With the embedded mitigation measures in place, the overall quantities of construction waste anticipated to be sent to landfill are below 1% of regional inert and non-hazardous landfill capacity and less than 0.1% of national hazardous landfill capacity (Table 1-19). Therefore, the magnitude of impact is **negligible**, and the **effect is slight**, which is considered to be **not significant**. The impact is direct and the duration of the impact is temporary (construction phase).

1.9.9 Excavated material is not included in the construction waste estimates or when calculating the overall waste recovery rate since, where possible, the material would be reused on-site and hence will not be categorised as a waste. Waste

recovery targets do not include excavated material (uncontaminated excavated soil and stones, European Waste Catalogue (EWC) code 17 05 04). This approach is consistent with the waste hierarchy and the objectives of minimising waste generation and reusing materials.

- 1.9.10 As the Proposed Development site is relatively flat, large-scale earthworks are not expected to be required and therefore there is not expected to be either a large surplus or shortfall of fill material requiring either export or import from/to the Principal Site. It is expected that all materials removed by cable trenching operations or in the creation of working or laydown/compound areas will be reinstated again with no import or export of materials being required.
- 1.9.11 Excavation in areas of historic landfill may be required during construction, more information about the historic landfills is provided in paragraph 1.7.9.
- 1.9.12 At this stage the potential for generation of some surplus excavated material cannot be ruled out, but the quantities involved would not be significant in the context of regional inert and non-hazardous landfill capacity and national hazardous landfill capacity, and would only be disposed of to landfill as a last resort, with reuse or deposit for recovery being the preferred options.
- 1.9.13 Excavated material reuse would be implemented via a Materials Management Plan in accordance with the CL:AIRE DoW CoP<sup>31</sup>, exemption or environmental permit.
- 1.9.14 Considering the above, it is concluded that significant waste effects are not expected during construction of the Proposed Development.

### **Operational (including Maintenance) Effects**

- 1.9.15 During operation there is expected to be a small number of full time equivalent (FTE) staff with additional staffing/visitors such as maintenance workers and deliveries attending site on an as needed basis.
- 1.9.16 Waste arisings from this day-to-day operation will include:
- > Welfare facility waste; and
  - > General waste (paper, cardboard, wood etc).
- 1.9.17 All management of waste will be in accordance with the relevant regulations and waste will be transported by licensed waste hauliers to waste management sites which hold the necessary regulatory authorisation and/or permits for those wastes consigned to them.

- 1.9.18 During operation, including maintenance activities, waste generation is expected to be negligible, since solar photovoltaic (PV) panels do not generate any waste as part of the energy production process.
- 1.9.19 Waste arisings associated with maintenance activities, such as component replacement during the operational life of the Proposed Development, will be managed in the same way as waste from the final decommissioning of the Proposed Development.
- 1.9.20 During the operational life of the Proposed Development, it is expected that there will be a requirement for periodic replacement of some of the solar farm elements. For the purpose of assessment, it is assumed that one full replacement of the solar panels during operation will be required. Table 1-4 below summarises the indicative design life of a list of expected components for the Proposed Development. Replacement of key infrastructure and components is anticipated to first occur around the 10-year mark, with a gradual escalation in replacement activities. The timing of replacements can be concentrated within a brief timeframe or distributed throughout the year, depending upon stakeholder preferences and expectations.
- 1.9.21 Ad hoc replacement of solar panels is based on an annual failure rate of 0.05%, which equates to 90 m<sup>3</sup> of solar panel waste per year. A full replacement of all 1.6 million solar panels is 179,200 m<sup>3</sup> of waste. A full replacement of all 764 Battery Energy Storage System (BESS) containers is 51,417 m<sup>3</sup> of waste based on a 40ft container volume of 67.3 m<sup>3</sup>.

Table 1-4. Indicative Design Life of Proposed Development Components

Proposed Development Component	Indicative Design Life	Recyclable / Recoverable
Solar Panels	25-40 years	Yes
Inverters	10-20 years	Yes
Racking and Mounting Systems	Replacement not anticipated during the 60 year operational lifetime.	Yes
Above Ground Electrical Wiring and Cabling	25-30 years	Yes
Transformers	Replacement not anticipated during the 60 year operational lifetime.	Yes
Monitoring and Control Systems	10-20 years	Yes
Batteries	5-15 years	Yes
DC/DC Converter	10-20 years	Yes
Meteorological Sensors	5-15 years	Yes
Substation Equipment	Replacement not anticipated during the 60 year operational lifetime.	Yes
Communication Equipment	10-20 years	Yes

- 1.9.22 With the embedded mitigation measures in place, including the commitment to 100% reuse and recycle solar panels, the overall quantities of construction waste anticipated to be sent to landfill are below 1% of regional inert and non-hazardous landfill capacity and less than 0.1% of national hazardous landfill capacity (Table 1-19). Therefore, the magnitude of impact is **negligible**, and the **effect is slight**, which is considered to be **not significant**. The impact is direct and the duration of the impact is temporary (operational phase).

### Decommissioning Effects

- 1.9.23 Table 1-5 summarises the anticipated waste streams from decommissioning. This information is based upon other similar Solar NSIP proposed developments and the number of solar panels.

Table 1-5. Estimated Decommissioning Waste

Waste Type	Estimated Quantity	Recyclable / Recoverable
General waste from site offices and welfare facilities	Minimal	Yes
Waste from the maintenance of vehicles used during decommissioning	Minimal	Yes
Hazardous waste (e.g. chemicals, batteries, solvents, oils, oily rags aerosols etc.)	Minimal	Yes
Concrete, aggregates and steel	All concrete and aggregates used in construction. Construction materials required to construct the Proposed Development are not yet confirmed but based on the construction material quantities for other similar proposed developments they are unlikely to be required in large quantities.	Yes
Solar PV panels	1.6 million panels, 179,200 m <sup>3</sup> based on a panel weight of 33.6kg and a density of 0.31 tonnes/m <sup>3</sup> (based on panel dimensions).	Yes
Batteries	764 Battery Energy Storage System (BESS) containers, 51,417 m <sup>3</sup> based on a 40ft container volume of 67.3m <sup>3</sup> .	Yes

1.9.24 Recycling routes are generally available for decommissioning materials at present, and it is likely that there will be even greater opportunities for recycling in the future, not least because the market will have expanded to meet demand as solar PV installations increase.

- 1.9.25 The company “Recycle Solar”, based in Scunthorpe, North Lincolnshire, reports that 90% of the glass and 95% of the semiconductor materials in end-of-life solar panels can be extracted for use in new PV panels<sup>47</sup>.
- 1.9.26 The UK market for Lithium-ion battery recycling is under development, as the fleet of electric vehicles and other Lithium-ion battery users rapidly increases. A number of new investments have been announced and an 80% recovery rate is reported<sup>48</sup>.
- 1.9.27 As set out in the **Outline Decommissioning Environmental Management Plan [EN010159/APP/7.6]** the Applicant is committed to maximise recycling and reuse of the Proposed Development components at the end of their life. There are already organisations around the UK and Europe specialising in solar recycling, such as PV Cycle and the European Recycling Platform. They are working with solar developers to minimise electrical waste and recycling old panels in line with the WEEE Regulations<sup>9</sup>. In addition, companies such as SECONDSOL<sup>49</sup> offer a marketplace service for the purchase and selling of second hand PV panels and equipment, where there is still a good level of life in the equipment remaining. Panels that have developed faults or damage can also be refurbished and repowered by specialist companies and the manufacturers and resold or reinstalled. The Applicant will adhere with the industry best practice outlined in Solar Power Europe’s Lifecycle Quality Best Practice Guidance<sup>34</sup>.
- 1.9.28 The Proposed Development contains Battery Energy Storage System (BESS), the removal of batteries from Waste Electrical and Electronic Equipment (WEEE) will be required, and the handling, recovery, recycling, or disposal of batteries will need to be undertaken in accordance with WEEE Regulations<sup>9</sup> and the Waste Batteries and Accumulators Regulations 2009. This is most likely to be undertaken by the battery manufacturer or supplier.
- 1.9.29 With the embedded mitigation measures in place including the Applicant’s commitment to 100% reuse and recycling of solar panels, the overall quantities of decommissioning waste sent to landfill are anticipated to be below 1% of regional inert and non-hazardous landfill capacity and less than 0.1% of national hazardous landfill capacity. Therefore, the magnitude of impact is **negligible**, and the **effect is slight**, which is considered to be **not significant**. The impact is direct and the duration of the impact is temporary (decommissioning phase).

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<sup>47</sup> RecycleSolar, 2024. Recycling Solar Panels. Available at: <https://www.recyclesolar.co.uk/>. [Accessed 18 November 2024].

<sup>48</sup> Recover, 2024. A Focus on Eco-Sustainable Recycling. Available at: <https://eco-recycle.co.uk/meeting-the-uks-lithium-ion-battery-challenge/>. [Accessed 18 November 2024].

<sup>49</sup> SECONDSOL, 2024. Products for your PV system. Available at: <https://www.secondsol.com/en/index.htm>. [Accessed 18 November 2024].

## 1.10 Cumulative Assessment

- 1.10.1 This section assesses the potential effects of the Proposed Development in combination with the potential effects of other proposed and committed plans and projects including other developments (referred to as ‘cumulative schemes’) within the surrounding area.
- 1.10.2 The East Midlands is used for the non-hazardous waste study area (rather than Nottinghamshire and Lincolnshire alone) recognising the fact that waste may not always be managed within the Waste Planning Authority area where it is generated and may instead be managed at the regional level. England is used for the hazardous waste study area.
- 1.10.3 The cumulative schemes to be considered in combination with the Proposed Development for waste are solar farms in Nottinghamshire and Lincolnshire.

### Recovery and Recovery Assumptions

- 1.10.4 Two assessments have been carried out, with different assumptions around recovery rates:
- > A “realistic worst case” of a 70% recovery rate, based on current and likely future recovery rates. Recovery is defined as reuse, recycling and recovery e.g. (energy from waste).
  - > An “absolute worst case” based on the assumption that all construction and demolition (C&D) waste goes to landfill.
- 1.10.5 The “absolute worst case” is considered to be extremely unlikely to occur, and the “realistic worst case” considered appropriately conservative for the following reasons:
- > The 2020 C&D recovery rate for the UK was approximately 92.6%**Error! Bookmark not defined.**, exceeding the national target of 70% recovery and has remained at a similar level since 2010. A 70% recovery rate is therefore considerably lower than this rate.
  - > Waste generated by the Proposed Development comprises readily recyclable materials, with existing high recovery rates:
    - Concrete and aggregates are widely recycled for use in construction.
    - Metals have a very high recovery rate with a well-developed market, historically driven by economics but increasingly also by the need for decarbonisation of the metal production sector.



- PV panels are recyclable and there are numerous examples of companies recycling them. Capacity for PV panel recycling in the UK is relatively low at present, due to small volumes of waste being generated (since most PV panels that have been installed are still operating). There are strong economic and regulatory drivers for recycling, and it is technically proven, and hence it is realistic to expect a high recovery rate.
- Primary legislation (The Waste Electrical and Electronic Equipment Regulations 2013<sup>9</sup> and The Waste Batteries and Accumulators (Amendment) Regulations 2015<sup>10</sup>) places an obligation on producers (manufacturers and importers) of electrical and electronic equipment (which includes PV panels) and batteries to finance the collection and recycling of their products. Producers of PV panels and batteries are obligated to join a Producer Compliance Scheme (PCS), which then ensures their legal obligations are met.

1.10.6 The assessment assumes that current policy, regulatory and fiscal incentives for recycling and otherwise diverting waste from landfill will be maintained. The Applicant considers this is a realistic worst case for assessment since:

- > Any move away from the current policy framework would be inconsistent with the underlying principles of waste management that have been progressively implemented over the past 20+ years, as well as being inconsistent with the policy objectives of Net Zero (since recycling and recovery have a significant role to play in achieving Net Zero); and
- > If at any point the policy framework were to move away from favouring recycling and recovery, then there would need to be a large expansion in landfill capacity to accommodate the waste that was no longer recovered or recycled; in which case landfill void capacity would no longer be considered a sensitive receptor. A move away from favouring recycling recovery without an associated increase in landfill void capacity would not be a tenable policy.

### **Cumulative Impacts**

1.10.7 The cumulative assessment follows the same approach as for the assessment of the Proposed Development presented in Section 1.9, and considers the waste generated from the following other Solar PV schemes in Lincolnshire and Nottinghamshire as outlined in Table 1-6

1.10.8 Waste estimates are not available for all of these projects, and hence estimates have been generated specifically for this cumulative assessment by:

- > Estimating PV module waste based on a nominal module capacity of 0.65 kW and weight of 35 kg;



- > Assuming that the ratio of other waste to PV module waste for schemes is the average of four schemes for which decommissioning waste estimates are available (Tillbridge Solar Project, Gate Burton Energy Park, Longfield Solar Farm and East Yorkshire Solar Farm) which is 35% of total waste by mass comprises PV modules, and the remaining 65% is other waste.

1.10.9 This approach has been taken across all cumulative developments including One Earth Solar Farm (rather than using the estimates provided for individual projects) to enable a clear and consistent approach for the purpose of this assessment.

1.10.10 The cumulative assessment focuses on decommissioning waste since: The peak of waste generation would be during decommissioning and this is therefore the worst case in terms of waste generation – the decommissioning scenario would also cover any large-scale interim replacement of PV modules and other components; and

Operational waste generation is not expected to be concurrent for all projects, given that their PV modules and other components would have different operating periods and it is very unlikely that all facilities would replace their equipment at the same time.

1.10.11 For the purposes of this cumulative assessment, it is assumed that all schemes are decommissioned over a single five year period and that all waste is non-hazardous (although in practice a proportion may be hazardous – this is considered further below).

1.10.12 For the following cumulative developments it is assumed these have a size of 49.9MW as a worst-case scenario (current maximum size for a local authority application) as no information is available online:

- > Land North and South of Tuxford Road;
- > Land Adjoining Former High Marnham Power Station;
- > Land at Hawbush Road, Highgate Lane Solar Farm;
- > Land at M1, Between Junction 25 and 26, Trowell; and
- > Land North of A180 Between Kiln Lane and North Moss Lane Stallingborough.

1.10.13 The cumulative impact assessment is presented in Table 1-6.

Table 1-6. Cumulative Impact Assessment Summary

Cumulative development (and status)	Size (MW)	PV panel waste (tonnes)	Other waste (tonnes)	Total waste (tonnes)
Beacon Fen Energy Park (pre-application)	400	21,538	39,892	61,430
Heckington Fen Solar Park (approved)	500	26,923	49,865	76,788
Mallard Pass Solar Project (approved)	350	18,846	34,905	53,751
Temple Oaks Renewable Energy Park (pre-application)	250	13,462	24,932	38,394
Springwell Solar Farm (pre-examination)	800	43,077	79,783	122,860
West Burton Solar Project (approved)	480	25,846	47,870	73,716
Tillbridge Solar Project (examination)	500	26,923	49,865	76,788
Gate Burton Energy Park (approved)	500	26,923	49,865	76,788
Cottam Solar Project (approved)	600	32,308	59,837	92,145
Fosse Green Energy (pre-application)	350	18,846	34,905	53,751
Little Crow Solar Park (approved)	200	10,769	19,946	30,715
One Earth Solar Farm (pre-application)	740	39,846	73,799	113,646
Steeple Renewables Project (pre-application)	400	21,538	39,892	61,430

Cumulative development (and status)	Size (MW)	PV panel waste (tonnes)	Other waste (tonnes)	Total waste (tonnes)
Great North Road Solar (pre-application)	800	43,077	79,783	122,860
Development Site to the North of Brick Yard Road, Gamston (approved)	45.4	2,445	4,528	6,972
Land at Hawbush Road, Weston (approved)	49.9	2,687	4,976	7,663
Land North West and South of Field Farm, Wood Lane, Sturton Le Steeple (Wood Lane Solar Farm) (approved)	49.9	2,687	4,976	7,663
Land North and South of Tuxford Road (approved)	49.9	2,687	4,976	7,663
Land at Church Farm Gotham Road Kingston on Soar (approved)	49.9	2,687	4,976	7,663
Land to North East of Highfields Farm Bunny Hill Costock (approved)	49.9	2,687	4,976	7,663
Land North of Stragglethorpe Road Stragglethorpe Road Stragglethorpe (Heron Solar Farm) (approved)	20	1,077	1,995	3,072
The Old Airfield Reepham Road Fiskerton Lincoln (approved)	49.9	2,687	4,976	7,663
Land at M1, Between Junction 25 and 26, Trowell (pre-application)	49.9	2,687	4,976	7,663
Land West of Bradley Road, Bradley (approved)	43.7	2,353	4,358	6,711
Land Off Margaret Street, Immingham (awaiting decision)	49.9	2,687	4,976	7,663

Cumulative development (and status)	Size (MW)	PV panel waste (tonnes)	Other waste (tonnes)	Total waste (tonnes)
Land North of A180 Between Kiln Lane and North Moss Lane, Stallingborough (pre-application)	49.9	2,687	4,976	7,663
Land West of A1173, Stallingborough and East of Stallingborough Road, Keelby North East Lincolnshire (Grange Energy Park) (pre-application)	49.9	2,687	4,976	7,663
Land West of Mallows Lane and North of Pymoor Lane, Main Road, Sibsey (Mallows Solar Farm) (approved)	10	538	997	1,536
Land at Gonerby Moor Great, Gonerby (approved)	49.9	2,687	4,976	7,663
Land North West of Bicker, Vicarage Drove Solar Farm (approved)	49.9	2,687	4,976	7,663
Inkersall Grange Farm Inkersall Grange Road, Bilsthorpe (approved)	49.9	2,687	4,976	7,663
Land at The Grange Cotham Lane, Hawton (approved)	49.9	2,687	4,976	7,663
Land to the North of White Cross Lane, Burton Gorse, Sleaford (approved)	32	1,723	3,191	4,914
Home Farm, Dyke Drove, Bourne (Home Farm Solar Farm) (awaiting decision)	28	1,508	2,792	4,300
Land Adjoining Former High Marnham Power Station (approved)	43	2,315	4,288	6,604

Cumulative development (and status)	Size (MW)	PV panel waste (tonnes)	Other waste (tonnes)	Total waste (tonnes)
Highgate Lane Solar Farm (awaiting decision)	49.9	2,687	4,976	7,663
Land at Barker Farm Stow Park Road (pending)	35	1,885	3,491	5,375
<b>TOTAL:</b>	<b>7,876</b>	<b>424,071</b>	<b>785,426</b>	<b>1,209,497</b>
<b>Cumulative Waste (assuming all schemes decommissioned within 5 yr window)</b>				
Total waste from cumulative schemes (tonnes)		84,814	157,085	241,899
Total waste from cumulative schemes (m <sup>3</sup> ) (assuming density of 0.31 t/m <sup>3</sup> for PV panels and 1.6 t/m <sup>3</sup> for other waste)		273,594	251,336	524,930
Waste to landfill, m <sup>3</sup> (realistic worst case estimate with 70% recovery)		82,078	75,401	157,479
Waste to landfill, m <sup>3</sup> (assuming zero recycling/recovery)		273,594	251,336	524,930
<b>Baseline</b>				
Regional landfill capacity (m <sup>3</sup> )				49,686,000
<b>Comparison Against Baseline</b>				
% of regional landfill capacity required for Scheme (realistic worst case estimate with 70% recovery)		0.17%	0.15%	0.32%

Cumulative development (and status)	Size (MW)	PV panel waste (tonnes)	Other waste (tonnes)	Total waste (tonnes)
% of regional landfill capacity required for Scheme (assuming zero recycling/recovery)		0.55%	0.51%	1.06%
<b>Assessment</b>				
Receptor Sensitivity				Very High
<b>Realistic Worst Case</b>				
Magnitude of Impact				Negligible
Effect				Slight adverse
Significance				Not significant
<b>Absolute Worst Case</b>				
Magnitude of Impact				Minor
Effect				Moderate adverse
Significance				Significant

- 1.10.14 The assessment shows that under the realistic worst case (with 70% waste recovery), cumulative impacts would not be significant.
- 1.10.15 Under the absolute worst case assessment (assuming zero recycling/recovery, which would not be realistic due to commitments and regulatory controls on the identified cumulative projects), cumulative impacts would be significant.
- 1.10.16 The threshold of significance for an effect on hazardous landfill capacity is 0.1% of national capacity, equivalent to 9,680 m<sup>3</sup>. If it is assumed that the hazardous fraction of waste solar panels is sent to hazardous waste landfill, then a significant effect would occur if this hazardous fraction represents more than 3.54% of the mass of solar panels. However, the majority of solar panel components would not be considered to be hazardous waste, e.g. approximately 76-89% glass, 4-10% plastic and 6-8% aluminium frame<sup>50</sup>.

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<sup>50</sup> Vekony, A.T. 2024. The Opportunity of Solar Panel Recycling. Available at: <https://www.greenmatch.co.uk/blog/2017/10/the-opportunities-of-solar-panel-recycling> [Accessed 31 October 2024].

## Appendix A Materials and Waste Legislation, Policy and Guidance

### A.1 Legislation, Planning Policy and Guidance

- A.1.1.1. A summary of applicable legislation, policy and other guidance documents of relevance to the assessment of Materials and Waste is provided below.

#### A.1.2 Legislation

##### **The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations)**

- A.1.2.1. Regulation 5(2)(d) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017<sup>3</sup> requires that the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the likely significant direct and indirect effects of the Proposed Development on material assets. Regulation 8(1)(d) of the Regulations require that the EIA must describe any likely significant effects of the Proposed Development on the environment resulting from the expected residues and emissions and the production of waste.

##### **Waste Framework Directive 2008 (2008/98/EC)**

- A.1.2.2. The Waste Framework Directive<sup>2</sup> establishes the wider regulatory context for waste management across Europe. In addition to defining waste, it also introduces the concept of the waste hierarchy and establishes landfill diversion targets for Member States. The requirements of the Waste Framework Directive are transposed into applicable national law through the Waste (England and Wales) Regulations 2011<sup>4</sup> as amended and The Waste (Miscellaneous Amendments) (EU Exit) Regulations 2019<sup>51</sup>.

##### **The Waste (England and Wales) Regulations 2011**

- A.1.2.3. The Waste (England and Wales) Regulations 2011<sup>4</sup> transposes the requirements of the Waste Framework Directive in England and Wales and requires the Secretary of State (SoS) to establish waste prevention programmes and waste management plans that apply the waste hierarchy (as defined in the Waste Framework Directive). The waste hierarchy prioritises waste prevention, followed by preparing for reuse, recycling, recovery and finally disposal to the management of waste. The Regulations require businesses to apply the waste hierarchy, Plate 1-1, when managing waste,

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<sup>51</sup> The Waste (Miscellaneous Amendments) (EU Exit) Regulations 2019. Available at: <https://www.legislation.gov.uk/uksi/2019/620/made> [Accessed 31 October 2024].



and also require that measures are taken to ensure that, by the year 2020, at least 70% by weight of non-hazardous Construction and Demolition (C&D) waste is subjected to material recovery.

### **The Environmental Permitting (England and Wales) Regulations 2016**

- A.1.2.4. The Environmental Permitting (England and Wales) Regulations 2016<sup>5</sup> require sites where waste is processed, treated or disposed of to hold a valid Environmental Permit issued by the Environment Agency (EA). The Regulations also include a schedule of activities that are exempt from the requirements of permitting. However, to comply with the Regulations, an exempt activity must generally be registered with the EA before commencing.

### **The Environmental Protection Act 1990**

- A.1.2.5. The duty of care for waste management is set out under section 34 of the Environmental Protection Act 1990<sup>6</sup> and the Waste (England and Wales) Regulations 2011 (as amended)<sup>4</sup>. It requires anyone who produces, imports, keeps, stores, transports, treats or disposes of waste to take all reasonable steps to ensure that waste is managed properly and places a duty on producers and holders of waste to:

- > Prevent illegal disposal, treatment or storage of waste;
- > Handle their waste safely;
- > Know whether the waste is hazardous or non-hazardous;
- > Store waste securely in a manner that prevents release of the waste;
- > Provide an accurate written description of the waste in order to facilitate the compliance of others with the Duty and avoidance of the offences under Section 33 of the Environmental Protection Act 1990: via a compulsory system of Controlled Waste Transfer Notes (WTNs) which controls the transfer of waste between parties; and
- > Ensure anyone dealing with their waste has the necessary authorisation.

### **Environment Act 2021**

- A.1.2.6. The Environment Act 2021<sup>7</sup> makes provision about targets, plans and policies for improving target areas within the natural environment. Part 3 of the Act outlines the priority for waste reduction and resource efficiency. The Act will deliver:
- > An extension of producer responsibility to make producers pay for 100% of the cost of disposal of products, starting with plastic packaging;
  - > A Deposit Return Scheme for single use drinks containers;
  - > Charges for single use plastics;

- > Greater consistency in recycling collections in England;
- > Electronic waste tracking to monitor waste movements and tackle fly-tipping;
- > Further tackling of waste crime;
- > The power to introduce new resource efficiency information (labelling on the recyclability and durability of products);
- > The regulation of the shipment of hazardous waste; and
- > A ban or export restriction of waste to non-OECD countries.

### **The Hazardous Waste Regulations (England and Wales) 2005**

A.1.2.7. The Hazardous Waste Regulations (England and Wales) 2005 (as amended)<sup>8</sup> places a requirement on producer of the waste to:

- > Classify the waste;
- > Separate hazardous waste from other general waste streams;
- > Use authorised businesses to collect, recycle or dispose of your waste; and
- > Complete relevant hazardous waste consignment note.

### **The Waste Electrical and Electronic Equipment (WEEE) Regulations 2013**

A.1.2.8. The WEEE Regulations 2013<sup>9</sup> aim to reduce the environmental impact of electrical and electronic waste. They require producers to finance the collection, treatment, and recycling of such waste, ensuring that hazardous substances are managed safely. The regulations also set targets for the recovery and recycling of materials, promoting a circular economy by encouraging the reuse of valuable resources

A.1.2.9. The Waste Batteries and Accumulators (Amendment) Regulations 2015<sup>10</sup> set out comprehensive requirements for the collection, treatment, recycling, and disposal of all battery types in the UK. Key aims include reducing the environmental impact of batteries by ensuring their proper disposal and recycling and meeting specific collection targets: 25% by 2012 and 45% by 2016. The regulations mandate that producers finance the collection and recycling processes, and they establish obligations for battery compliance schemes, distributors, and other economic operators to facilitate the safe and efficient handling of waste batteries.

## **A.1.3 National Planning Policy**

A.1.3.1. The relevant National Policy Statement (NPS) requirements, together of an indication of where in the ES the information is provided to address these requirements, are provided in Table 1-7.

Table 1-7 Relevant NPS requirements for the Materials and Waste Assessment

Relevant NPS paragraph reference	Requirement of the NPS	Location of information provided to address this
<b>Overarching National Policy Statement for Energy (EN-1)</b>		
Paragraph 5.15.6	Applicants must demonstrate that development proposals are in line with Defra's policy position on the role of energy from waste in treating residual waste.	The waste hierarchy has been and will be implemented for the management of waste from the Proposed Development. Further information on waste management arrangements are provided within in the Outline Site Waste Management Plan (OSWMP).
Paragraph 5.15.8	The applicant should set out the arrangements that are proposed for managing any waste produced and prepare a report that sets out the sustainable management of waste and use of resources throughout any relevant demolition, excavation and construction activities	Further information on waste management arrangements is provided within in the OSWMP.
Paragraph 5.15.9	The arrangements described and a report setting out the sustainable management of waste and use of resources should include information on how re-use and recycling will be maximised in addition to the proposed waste recovery and disposal system for all waste generated by the development. They should also include an assessment of the impact of the waste arising from development on the capacity of waste management facilities to deal with other waste arising in the area for at least five years of operation	Further information on waste management arrangements is provided within in the OSWMP. Waste impacts are assessed in section 1.9 of this Report.
Paragraph 5.15.10	The applicant is encouraged to refer to the 'Waste Prevention Programme for England: Maximising Resources Minimising Waste' and should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome.	Further information on waste management arrangements is provided within in the OSWMP.  'Waste Prevention Programme for England: Maximising Resources Minimising Waste' has been referred to for the specification of waste management arrangements for the Proposed Development and in undertaking the assessment, as set out within this appendix.

Relevant NPS paragraph reference	Requirement of the NPS	Location of information provided to address this
Paragraph 5.15.12	The UK is committed to moving towards a more 'circular economy'. Where possible, applicants are encouraged to source materials from recycled or reused sources and use low carbon materials, sustainable sources and local suppliers. Construction best practices should be used to ensure that material is reused or recycled onsite where possible	This has been considered throughout the design of the Proposed Development. Sourcing of materials from recycled or reused sources and use of low carbon materials, sustainable sources and local suppliers are set out within the Outline Construction Environmental Management Plan (CEMP) and OSWMP.
Paragraph 5.15.13	Applicants are also encouraged to use construction best practices in relation to storing materials in an adequate and protected place on site to prevent waste, for example, from damage or vandalism. The use of Building Information Management tools (or similar) to record the materials used in construction can help to reduce waste in future decommissioning of facilities, by identifying materials that can be recycled or reused.	Standard, good and best practice recovery rates by material are provided by WRAP. As set out in paragraph B.2.1.9. Good and best practice waste recovery (landfill diversion) for the Proposed Development is likely to be above 90% for the majority of construction wastes. Good practice measures will be proposed and implemented during construction; these are set out within the Outline CEMP and OSWMP.
Paragraph 5.15.14	The Secretary of State should consider the extent to which the applicant has proposed an effective system for managing hazardous and non-hazardous waste arising from the construction, operation and decommissioning of the proposed development.	Further information on waste management arrangements is provided within in the OSWMP.
Paragraph 5.15.15	<p>The Secretary of State should be satisfied that:</p> <ul style="list-style-type: none"> <li>any such waste will be properly managed, both on-site and off-site.</li> <li>the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area.</li> <li>adequate steps have been taken to minimise the volume of waste</li> </ul>	Further information on waste management arrangements is provided within in the OSWMP. Waste impacts are assessed in section 1.9 of this Report.

Relevant NPS paragraph reference	Requirement of the NPS	Location of information provided to address this
	arising, and of the volume of waste arising sent for recovery or disposal, except where that is the best overall environmental outcome.	
Paragraph 5.15.19	The Secretary of State should have regard to any potential impacts on the achievement of resource efficiency and waste reduction targets set under the Environment Act 2021 or wider goals set out in the government's Environmental Improvement Plan 2023.	Further information on waste management arrangements is provided within in the OSWMP. Waste impacts are assessed in section 1.9 of this Report.

A.1.3.2. NPS EN-3 and EN-5 do not contain specific requirements relevant to the Materials and Waste assessment for the Proposed Development.

### National Planning Policy Framework (NPPF) 2024

A.1.3.3. The NPPF<sup>14</sup> does not contain specific waste policies as these are detailed within the National Planning Policy for Waste<sup>16</sup> and Waste Management Plan for England<sup>18</sup>, however, the overarching policies are relevant to materials and waste:

- > Paragraph 8c: The planning system's overarching environmental objective is to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- > Paragraph 223b: Planning policies should: so far as practicable, take account of the contribution that substitute or secondary and recycled materials and minerals waste would make to the supply of materials, before considering extraction of primary materials, whilst aiming to source minerals supplies indigenously.

### The Waste Management Plan for England 2021

A.1.3.4. The Waste Management Plan for England 2021<sup>18</sup> provides an overview of waste management in England and reiterates the requirement for all waste producers and waste management providers to implement the waste hierarchy. It also highlights the need for waste to be managed using the proximity principle and confirms England's commitment to recovering at least 70% by weight of non-hazardous C&D waste by 2020 (excluding soils and

stones). Recovery is assumed in the context of this policy to include reuse, recycling and incineration with energy recovery.

### **A Green Future: Our 25 Year Plan to Improve the Environment 2018**

A.1.3.5. The Government's 25 Year Plan to Improve the Environment<sup>19</sup> *"sets out goals for improving the environment within a generation and leaving it in a better state than we found it"*. It details how the Government will work with communities and businesses to do this. The following policies are relevant:

- > Make sure that resources are used more efficiently and kept in use for longer to minimise waste and reduce its environmental impacts by promoting reuse, remanufacturing and recycling.
- > Work towards eliminating all avoidable waste by 2050 and all avoidable plastic waste by end of 2042.
- > Reducing food supply chain emissions and waste.
- > Reducing litter and littering.
- > Improving management of residual waste.

### **Our Waste, Our Resources: A Strategy for England (Resources and Waste Strategy for England) 2018**

A.1.3.6. The Strategy<sup>20</sup> will help the Government to meet the commitments outlined in the 25 Year Plan and "sets out how we will preserve our stock of material resources by minimising waste, promoting resource efficiency and moving towards a circular economy. At the same time, we will minimise the damage caused to our natural environment by reducing and managing waste safely and carefully, and by tackling waste crime." The strategy combines actions to be taken now and commitments for the coming years. Key targets and milestones and targets, which could be relevant to the Proposed Development, include:

- > Roll out of a deposit return scheme – (October 2027)<sup>52</sup>;
- > Legislation for mandatory separate food waste collections – by the end of March 2026;
- > 75% recycling rate for packaging (subject to consultation);
- > 65% recycling rate for municipal solid waste – 2035; and
- > Municipal waste to landfill 10% or less – 2035.

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<sup>52</sup> DEFRA. 2024b. UK government update: Deposit Return Scheme for drinks containers. Available at: <https://www.gov.uk/government/publications/uk-government-update-deposit-return-scheme-for-drinks-containers/uk-government-update-deposit-return-scheme-for-drinks-containers> [Accessed 31 October 2024].

## Environmental Improvement Plan 2023

- A.1.3.7. The 25 Year Environment Plan set out the Government's 25-year plan to improve the environment within a generation. It defined 10 goals and provided a framework and vision for how these were to be achieved. The goals included: maximise our resources, minimise our waste. In accordance with the Environment Act 2021 the 25-year plan is to be reviewed and updated every five years; the Environmental Improvement Plan 2023<sup>21</sup> is the first of these updates. The Environmental Improvement Plan 2023 reinforces the intent of the 25 Year Environment Plan and sets out the progress made against all 10 goals, the specific targets and commitments made in relation to each goal, and the Government's plan to continue to deliver these targets and the overarching goals. The 25 Year Environment Plan and the Environmental Improvement Plan 2023 highlight the Government's support for the reduction in the UK's carbon footprint; protection and enhancement of the natural environment; and ensuring land is managed with environmental gains.

## The Waste Prevention Programme for England: Maximising Resources, Minimising Waste 2023

- A.1.3.8. The new programme<sup>22</sup> builds on and embeds strategic principle 2 from the Our Waste, Our Resources Strategy, to prevent waste from occurring in the first place and manage it better when it does. The goal is for a circular economy approach which retains products and materials in circulation for as long as possible and at their highest value.

## A.1.4 Local Planning Policy

### Central Lincolnshire Local Plan (Adopted April 2023)

- A.1.4.1. The Central Lincolnshire Local Plan<sup>23</sup> (CLLP) was adopted by the Central Lincolnshire Joint Strategic Planning Committee on 13 April 2023 and it now replaces the 2017 version of the CLLP Local Plan as the development plan for the City of Lincoln, West Lindsey, and North Kesteven District Councils.
- A.1.4.2. **Policy S53:** Design and Amenity provides a clear set of standards and considerations that need to be deliberated when designing and making decisions on all schemes across Central Lincolnshire and it provides a framework for the development of local design guides or codes by communities, parish, applicants or individual District Councils in the future. Under Policy S53, all development proposals will:
- > Provide adequate storage, waste, servicing and utilities for the use proposed;
  - > Minimise the need for resources both in construction and operation of buildings and be easily adaptable to avoid unnecessary waste in accordance with Policies S10 and S11;



- > Use high quality materials which are not only suitable for the context but that are durable and resilient to impacts of climate change in accordance with the requirements of Policy S20;
- > Use high quality materials which are durable and ensure buildings and spaces are adaptive.

### **Bassetlaw Local Plan 2020-2038**

- A.1.4.3. The Bassetlaw Local Plan<sup>24</sup> was adopted by the Council on 29 May 2024. It replaces the Bassetlaw Core Strategy and Development Management Policies DPD 2011.
- A.1.4.4. **Policy ST33:** Design Quality sets out the key design objectives that are critical in delivering high quality places and spaces. Under Policy ST33, all development must be of a high quality of design that:
- > Respects the local context and complements the landform, layout, building orientation, scale, height, massing, type, materials, details and landscaping of the surrounding areas;
  - > Is sustainable in design and construction, and utilises construction methods and durable materials, where practicable;
  - > Provides for external storage including waste disposal.

### **Newark and Sherwood Amended Core Strategy Development Plan Document**

- A.1.4.5. The Newark and Sherwood Amended Core Strategy DPD<sup>25</sup> sets out the issues that Newark and Sherwood District Council and their public and private sector partners need to address over the next twenty years. It replaces policies from the previous 2011 Core Strategy.
- A.1.4.6. **Core Policy 9: Sustainable Design.** The District Council will expect new development proposals to demonstrate a high standard of sustainable design that both protects and enhances the natural environment and contributes to and sustains the rich local distinctiveness of the District. Therefore, all new development should:
- > Minimise the production of waste and maximise its re-use and recycling.

### **Nottinghamshire and Nottingham Replacement Waste Local Plan: Part 1 Waste Core Strategy (Adopted December 2013).**

- A.1.4.7. Nottinghamshire County Council and Nottingham City Council jointly prepared a Waste Core Strategy<sup>26</sup>, adopted by the Councils on 10 December 2013. It sets out their overall approach to future waste management in Nottinghamshire and Nottingham, including estimates of how much waste capacity needs to be provided up to 2031, what types of sites are suitable and

where new or extended waste management sites should be located. This document is soon to be replaced by the Nottinghamshire and Nottingham joint Waste Local Plan.

- A.1.4.8. **Policy WCS2: Waste Awareness and Re-use** states that all new development should be designed, constructed and implemented to minimise the creation of waste, maximise the use of recycled materials and assist the collection, separation, sorting, recycling and recovery of waste arising from the development.
- A.1.4.9. **Policy WC210: Safeguarding Waste Management Sites** states that the following sites will be safeguarded for waste management facilities:
- > Existing authorised waste management facilities including potential extensions and sites which have a valid planning permission that has not yet been implemented; or
  - > Sites allocated in the Site Allocations Document.
  - > Safeguarding will only apply to the above identified sites and any land immediately adjacent to the site where a need to safeguard has been clearly demonstrated.

#### **Nottinghamshire and Nottingham Pre-submission Draft Waste Local Plan.**

- A.1.4.10. Nottinghamshire County Council and Nottingham City Council are preparing a new joint Waste Local Plan<sup>27</sup> to provide the planning policy framework against which all proposals for new waste development will be assessed. Once adopted, the Waste Local Plan will form the land use planning strategy for waste development within Nottinghamshire and Nottingham up to 2038, replacing the Waste Core Strategy and Local Plan. It will provide the basis for the determination of all recycling and waste planning applications within the County and City.
- A.1.4.11. **Policy SP1: Waste Prevention and Re-use** states that all new development should be designed, constructed, and operated to minimise the creation of waste, maximise the use of recycled materials, and assist with the collection, separation, sorting, recycling and recovery of waste arising from the development during its use.
- A.1.4.12. Policy SP8: Safeguarding Waste Management Facilities lays out the following:
- > Nottinghamshire and Nottingham City will seek to avoid the loss of existing authorised waste management facilities, including potential extensions; sites which have an unimplemented planning permission; and facilities to transport waste, such as rail or water.

- > Proposals, including both planning applications and allocations in local plans, for non-waste uses near existing or permitted waste management facilities will need to provide suitable mitigation before the development is completed to address significant adverse impacts and demonstrate that the waste management uses can operate without unreasonable restrictions being placed upon them.
- > Where proposed non-waste development would have an unacceptable impact on a waste management facility, the applicant will need to demonstrate that there are wider social and/or economic benefits that outweigh the retention of the site or infrastructure for waste use and either:
  - > The equivalent, suitable and appropriate capacity will be provided elsewhere prior to the non-waste development; or
  - > The waste capacity and/ or safeguarded site is no longer required.

### **Nottinghamshire Minerals Local Plan (Adopted March 2021)**

- A.1.4.13. Nottinghamshire County Council adopted the Minerals Local Plan<sup>28</sup> on 25 March 2021, replacing saved policies from the previous Minerals Local Plan. The new Minerals Local Plan covers the period to 2036 and sets out how much mineral the county is likely to need, site specific allocations to meet identified demand, and a range of planning policies against which future mineral development will be assessed.
- A.1.4.14. **Policy SP7: Minerals Safeguarding, Consultation Areas and Associated Minerals Infrastructure** states that locally and nationally important mineral resources, permitted reserves, allocated sites, and associated minerals infrastructure will be safeguarded from needless sterilisation by non-minerals development through the designation of minerals safeguarding areas, identified on a Policies Map. Here, non-minerals development within a safeguarded area will have to demonstrate that mineral resources will not be needlessly sterilised as a result of the development, and that the development would not pose a serious hindrance to future excavation in the vicinity.

### **Lincolnshire Minerals and Waste Local Plan (Adopted June 2016)**

- A.1.4.15. Lincolnshire County Council is responsible for minerals and waste planning in the council, and has prepared the Core Strategy and Development Management Policies document as the first part of a new Lincolnshire Minerals and Waste Local Plan<sup>29</sup>. The document sets out the key principles to guide the future winning and working of minerals and the form of waste management development in the County up to 2031. It also sets out the development management policies against which planning applications for minerals and waste development will be considered. The following policies are relevant to minerals and waste:
- A.1.4.16. **Policy M11: Safeguarding of Mineral Resources** states that applications for non-minerals development in a minerals safeguarding area must be

accompanied by a Minerals Assessment. Planning permission will be granted for development within a Minerals Safeguarding Area provided that it would not sterilise mineral resources within the Mineral Safeguarding Areas or prevent future minerals extraction on neighbouring land.

- A.1.4.17. **Policy M12: Safeguarding of Existing Mineral Sites and Associated Minerals Infrastructure** states that mineral sites (excluding dormant sites) and associated infrastructure that supports the supply of minerals in the County will be safeguarded against development that would unnecessarily sterilise the sites and infrastructure or prejudice or jeopardise their use by creating incompatible land uses nearby.
- A.1.4.18. **Policy W8: Safeguarding Waste Management Sites** states that the County Council will seek to safeguard existing and allocated waste management facilities from redevelopment to a non-waste use and/ or the encroachment of incompatible development unless:
- > Alternative provision in the vicinity can be made in accordance with the Development Plan; or
  - > It can be demonstrated that there is no longer a need for a waste facility at that location.

## A.1.5 Other Guidance

### National Planning Policy Guidance (NPPG) for Waste and Minerals

- A.1.5.1. The NPPG for Waste<sup>16</sup> and Minerals<sup>17</sup> was published to provide more in-depth guidance to the NPPF. The NPPG aims to make planning guidance more accessible and ensures that the guidance is kept up to date.

### IEMA Guide to: Materials and Waste in Environmental Impact Assessment, Guidance for a Proportionate Approach

- A.1.5.2. The document **Error! Bookmark not defined.** offers guidance and recommendations for EIA practitioners and stakeholders concerned with the impacts and effects of materials and waste on the environment. The guidance provides considerations for screening, scoping, consultation, assessment and subsequent reporting and monitoring.

### Waste & Resources Action Programme (WRAP) Designing Out Waste: A Design Team Guide for Civil Engineering

- A.1.5.3. The document<sup>30</sup> provides information on the key principles that designers can use during the design process and how these principles can be applied to projects to maximise opportunities to Design out Waste. This includes five key principals during the design process to reduce waste:

- > Design for Reuse and Recovery
- > Design for Off Site Construction
- > Design for Materials Optimisation
- > Design for Waste Efficient Procurement
- > Design for Deconstruction and Flexibility

### **Contaminated Land: Applications in Real Environments (CL:AIRE)** **Definition of Waste: Development Industry Code of Practice (DoW CoP)**

- A.1.5.4. The document<sup>31</sup> provides a clear, consistent and efficient process which enables the reuse of excavated materials on-site or their movement between sites.
- A.1.5.5. Use of the DoW CoP supports the sustainable and cost-effective development of land. It can provide an alternative to environmental permits or waste exemptions.
- A.1.5.6. In order to implement the CoP, a Materials Management Plan (MMP) is required. A MMP enables the reuse of contaminated or uncontaminated soil, made ground and other material in earthworks without the costs and time constraints often associated with obtaining environmental permits.

### **Waste Duty of Care Code of Practice**

- A.1.5.7. The code of practice<sup>32</sup> sets out practical guidance on how to meet the waste duty of care requirements. It is issued under section 34(7) of the Environmental Protection Act 1990 (the EPA) in relation to the duty of care set out in Section 34(1) of that Act.
- A.1.5.8. This code of practice applies to those that import, produce, carry, keep, treat, dispose of or, as a dealer or broker have control of, certain waste in England or Wales.
- A.1.5.9. Failure to comply with the duty of care is an offence with no upper limit on the courts' power to fine. In some instances, a fixed penalty notice may be issued for failure to comply with the duty of care in place of prosecution. The code of practice is admissible as evidence in legal proceedings for Section 34(1) offences and its rules must be taken into account where relevant to questions raised in the case.

### **DEFRA Guidance on Applying the Waste Hierarchy**

- A.1.5.10. This guidance<sup>33</sup> was produced under regulation 15(1) of the Waste (England and Wales) Regulations 2011 and any person subject to the regulation 12 duty must have regard to it. The guidance is for any business or public body which generates, handles or treats waste. It sets out:

- > What the waste hierarchy is;
- > How it works for a range of common materials and products;
- > What businesses and public bodies need to do; and
- > Key questions and ideas for dealing with waste in line with the hierarchy.

### **Solar Power Lifecycle Quality Best Practice Guidance**

- A.1.5.11. The Lifecycle Quality Best Practice Guidance<sup>34</sup> focuses on ensuring quality assurance throughout the entire lifecycle of solar projects. It emphasises the importance of due diligence, risk management, and standardising key terms and stakeholder roles across different phases, including Engineering, Procurement, and Construction (EPC), Operation & Maintenance (O&M), and Asset Management. This guidance aims to enhance the technical and economic performance of solar systems by promoting best practices and continuous improvement.

### **UK Battery Strategy**

- A.1.5.12. The UK Battery Strategy<sup>35</sup> aims to establish a globally competitive battery supply chain by 2030, supporting economic prosperity and the transition to net zero. It focuses on sustainable battery design, manufacturing, and use, backed by over £2 billion in new capital and R&D funding for the automotive sector. The strategy emphasizes innovation, resilience in manufacturing supply chains, and the development of a sustainable battery industry. It also highlights the importance of a thriving battery innovation ecosystem and aims to position the UK as a world leader in this field.

## Appendix B Materials and Waste Methodology and Baseline

### B.1 Assessment Methodology

#### B.1.1 Impact Assessment Methodology

##### Receptor Sensitivity

- B.1.1.1. The sensitive receptors for the assessment of the construction, operational and decommissioning phase of the materials and waste impacts are described within Section 1.6.2.

##### Materials

- B.1.1.2. The sensitivity of materials relates to the availability and type of construction materials to be consumed by the Proposed Development. The IEMA Guidance criteria described within Table 1-8 is used to determine the sensitivity of materials.

Table 1-8. Materials Receptor Sensitivity

Effects	Criteria for Materials Receptor Sensitivity
<b>Negligible</b>	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock. <i>And/or</i> are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials. *
<b>Low</b>	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock. <i>And/or</i> are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.
<b>Medium</b>	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock. <i>And/or</i>



Effects	Criteria for Materials Receptor Sensitivity
	are available comprising some sustainable features and benefits compared to industry-standard materials.
<b>High</b>	On balance, the key materials required for the construction of the Proposed Development are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock. <i>And/or</i> comprise little or no sustainable features and benefits compared to industry-standard materials.
<b>Very High</b>	On balance, the key materials required for the construction of the Proposed Development are forecast are known to be insufficient in terms of production, supply and/or stock. <i>And/or</i> comprise no sustainable features and benefits compared to industry-standard materials.
* <i>Subject to supporting evidence, sustainable features and benefits could include, for example, materials or products that: comprise reused, secondary or recycled content (including excavated and other arisings); support the drive to a circular economy; or in some other way reduce lifetime environmental impacts.</i>	

## Waste

- 1.10.17 The criteria described within Table 1-9 and Table 1-10 has been used to determine the sensitivity of landfill capacity.
- 1.10.18 As stated in the IEMA Guidance “due to uncertainties relating to future technologies and infrastructure, this first edition of the guidance does not incorporate a proposed methodology to assess impacts and effects during decommissioning or end of first life”. However, the criteria in the IEMA Guidance are applied to decommissioning for the Proposed Development.

Table 1-9. Inert and Non-hazardous Landfill Capacity Sensitivity

Effects	Criteria for Inert and Non-Hazardous Landfill Capacity Sensitivity
<b>Negligible</b>	Across construction and/or operational phases, the baseline/future baseline (i.e. without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to remain unchanged or is expected to increase through a committed change in capacity.

Effects	Criteria for Inert and Non-Hazardous Landfill Capacity Sensitivity
<b>Low</b>	Across construction and/or operational phases, the baseline/future baseline (i.e., without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to reduce minimally by <1% as a result of wastes forecast.
<b>Medium</b>	Across construction and/or operational phases, the baseline/future baseline (i.e., without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to reduce noticeably by 1 to 5% as a result of wastes forecast.
<b>High</b>	Across construction and/or operational phases, the baseline/future baseline (i.e. without the Proposed Development) of regional inert and non-hazardous landfill capacity is expected to reduce considerably by 6 to 10% as a result of wastes forecast.
<b>Very High</b>	<p>Across construction and/or operational phases, the baseline/future baseline (i.e. without the Proposed Development) of regional inert and non-hazardous landfill capacity is:</p> <ul style="list-style-type: none"> <li>&gt; expected to reduce very considerably (by &gt;10%);</li> <li>&gt; end during construction or operation;</li> <li>&gt; is already known to be unavailable; or</li> </ul> <p>would require new capacity or infrastructure to be put in place to meet forecast demand.</p>

Table 1-10. Hazardous Waste Landfill Sensitivity

Effects	Criteria for Hazardous Landfill Capacity Sensitivity
<b>Negligible</b>	Across the construction and/or operational phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to remain unchanged or is expected to increase through a committed change in capacity.
<b>Low</b>	Across the construction and/or operational phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to reduce minimally by <0.1% as a result of wastes forecast.

Effects	Criteria for Hazardous Landfill Capacity Sensitivity
<b>Medium</b>	Across the construction and/or operational phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to reduce noticeably by 0.1 to 0.5% as a result of wastes forecast.
<b>High</b>	Across the construction and/or operational phases, the baseline/future baseline (i.e., without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is expected to reduce considerably by 0.5 to 1% as a result of wastes forecast.
<b>Very High</b>	<p>Across construction and/or operational phases, the baseline/future baseline (i.e. without the Proposed Development) of regional (or where justified, national) hazardous landfill capacity is:</p> <ul style="list-style-type: none"> <li>&gt; expected to reduce very considerably (by &gt;10%);</li> <li>&gt; end during construction or operation;</li> <li>&gt; is already known to be unavailable; or</li> </ul> <p>would require new capacity or infrastructure to be put in place to meet forecast demand.</p>

### Magnitude of Impacts

- B.1.1.3. The IEMA Guidance **Error! Bookmark not defined.** for assessing the magnitude of impact from materials comprises a percentage-based approach that determines the influence of construction materials use on the baseline national demand from the construction of the Proposed Development. The criteria used to assess the magnitude of impact for materials are provided in Table 1-11.

Table 1-11. Materials Magnitude of Impacts

Criteria for Materials Magnitude of Impacts	
<b>No change</b>	Consumption of no materials is required.
<b>Negligible</b>	Consumption of no individual material type is equal to or greater than 1% by volume of the baseline availability.
<b>Minor</b>	Consumption of one or more materials is between 1 to 5% by volume of the baseline availability.

Criteria for Materials Magnitude of Impacts	
<b>Moderate</b>	Consumption of one or more materials is between 6 to 10% by volume of the baseline availability.
<b>Major</b>	Consumption of one or more materials is >10% by volume of the baseline availability.
A national baseline is used in the absence of regional construction material availability data for steel. A regional baseline is used for aggregates, asphalt and concrete.	

B.1.1.4. The IEMA Guidance **Error! Bookmark not defined.** offers two methods to assess waste effects (Method W1 – Void Capacity and Method W2 – Landfill Diversion). For this assessment, Method W1 has been applied:

B.1.1.5. W1 – Void Capacity, a detailed methodology where the magnitude of impact from waste is assessed by determining the percentage of the remaining landfill void capacity that will be depleted by waste produced during the construction and/or operation. In a worst case, where landfill sensitivity is very high, a significant effect would occur at a magnitude of minor, which for the Proposed Development equates to non-hazardous and inert waste generation being more than 1% of landfill capacity and hazardous waste generation being more than 0.1% of landfill capacity. The criteria used to assess the magnitude of impact for inert and non-hazardous and hazardous waste is provided within Table 1-12 and Table 1-13 respectively.

*Table 1-12. Method W1 Inert and Non-hazardous Waste - Magnitude of Impact*

Criteria for Inert and Non-hazardous Waste Magnitude of Impacts	
<b>No change</b>	Zero waste generation and disposal from the Proposed Development.
<b>Negligible</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by <1%.
<b>Minor</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by 1 to 5%.
<b>Moderate</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by 6 to 10%.
<b>Major</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by >10%.

### Criteria for Inert and Non-hazardous Waste Magnitude of Impacts

# Forecast as the worst-case scenario, during a defined construction and/or operational phase.

Table 1-13. Method W1 Hazardous Waste - Magnitude of Impact

### Criteria for Hazardous Waste Magnitude of Impacts

<b>No change</b>	Zero waste generation and disposal from the Proposed Development.
<b>Negligible</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by <0.1%.
<b>Minor</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by <0.1 to 0.5%.
<b>Moderate</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by <0.5 to 1%.
<b>Major</b>	Waste generated by the Proposed Development will reduce Expansive Study Area landfill capacity baseline <sup>#</sup> by >1%.
# Forecast as the worst-case scenario, during a defined construction and/or operational phase.	

### Significance Criteria

- B.1.1.6. The effect thresholds and the associated significance of effects are described within Table 1-14 and Table 1-15.

Table 1-14. Effect Thresholds

Magnitude of Impact						
		No Change	Negligible	Minor	Moderate	Major
Sensitivity of Receptor	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 1-15 Significance of Effects

Effect	Materials	Waste
No Neutral	Not Significant	Not Significant
Slight		
Moderate	Significant	Significant
Large		
Very Large		

## B.2 Baseline Conditions

### B.2.1 Existing Baseline

#### Regional and National Availability of Key Construction Materials

- B.2.1.1. Table 1-16 outlines the national consumption and sales (providing an indication of availability) in 2023 for steel<sup>44</sup> and 2021 for aggregates, asphalt and concrete<sup>45</sup> (i.e., the most recent years for which data is available). These are expected to be the key materials used during the Proposed Development's

construction. Regional data is presented in Table 1-17. Sales of construction materials by region are provided for the region in which the Proposed Development is located (East Midlands).

- B.2.1.2. Potential recycled content for the main construction materials is outlined in Table 1-18. These good practice rates are derived from WRAP's Designing Out Waste Tool for Civil Engineering<sup>30</sup>.

*Table 1-16 National Consumption and Sales for Key Construction Materials*

Material	National availability (Million Tonnes, Year)	10% of National Availability (Million Tonnes, Year)	Baseline Data Year	Data Description
Steel	15	1.5	2023	UK's requirement
Aggregates of which:	279.8	27.98	2021	Minerals and mineral products sales in Great Britain
> Crushed rock	148.2	14.82		
> Sand and gravel – land won	47.7	4.47		
> Sand and gravel - marine	14.3	1.43		
> Recycled and secondary	69.6	6.96		
Asphalt	28.3	2.83		
Concrete of which:	77.5	7.75		
> Ready-mixed concrete	52.7	5.27		
> Concrete products	24.8	2.48		



\*10% of national availability noted as the point of significance for materials based on a sensitivity of low (see Table 1-11)

Table 1-17. Construction Material Sales by Region

Construction Material	Regional (East Midlands) availability	10% of regional (East Midlands) availability*
Crushed rock (million tonnes)	30.6	3.6
Sand and gravel (million tonnes)	6.1	0.61
Ready-mixed concrete (converted to million tonnes from m <sup>3</sup> using a density of 2.4 t/m <sup>3</sup> )	1.3	0.13
Asphalt (million tonnes)	3.3	0.33
*10% of national availability noted as the point of significance for materials based on a sensitivity of low (see Table 1-11)		

Table 1-18. Potential Recycled Content (Percentage by Weight)

Material Type	Potential Recycled Content (% by Weight)
Concrete	16
Asphalt	25
Aggregates	50
Steel reinforcement	100
Structural steel	60

### Landfill Capacity

- B.2.1.3. The remaining landfill capacities at the end of 2023 for the non-hazardous and inert waste Expansive Study Area (East Midlands) and the hazardous waste Expansive Study Area (England) is shown in Table 1-19<sup>38</sup>.
- B.2.1.4. Merchant landfills are operated for commercial purposes, accepting waste from construction projects and operating businesses. Merchant landfills are therefore considered to form the baseline. In contrast, restricted landfills are sites that deal with their own produced waste (i.e. not operating for commercial purposes). Therefore, additional capacity is excluded from the baseline. Some non-hazardous landfills have a Stable Non-Reactive Hazardous Waste

(SNRHW) cell (e.g. for asbestos). SNRHW cells usually form only a small fraction of the overall capacity. Therefore, for assessment purposes non-hazardous landfills with SNRHW cells are considered in the same way as non-hazardous landfills.

Table 1-19. Landfill Capacity (end of 2023) in the East Midlands and England

Landfill Type	East Midlands	England	Point of significance based on a sensitivity of “very high”
	Landfill Capacity ('000s m <sup>3</sup> )		m <sup>3</sup>
Hazardous merchant	Not applicable, assessment is completed at a national level only	9,680	9,680 (0.1% of national landfill capacity)
Non-hazardous with SNRHW cell	16,069	Not applicable, assessment is completed at a regional level only	307,690 (1% of national landfill capacity)
Non-hazardous	14,700		
Inert	18,917		189,170 (1% of national landfill capacity)

## Waste Management Infrastructure

- B.2.1.5. There are no permitted waste sites or waste site applications located within the Proposed Development boundary (Environmental Permitting Regulations – Waste Sites<sup>43</sup>).
- B.2.1.6. Some capacity data for waste management infrastructure is publicly available (e.g. Environmental Permitting Regulations – Waste Sites<sup>43</sup> and waste site permits). However, the permitted capacity is not necessarily representative of the actual operational capacity of the infrastructure. Therefore, inputs data are collated from the EA's Waste Data Interrogator for 2023 – Wastes Received (Excel) – Version 1<sup>40</sup>. A summary of waste inputs by facility within the East Midlands regions is provided in Table 1-20. Inputs are not totalled since the double counting of waste moving between the site types listed in the Waste Data Interrogator cannot be discounted.

Table 1-20. Summary of Waste Inputs by Facility for the East Midlands Region 2023

Facility Type	East Midlands (Tonnes Received)
Landfill	3,933,086
Metal Recycling Site	806,118
On/in land	282,857
Transfer	4,477,926
Treatment	7,709,968
Combustion	196,422
Incineration	1,333,480
Mining	13,209
Storage	242,214
Processing	178,916
Associated Process	1,814

## Waste Targets

- B.2.1.7. The national target for recovery of C&D waste is 70% by weight, as set out in the Waste Framework Directive<sup>2</sup> and the Waste Management Plan for England<sup>15</sup>. The target specifically excludes naturally occurring materials with EWC Code 17 05 04 (17 05 04 soil and stones other than those mentioned in 17 05 03\* (soils and stone containing dangerous substances)). Recovery is deemed to include reuse, recycling, and other recovery (e.g. energy recovery). A recovery rate of 70% is assumed be achievable for the purpose of the waste assessment.
- B.2.1.8. A good practice landfill diversion target of 90% has been achieved and exceeded by major UK developments as outlined in the IEMA Guidance **Error! Bookmark not defined.** In 2020, the most recent year for which data is available, the UK generated 59.4 million tonnes of non-hazardous C&D waste, of which 55 million tonnes was recovered. This represents a recovery rate of 92.6% **Error! Bookmark not defined.**

- B.2.1.9. Standard, good and best practice recovery rates by material are provided by WRAP<sup>30</sup>. Recovery rates for key construction materials and other construction wastes relevant to the Proposed Development are provided in Table 1-21.

*Table 1-21. Standard, Good and Best Practice Recovery Rates by Material*

Material	Standard Practice Recovery (%)	Good Practice Recovery (%)	Best Practice Recovery (%)
Metals	95	100	100
Packaging	60	85	95
Concrete	75	95	100
Inert	75	95	100
Plastics	60	80	95
Miscellaneous	12	50	75
Electrical equipment	Limited information	70	95
Cement	Limited information	75	95
Liquids and oils	100	100	100
Hazardous	50	Limited information, cannot be 100% since some hazardous waste (e.g. asbestos) must be landfilled.	

## B.2.2 Future Baseline

- B.2.2.1. There is no publicly available information on any potential changes to national or regional material availability by the time of the construction of the Proposed Development. Construction material demand, such as ready mixed concrete, is closely aligned to both the quantity of construction taking place and the general economy. It is deemed inappropriate to forecast future availability as the demand is unlikely to be linear and it is not possible to set a future baseline for materials. As such, future availability is assumed to remain the same as the current baseline as outlined in Table 1-16 and Table 1-17.

- B.2.2.2. There is no publicly available information regarding any potential changes to landfill capacity by the time of the Proposed Development's construction, operation and decommissioning.
- B.2.2.3. Due to the cyclic nature of inert and hazardous landfill capacity (e.g. landfill capacity decreasing, and then new sites or landfill cells being opened with landfill capacity increasing), it is not realistic to forecast future landfill capacity. Therefore, inert and hazardous landfill capacity is assumed to remain the same as the current baseline as outlined in Table 1-19.
- B.2.2.4. For non-hazardous waste, using the current rate of decline of landfill capacity and forecasting into the future would lead to the inevitable conclusion that there would be no void space remaining. However, this is not a credible scenario as if there is still a need for landfill, then the WPA will need to consent new landfill capacity to replace that which has been used up. Therefore, non-hazardous and hazardous landfill capacity is assumed to remain the same as the current baseline, as outlined in Table 1-19.



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