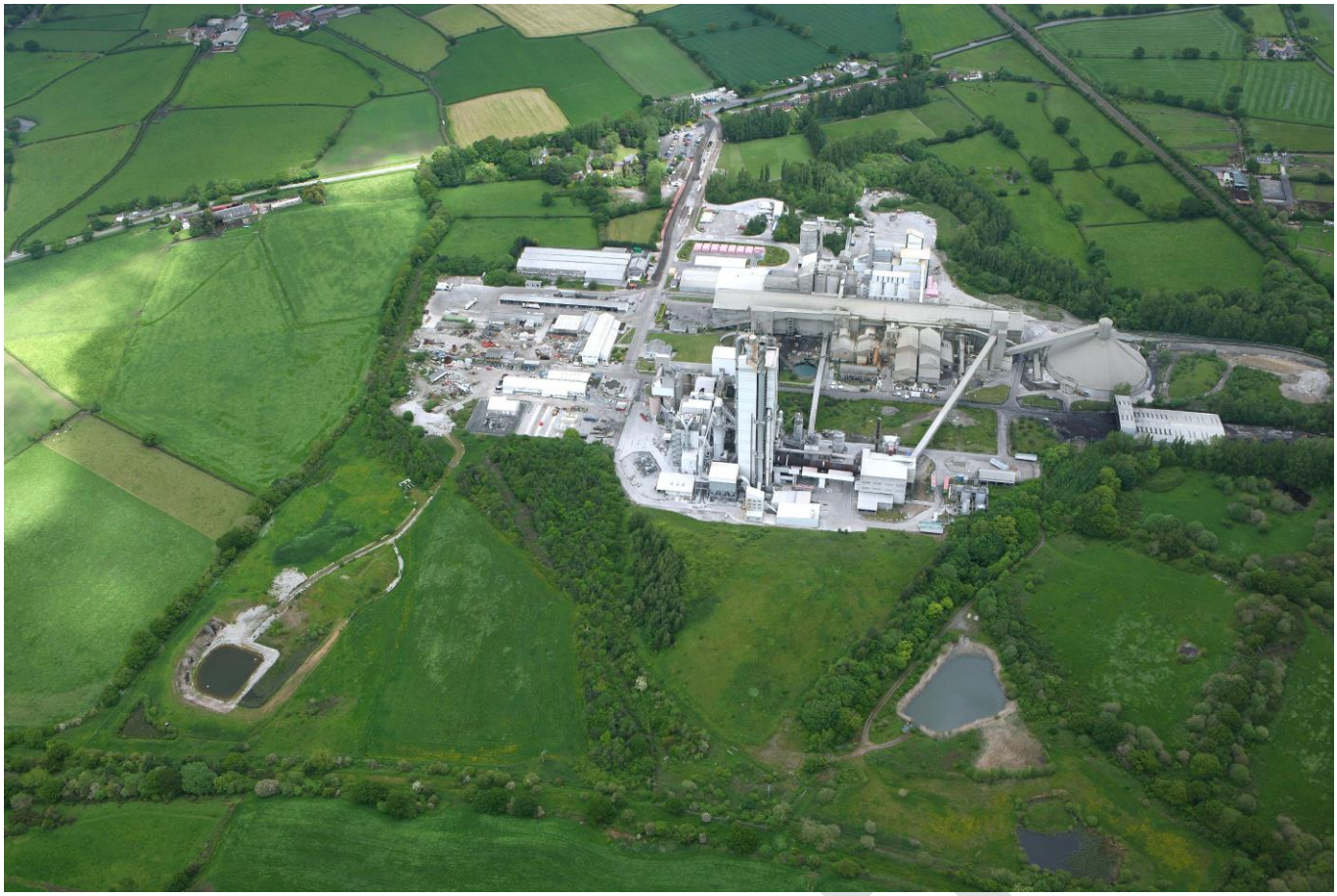

Castle Cement Limited

Carbon Capture and Storage Project – Padeswood, North Wales

Volume 4, Draft Technical Appendix 14.1

Outline Site Waste Management Plan

RSK

JUNE 2024

CONTENTS

TABLES

1 INTRODUCTION

1.1 Background

1.1.1 This Outline Site Waste Management Plan (OSWMP) has been prepared by RSK on behalf of Castle Cement Ltd (hereafter referred to as 'Applicant') in response to the Scoping Direction issued by Planning and Environment Decisions Wales (PEDW) (Ref. DNS CAS-02009-W1R1Z7).

1.1.2 The Scoping Direction was issued based on the Scoping Report submitted to PEDW on 04 November 2022 and states at ID.11:

> *'Although is clear that construction waste generated will not be atypical compared to the construction of projects of similar nature and scale, the SR does not contain any information regarding the substances used during the operations. NRW advises in their response contained at Appendix 1 (of the Scoping Direction) that the Site's existing Environmental Permit will need to be amended and the SR appears to suggest that there will be a stream of hazardous waste generated during construction and operations (see paragraph 5.2.5). Therefore, it is not possible at this stage to understand whether this aspect could be scoped out based on the information provided.*
>
> *Material Assets are therefore scoped into the ES, at this stage. If the Applicant still wish to scope material assets out of the assessment, more information should be provided in ES to satisfy the decision maker that there will be no significant impacts generated by the proposed development.'*

1.1.3 This OSWMP has therefore been prepared to support the draft Environmental Statement to be submitted for a new Carbon Capture and Storage Project proposed at the Padeswood Cement Works, Flintshire, North Wales (hereafter referred to as the 'Proposed Development') and scope material assets out of the assessment.

1.1.4 This OSWMP considers the potential overall impacts that may arise as part of the Proposed Development, from waste generated during site preparation, construction and operational phases, with an overall aim of developing an outline strategy for legislative compliance and good practice in the separation, storage, collection, treatment and/or disposal of waste arisings.

1.1.5 The report also outlines the opportunity for implementing waste mitigation measures for the potential impacts from each phase of the development, specifically site preparation (including any demolition), construction and operation, in order to ensure such measures are consistent with both Welsh Government and local authority waste policies and targets.

1.2 Summary of Proposed Development

1.2.1 Padeswood Cement Works is located to the south of Buckley, near Mold, Flintshire, CH7 4HB at National Grid Reference SJ 29127 62227.

1.2.2 The cement works is owned and operated by Castle Cement Limited (the Applicant, trading as Heidelberg Materials UK, one of the largest building materials manufacturers in the world, the global market leader in aggregates which also has leading positions in asphalt, cement, concrete and other downstream activities.

1.2.3 The proposal is to integrate Padeswood Cement Works into the HyNet North West network for the transportation of captured CO_2 for storage in Liverpool Bay CCS Limited's Liverpool Bay storage facilities.

1.2.4 The Proposed Development will compromise of:

- Bunding – to screen the Proposed Development from key viewpoints surrounding the Site. To be constructed using topsoil and subsoil stripped from the construction phase and stabilised with native planting;
- Demolition of Padeswood Hall, and Padeswood Hall Farm and outbuildings;
- Site Access Road to Carbon Capture Plant;
- Offices and Joint Control Centre;
- General Car Parking;
- Carbon Capture Plant, including:
    - Instrument Air System;
    - Waste Heat Recovery System;
    - Combined Heat Power Plant and associated infrastructure;
    - Integrated Quencher;
    - Gas-Gas Heater;
    - Absorber Tower;
    - Wash Tower;
    - CO_2 Regenerator Column;
    - Compressor House;
    - Pipeline Connection Point Compound;
    - Flue Gas Stack;
    - Hybrid Cooling Towers;
    - Piperack and Air Coolers; and,
    - Substation.

1.3 Assessment Aims

1.3.1 The aim of this OSWMP is to consider the key issues associated with the sustainable

management of construction waste at the Proposed Development with particular reference to:

- Identifying opportunities to maximise the reduction, reuse, recycling and recovery of waste and thereby minimising disposal in line with Welsh Government policy; and
- Identifying opportunities for waste segregation and the transfer of waste to appropriate processing facilities.

1.4 Methodology

1.4.1 The development of this OSWMP has involved a number of tasks including:

- A desk top review to collate information relating to waste generation, collection, and disposal options;
- A review of Welsh Government and Flintshire County Council's waste management requirements, as the local planning authorities, and any forthcoming policy changes for development in the area;
- A review of available and accessible planning and policy guidance; and
- Identification of opportunities for waste minimisation, reuse and recycling during Site preparation (including demolition where required), construction and operational phase (including options for sustainable re-use and recycling of wastes such as Environmental Permit; Exemptions; the CL:AIRE Definition of Waste Code of Practice (DoWCoP) (for re-use of soils); and Waste & Resources Action Programme (WRAP) Quality Protocol (for the reuse of demolition materials).

1.5 Limitations

1.5.1 This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

1.5.2 The comments given in this report and the opinions expressed are based on the plans provided at the time and discussions with relevant parties. However, there may be conditions pertaining to the Site that have not been disclosed by investigations and therefore could not be taken into account.

2 WASTE LEGISLATION, POLICY AND GUIDANCE

2.1 Introduction

2.1.1 This section contains detail of the national legislation and local waste policy and guidance that has relevance to this Proposed Development.

2.2 National Legislation

Waste Framework Directive[1]

2.2.1 The key European legislation is the revised Waste Framework Directive (2008/98/EC) ('rWFD'), which consolidates a number of separate waste Directives and amendments. It establishes the basis for the management of wastes across the European Union (EU). It defines certain terms, such as "waste", "recovery" and "disposal", to ensure that a uniform approach is taken across the EU. Following the UK withdrawal from the EU, this directive still applies through the implementation of the European Union (Withdrawal) Act 2018 and the European Union (Withdrawal Agreement) Act 2020 (refer to **Paragraph 2.2.6**).

Duty of Care[2]

2.2.2 The waste Duty of Care is a legal requirement, originally implemented by Section 34 of the Environmental Protection Act 1990 and still applicable, to ensure that producers and holders handle their waste safely and in compliance with the appropriate regulations. One of the fundamental aspects of duty of care requires the holder of waste to make sure that anyone else dealing with their waste has the necessary authorisation to do so. If the holder does not do this and their waste is subsequently found to have been illegally disposed, the holder could be held responsible and may face prosecution. The Duty of Care provisions are contained in the Waste (England & Wales) Regulations 2011 SI 2011 No. 988.

The Waste Regulations[3]

2.2.3 The Waste (England and Wales) Regulations 2011 SI 2011 No. 988, implement the rWFD in England and Wales. The waste hierarchy is set out at Article 4 of the rWFD. The waste hierarchy requires a demonstration by the producer/holder of a waste that the priority identified in **Table 1** has been considered in order to determine the most suitable waste management option for all waste arisings:

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0098

[2] https://www.legislation.gov.uk/uksi/1991/2839/made

[3] https://www.legislation.gov.uk/uksi/2011/988/introduction/made

Table 1 The Waste Hierarchy (reproduced from Department of Environment, Food & Rural Affairs [DEFRA] website)

Waste Hierarchy	Relevant Activity
Prevention	Using less material in design and manufacture, keeping products for longer, re-use, using less hazardous materials.
Preparing for re-use	The waste is capable of being recycled by existing local or regional waste management facilities without requiring adaptation.
Recycling	Turning waste into a new substance or product, includes composting if it meets quality protocols.
Other recovery	Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat, and power) and materials from waste, some backfilling.
Disposal	Landfill and incineration without energy recovery.

2.2.4 It is a legal requirement for waste producers/holders to follow the waste hierarchy when making decisions about waste management options for waste. Waste holders must choose the highest possible hierarchical option for their wastes. Lower hierarchical options cannot be justified by cost alone. They require environmental justification over available higher options, for example the location of a site may justify sending waste to a lower option (e.g. local landfill), rather than sending it hundreds of miles to the nearest facility that could provide a higher option.

Hazardous Waste Regulations[4]

2.2.5 The Hazardous Waste Regulations (HWR) provides the rules for assessing if a waste is hazardous or not as set out under the EU List of Wastes Decision 2000/532/EC. As part of the assessment of waste, hazardous wastes are identified in the European Waste Catalogue (EWC) by an asterisk (*). Some types are classed as hazardous outright (known as absolute entries in the EWC), others require separate assessment dependent upon the concentration of dangerous substances present above threshold concentrations (known as mirror entries in the EWC). The HWR refer to the List of Wastes for the relevant thresholds for some of the hazardous properties; and to assign the formal description and code for the waste. The regulatory framework to do this is contained in:

- Hazardous Waste (England and Wales) Regulations (SI 2005/ 894);
- Hazardous Waste (England and Wales) (Amendment) Regulations (2009 /507)[5];

[4] https://www.legislation.gov.uk/uksi/2005/894/contents/made

[5] https://www.legislation.gov.uk/uksi/2009/507/contents/made

- Hazardous Waste (Miscellaneous Amendments) Regulations (SI 2015/1360)[6]; and
- Hazardous Waste (England and Wales) (Amendment) Regulations 2016 (SI 2016/334)[7].

2.2.6 Following the UK withdrawal from the EU, the implementation of the European Union (Withdrawal) Act 2018 and the European Union (Withdrawal Agreement) Act 2020 (see Section 2.2.6) means that this legislation is currently unaffected (see below).

European Union (Withdrawal) Act 2018[8] **and** European Union (Withdrawal Agreement) Act 2020[9]

2.2.7 On 31 December 2020 the effect of the European Communities Act 1972 (ECA 1972) ceased and no longer serves as a conduit through which the EU can directly affect UK legislation. The European Union (Withdrawal) Act 2018 and European Union (Withdrawal Agreement) Act 2020 provide a framework to ensure the legal position that existed before 31 December 2020 will continue to be preserved by retaining EU law that applies to the UK at that point and bringing it within the UK's domestic legal framework as a new category of law; 'Retained EU Law'. The Acts also provide the government with the necessary powers to amend or disapply Retained EU Law where it is considered appropriate.

Wellbeing of Future Generations Act (Wales) 2015[10]

2.2.8 The Wellbeing of Future Generations (Wales) Act 2015 (the WBFG Act) came into force in 2015. The WBFG Act is about improving the social, economic, environmental and cultural well-being of Wales.

2.2.9 It requires public bodies listed in the Act (i.e., Welsh Ministers, local authorities and the Natural Resources Wales) to carry out sustainable development and to think more about the long-term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach. The Act states that this approach will help create a Wales that *'we all want to live in, now and in the future*'.

2.2.10 To make sure public bodies in Wales are all working towards the same vision, the Act puts in place seven well-being goals, which are set out below:

[6] https://www.legislation.gov.uk/uksi/2015/1360/contents

[7] https://www.legislation.gov.uk/uksi/2016/336/made

[8] https://www.legislation.gov.uk/ukpga/2018/16/contents/enacted

[9] https://www.legislation.gov.uk/ukpga/2020/1/contents/enacted

[10] https://www.gov.wales/well-being-future-generations-act-essentials-html

Figure 1.1 Wellbeing Goals (gov.wales)

2.2.11 Flintshire and Wrexham Public Services Board has developed a well-being plan for 2023-2028[11] which seeks to tackle inequality and improve well-being through two objectives:

- Build flourishing communities by reducing inequalities across environment, education, employment, income and housing;
- Improve community well-being by enabling people of all ages to live healthy and independent lives.

2.2.12 Through these objectives, Flintshire and Wrexham Public Services Board seeks to '*mobilise everyone's skills and talents to tackle climate change and the nature emergency and build a strong, fair sustainable local economy.'*

2.2.13 Although there are no requirements for the private sector under the WBFG Act or the Flintshire and Wrexham Public Services Board well-being plan, these documents provide guidance on the policy landscape in which waste management is viewed and assessed.

2.3 National Waste Policy and Guidance

2.3.1 Regulation 7 of The Waste (England and Wales) Regulations 2011 requires Welsh Ministers to develop one or more plan(s) containing policies in relation to waste management (i.e., a waste management plan). Regulation 8 and Schedule 1 of The Waste (England and Wales) Regulation 2011 set outs the information required in a waste management plan including (but not limited to):

- Analysis of the current waste management situation;

[11] https://www.flintshire.gov.uk/en/PDFFiles/Policy-and-Performance/PSB/Flintshire-and-Wrexham-Public-Services-Board-Well-being-Plan-2023-2028.pdf

- Policies relating to packaging waste, the collection waste, bio-waste and re-use; and
- Re-use, recovery and recycling targets (including construction and demolition waste).

2.3.2 The Welsh waste management plan consists of a series of documents that include: 'Beyond Recycling' - the circular economy strategy for Wales (2021)[12], Towards Zero Waste (2010)[13], Planning Policy Wales (2021)[14], Technical Advice Note 21:Waste (TAN21)[15] , other Sector Plans covering specific major waste streams, and the Waste Prevention Programme.

2.3.3 National planning policy on waste is set out in Planning Policy Wales Edition 12[16] (PPW) and Technical Advice Note (TAN) 21: Waste[17]. Towards Zero Waste[18] sets out Wales long term strategy for resource efficiency and waste management.

Planning Policy Wales (PPW)[19]

2.3.4 PPW is the principal planning guidance document of Welsh Government that should be taken into account in the preparation of development plans and in the determination of planning applications and appeals. The main objective of PPW is to promote sustainable development by ensuring that the planning system provides for an adequate and continuous supply of land available and suitable for development.

2.3.5 **Section 5.11** of the PPW focuses on the circular economy and establishes a range of measures aimed at reducing waste and supporting the efficient use of materials and resources, which are reflected as applicable in this report.

Technical Advice Note 21: Waste[20]

2.3.6 TAN21 focuses on support for the fundamental principles of sustainable waste management and requires that the land use planning system should:

- Provide a planning framework enabling adequate provision to be made for waste resource management facilities to meet the needs of society for the reuse, recovery and disposal of waste;
- Help meet the needs of business and encourage competitiveness;
- Encourage sensitive waste management, enhance the overall quality of the environment and avoid risks to human health and safety;
- Have regard to the need to protect areas of designated landscape and nature conservation value from inappropriate development;

[12] https://www.gov.wales/beyond-recycling
[13] https://www.gov.wales/towards-zero-waste-our-waste-strategy
[14] https://www.gov.wales/planning-policy-wales
[15] https://www.gov.wales/sites/default/files/publications/2018-09/tan21-waste.pdf
[16] https://www.gov.wales/planning-policy-wales
[17] https://www.gov.wales/sites/default/files/publications/2018-09/tan21-waste.pdf
[18] https://www.gov.wales/towards-zero-waste-our-waste-strategy
[19] See footnote 16
[20] See footnote 17

- Have regard to the need to protect the amenity of the community and of neighbouring land uses and users affected by existing or proposed waste management facilities;
- Minimise adverse environmental impacts arising from the handling, transport and disposal of waste;
- Consider what new facilities may be needed, in the light of waste arisings (current and projected);
- Ensure that opportunities for incorporating reuse/recycling facilities in new developments are properly considered.

Towards Zero Waste – One Wales: One Planet (2010)[21]

2.3.7 This is the Welsh Government's overarching waste strategy for Wales and sets out a long-term framework for resource efficiency and waste management in Wales up until 2050, taking into account social, economic and environmental outcomes. Achieving the aims in Towards Zero Waste relies on a suite of waste sector plans. These waste sector plans provide details on how the outcomes, targets and policies in Towards Zero Waste are to be implemented.

2.3.8 The are two key milestones:

- 2025: Towards Zero Waste – An intermediary step where Wales will have significantly reduced waste through actions on sustainable consumption and production and will manage any waste that is produced in a way that makes the most of the country's valuable resources i.e. maximise recycling, minimise the amount of residual waste produced and eliminate landfill as far as possible.
- 2050: Achieving Zero Waste - As a minimum, Wales will reduce the impact of waste to within its environmental limits (which is defined as 'one Wales: one planet' levels of waste, roughly 65% less waste than was produced when the strategy was prepared), aiming to phase out residual waste through actions on waste prevention and sustainable consumption and production so that the only waste that is produced is reused or recycled as a resource (thus meeting the aspirations of the 'zero waste' philosophy).

2.3.9 In order to achieve the above milestones, Wales needs to have a network of appropriate waste/resource management facilities that will divert waste away from landfill in a way that will reduce the impact of waste on the environment and for its reuse as a resource.

CL:AIRE Code of Practice (CoP)[22]

2.3.10 The definition of waste and re-use of materials can be complex, CL:AIRE (Contaminated Land: Applications in Real Environments) have produced a Definition

[21] https://www.gov.wales/towards-zero-waste-our-waste-strategy

[22] https://www.claire.co.uk/component/phocadownload/category/8-initiatives?download=212:definition-of-waste-development-industry-code-of-practice

of Waste Code of Practice (DoWCoP) that can be followed when reusing source segregated aggregate on the Site of production. The DoWCoP covers:

- Ground based infrastructure that is capable of reuse within earthworks projects e.g. road base, concrete floors;
- Source segregated aggregate material arising from demolition activities, such as crushed brick and concrete, to be reused on the Site of production within earthworks projects or as sub-base or drainage materials; and
- Stockpiled excavated materials that include the above.

3 PROJECT PLANNING AND DESIGN STAGE

3.1 Introduction

3.1.1 The following section outlines how effective waste management will be considered during the design stage of the Proposed Development.

3.2 Designing Out Waste

3.2.1 The type and quantity of waste generated on the Proposed Development will be significantly influenced at a more detailed design phase. By making design decisions at this phase the generation of waste can be prevented and minimised in the first place.

3.2.2 Decisions at this phase can also positively improve the recycled content and future recyclability of the Proposed Development.

3.2.3 Design teams and Project Managers will be required to:

- Understand the waste streams that are produced on-site;
- Understand how materials will be reused and recycled; and
- Review at key stages how well design and specification is impacting upon waste management and identify any opportunities for improvement.

3.2.4 At detailed design phase, in order to minimise waste, the following will be considered as a minimum:

- Use of prefabricated and standardised materials wherever possible will reduce waste on-site. Many materials can be produced to a specification to reduce the quantity of offcuts;
- The types of materials to be used on the development should be considered, with priority given to recycled and reclaimed materials wherever feasible; and
- The provision of accurate design specifications to subcontractors and supply chain teams.

3.3 Project Management

3.3.1 Efficient Project Management is key to reducing the quantity of waste produced on a site and ensuring that any waste produced is managed sustainably and appropriately wherever possible.

3.3.2 The following are steps that will be considered by the project manager:

- By undertaking work in the correct order, the need for remedial actions will be reduced and as a result the amount of waste produced will also be reduced;

- By determining how materials and waste will be moved around the Site, the Site manager can ensure that waste is disposed of appropriately and that segregation takes place;
- Ensure that all site staff and sub-contractors gain a suitable site induction that includes awareness of good waste management and the specific measures to be used on-site;
- Regular toolbox talks on good waste management can be used to make sure that everyone who comes to site knows how to reduce, re-use and recycle at the Site;
- 'Just-in-time' delivery strategies can reduce waste created by improper storage and weather damage. Therefore, arrange deliveries of materials to align with project construction stages where practicable. This will help avoid materials being stored on-site longer than necessary and reduce the risk of damage;
- Check contracts with suppliers and the supplier's haulier for return of packaging. It is often the case that the supplier contract will include a clause for return of packaging, but this is not included in the contract with their haulier. These issues should be identified and resolved as early as possible to prevent problems on-site; and
- Consider suppliers that offer reusable packaging schemes.

4 MANAGEMENT OF CONSTRUCTION WASTE

4.1 Introduction

4.1.1 The following section details how overarching waste management practices would be undertaken during the Site preparation phase and subsequent construction phases of the Proposed Development.

4.2 Waste Management

4.2.1 The main aims of managing waste should be to improve materials resource efficiency by promoting economic use of construction materials and methods to ensure that the waste hierarchy of reduce, reuse, recycle is followed before any disposal options are explored. In addition, opportunities for the illegal disposal of waste will be significantly reduced by ensuring compliance with existing legal controls and providing a full audit trail of waste removed from the construction site.

4.2.2 Records of all waste movements off-site will be retained by site management for the required time and these records will outline how waste was managed and demonstrate compliance with Duty of Care with respect to construction waste.

4.2.3 Different members of the construction team will have specific roles and responsibilities identified in **Table 2**.

Table 2 Roles and Responsibilities

Position	Roles	Responsibilities
The Applicant	Promote waste minimization Drive good practice within the team Ensure hazardous waste identified prior to construction	Duty of Care Best Practice Identification of waste reduction opportunities
Architect	Consider design options to reduce waste Promote use of reclaimed materials Reduce bespoke designs which may result in the generation of excessive quantities of waste	Duty of Care Design out waste
Main Contractor – Site Manager	Develop, implement and communicate a detailed site specific waste plan/strategy Work with design team Ensure segregation of waste materials Designate and facilitate on-site storage compounds / treatment areas Reduce waste being brought on to site (packaging) Ensure appropriate waste storage Keep proper records of all waste produced / re-used / sent off-site Ensure appropriate off-site transport of waste and confirm destination of all waste leaving site	Health and Safety Development of a site-specific waste plan/strategy Management of on-site processes and programme Hazardous waste identification and management Duty of Care record keeping
Sub-Contractors	Develop method statements for works on-site Liaise with Main Contractor to ensure they understand and comply with the Site waste plan/strategy	

4.2.4 Regular inspection and audit of all waste management records and activities on-site will be undertaken to ensure that the relevant legislation and any good practice measures outlined within this OSWMP are complied with. Inspections and audits will be arranged by management teams at appropriate intervals and records of these inspections and audits will be retained.

4.3 Waste Classification

4.3.1 As part of waste Duty of Care, waste must be assessed and classified, and any hazardous properties identified. Classification must be done before the waste is moved, disposed of, or recovered. It will help determine any controls that need to be applied during movement of the waste and help identify where the waste needs to be sent.

4.3.2 In most cases classification of waste is straightforward, i.e. cardboards, plastics, metals, glass etc. However, for soils, liquids or other less clear waste types there is a methodology by which waste should be classified and assessed - Technical Guidance WM3 – Guidance on the Classification and Assessment of Waste[23]. This technical guidance outlines the steps to be taken and the information to be considered. The classification and assessment of waste should consider geographical factors, historical factors, online visual assessments, site investigations and can include additional sampling and laboratory analysis. If this level of assessment is required, then further guidance will be sought.

4.4 Demolition

4.4.1 The Proposed Development will include the demolition of existing structures on-site. This includes the demolition of the derelict Padeswood Hall and Padeswood Hall Farm (and associated outbuildings).

4.4.2 Options for the reuse of material generated from demolition will be explored by the appointed contractor and will be reused on Site (where practicable).

4.4.3 Any asphalt lifted, treated and then reused on-site is not regarded to be waste assuming certain conditions can be met (treatment can occur either on-site or elsewhere). Natural Resources Wales has Regulatory Decisions that apply in the same way as the Environment Agency's Regulatory Position Statements (RPS) that refer to the storage treatment and use of asphalt waste. The majority of NRW's Regulatory Decisions have not been made publicly available. Therefore, should these be required further information on them will be requested from Natural Resources Wales to ensure they apply. As long as the conditions of these Regulatory Decisions are complied with there is no requirement for an environmental permit.

4.4.4 Any material generated during the demolition phase that has been contaminated with chemicals, asbestos and general rubbish will not be reusable. Disposal of these wastes will be required, and a pre-demolition audit could be used to ascertain the most appropriate route for disposal.

4.5 Site Preparation

4.5.1 In order to prepare the Site, earthworks and ground preparation will take place as part of the Proposed Development.

4.5.2 Vegetation removed from the Site will be reused where possible. Examples of reuse include the creation of habitats for wildlife and the chipping of any vegetation to create mulch. Such examples of reuse may require the registration of the appropriate waste exemption. If reuse is not possible then any green waste will be handled and transported from the Site by an appropriately registered contractor for reuse/recycling, where possible.

4.5.3 Prior to works commencing on any particular phase of the Site and prior to any required vegetation clearance commencing, the presence of invasive non-native plants will be assessed. The removal, treatment and disposal of any identified

[23] https://www.gov.uk/government/publications/waste-classification-technical-guidance

invasive non-native plants will be undertaken in accordance with the latest guidance to prevent further growth or spread beyond the Site.

4.5.4 Excavation is expected to take place as part of the Proposed Development, and this will produce an amount of aggregate and soil, some of which will be used on-site as part of landscaping and formation of a level development platform.

4.5.5 Under the Waste Framework Directive[24], naturally occurring soils are not considered waste if they are reused on the Site of origin for the purposes of development.

4.5.6 Should any clean and uncontaminated excavated soils be considered surplus to requirements they may then be classified as waste unless removed to a suitable site in accordance with the Definition of Waste: Development Industry Code of Practice (CL:AIRE)[25]. As outlined in **Paragraph 2.3.12,** DoWCoP is a voluntary framework for determining whether or not excavated material arising from site during land development works are waste. In this case the DoWCoP could apply to excavated materials that are:

- Transferred between sites and reused directly without treatment (clean and natural material only); or
- Transferred between sites and reused following treatment, as part of a Cluster project. A Cluster project as defined by DoWCoP is where soils are treated at a permitted hub to make them suitable for re-use at another project location. The Applicant will direct any surplus soil to the restoration of quarry sites Where waste materials do not meet the suitable for use criteria under DoWCoP, it is sometimes possible to use or treat them under a low-risk waste exemption or an environmental permit.

4.5.7 During the course of any excavation and ground preparatory works, should any potentially contaminated land that has not already identified be observed, works in that area will cease until an appropriate assessment has been undertaken by specialists to determine if there is any risk present to either the environment or human health. Should contaminated ground be discovered then the affected area of land would require remediation, with any contaminated excavated material treated or disposed of at an appropriately permitted site.

4.5.8 A number of measures will be implemented to ensure that the excavation of materials and the subsequent management of it in temporary stockpiles is undertaken in a manner that does not impact upon the environment or local amenity. This includes, but may not be limited to:

- Where possible any stripping, stockpiling or placing of soil will be carried out under dry weather conditions and where possible using tracked equipment to reduce compaction;
- Stripped soils should be stored for short periods of time only. This will ensure that any detrimental impacts on the soils' physical, chemical and biological properties are minimised;

[24] https://environment.ec.europa.eu/topics/waste-and-recycling/waste-framework-directive_en

[25] https://www.claire.co.uk/component/phocadownload/category/8-initiatives?download=212:definition-of-waste-development-industry-code-of-practice

- Stockpiles of different excavated materials will be clearly defined and labelled where necessary to avoid the mixing of topsoil and subsoil, and hazardous and non-hazardous;
- Temporary stockpiles will have side slopes of no greater than 1 in 3 and will not be higher than 3.5m;
- Any excavated materials will not be mixed with construction waste or contaminated materials;
- Stripped soil will be utilised onsite where possible;
- Stockpiles will be located away from any watercourses and drains and away from any occupied residential properties wherever possible.
- Soil bunds will be formed on the northern boundary of the construction areas to form a visual screen for residents of Padeswood Drive from both the proposed and existing works, and to allow the establishment of landscaping on these bunds.
- If drains are located near to any stockpiles, they will be blocked to ensure runoff does not enter them; and
- Runoff from stockpiles will be carefully monitored and managed where required to ensure there is no impact to the environment.

4.6 Construction Waste

4.6.1 During the construction phase, waste will be produced from surplus materials such as oversupply, off-cuts or damaged quantities of concrete, cladding, pipework, steel reinforcement etc. Some packaging waste is also expected to be produced. Surplus soil / gravel may be produced due to cut / fill activities.

4.6.2 The quantities of waste generated during the construction phase can be estimated using information regarding the floor area of the different units proposed. This information can then be used in conjunction with Building Research Establishment (BRE) Benchmark Data (which is recognised within the construction industry).

4.6.3 These calculations have been undertaken using the currently proposed designs for the Proposed Development. The BRE Benchmark Data (**Appendix A**) details the generation of waste (tonnes/100 m^2) for different types of development. This data can be used to estimate the waste arising during the construction phase of the development. The following generation figures will be used:

- For Industrial Buildings it will be 13.2 tonnes/100 m^2; and
- For Office Buildings it will be 13.1 tonnes / 100m^2.

4.6.4 RSK have been informed that the approximate floor areas for the Proposed Development are as outlined in **Table 3** (taken from **Volume 3, Figure 1.2**). Using the overall floor areas for the Proposed Development, and the BRE Benchmark data, the overall quantity of construction waste generated can be estimated.

Table 3 Schedule of Development Areas and Quantity of Construction Waste Generated

Description	Approximate Areas (m^2)	Waste generation figure (tonnes/100m^2)	Quantity of waste generated (tonnes)
Carbon Capture Plant	44,700	13.2	6,111.6
Offices and joint control centre	1,350	13.1	131
Carbon Capture Plant contractor village and welfare	4,710	13.2	380.16
Total	-	-	6,622.76

4.6.5 According to the information provided, the total quantity of waste generated during the construction phase of the Proposed Development is estimated to be approximately 6,622.76 tonnes.

4.6.6 Based on a conversion factor of 1.2 tonnes per cubic metre for construction and demolition waste this is calculated to be approximately 5,518.97 m^3.

4.6.7 The composition of the construction waste arisings will be dependent on the construction and demolition methods employed. Therefore, it has been assumed to comprise of the wastes listed below**:**

- Concrete;
- Steel;
- Offcuts;
- Packaging materials;
- Binders;
- Plastic (excluding packaging waste);
- Electrical and electronic equipment;
- Canteen/Office/ ad hoc waste;
- Liquids;
- Oils;
- Bituminous mixtures;
- Hazardous waste;
- Other waste; and
- Mixed construction and/or demolition waste.

4.6.8 Waste quantities on-site can be significantly reduced through the use of good waste management practices.

4.7 Raw Materials and Waste Storage

4.7.1 Implementation of good practice measures in relation to on-site storage and security of raw materials and waste include the following:

- Designated areas prepared for the storage of raw materials and waste. These areas will be clearly marked and provided for all phases of the construction process;
- Storage areas for raw materials and waste should be located away from any sensitive receptors (i.e., any nearby residents, watercourses, boreholes etc);
- Clearly labelled or colour coded skips or containers to allow segregation of waste for re-use and recycling will be made available;
- Covered skips to prevent spread of wind-blown wastes will be used where appropriate;
- Hazardous waste materials will be stored in a secure bunded compound in appropriate containers with clear signage;
- Any fuels, oils or chemicals needed in the construction process will be stored in appropriate containers in a secure bunded compound;
- Where practicable, surplus bricks/blocks and aggregates will be reused within hardstanding areas on-site;
- Ensuring deliveries to the Site are as far as practicable 'just in time' to minimise the generation of damaged goods becoming waste;
- Provision of on-site security to ensure potential loss of material from damage, vandalism or theft is avoided; and
- Avoid the mixing of hazardous and non-hazardous materials.

4.7.2 Facilitating effective waste management will require communication with contractors, sub-contractors and site operatives.

4.7.3 Waste and material storage areas will be set up before Site works start as close to the Site compound as possible and with adequate hard standing for waste containers.

4.7.4 The waste storage area during the demolition and construction phase will comprise of a number of waste containers. Different stages of the Proposed Development may have different waste requirements. This will dictate which waste containers may be on-site at any one time. These will comprise of:

- **Metal Waste Skip** – for all types of clean metal, including rebar offcuts, scrap metal etc;
- **Packaging/Light Mixed Waste** - Cardboard, paper products etc (not polythene sheeting or ties as this should go in the "mixed" skip);

- **Wood** - All types of clean untreated timber or wood products (treated timbers may contain hazardous preservatives and so may need to be placed in an additional separate skip);
- **Inert** - Clean concrete, rubble, hardcore, brick and block etc (should not decompose or create a hazard when buried);
- **Mixed General Waste Skip** - Any other waste except contaminated waste that cannot be recycled in other skips on the Site;
- **Hazardous Waste** – Usually a three drum system for expanding foam, aerosols and mastics. More drums can be added for additional hazardous waste types;
- Additional containers may be provided for paint cans and plasterboard offcuts in order for them to be stored separately. This will allow for them to be returned to the supplier as part of any takeback scheme, should it be available; and
- Used pallets will be stacked in a designated area so that they may be collected by a pallet repatriation company. This company should identify pallets that can be reused and arrange for the disposal of any that are unsuitable or damaged beyond repair.

4.7.5 Construction waste storage areas will be subject to regular checks by either a waste manager, or suitable personnel, designated by the Site manager to ensure that the area remains clean and tidy, waste is segregated properly and that there are no impacts to the environment. This includes inspections of any stockpiles of material or waste present on-site. Good waste management will be very important in ensuring the Site remains tidy and well ordered.

4.7.6 No waste will be burnt on-site.

4.8 Waste Recycling and Disposal Facilities

4.8.1 The Principal Contractor will arrange for a suitable waste and recycling service. This will include the provision of suitably sized and the number of storage containers, and their collection frequency.

4.8.2 In accordance with the waste hierarchy, disposal of waste will be the final option for any waste removed from the Site. The Principal Contractor will ensure that all waste is managed sustainably wherever possible.

4.8.3 Prior to waste being sent to any waste sites, they (the waste sites) will be checked to ensure they are suitable and that they can accept waste from the development. These checks may be undertaken by any waste broker used, but records of checks will be made available upon request.

4.9 Monitoring and Reporting

4.9.1 Any work undertaken will be managed in accordance with the Principal Contractor's internal environmental management procedures.

4.9.2 Any person working for or on behalf of the main contractor that transports waste from the Site must be registered (licensed) as a waste carrier.

4.9.3 Any person employed to manage waste contracts / removals by other waste carriers on behalf of the principal contractor must be registered as a 'Waste Broker'.

4.9.4 All movements of waste from the Site must be accompanied by a Waste Transfer Note (WTN) or Hazardous Waste Consignment Note (HWCN). WTNs and HWCNs must detail specific information regarding the type of waste produced. Common to both are:

- Date and time of movement;
- European Waste Catalogue (EWC) code;
- Description of waste;
- Address of the producing site;
- Standard Industrial Classification Code (SIC) 2007, which describes the producer of the waste (i.e., construction of residential and non-residential buildings – 41.20);
- Waste carrier's details including waste carrier registration number;
- Quantity of waste;
- How it is contained (e.g., RORO skip);
- Address of the receiving site (e.g., landfill);
- The Environmental Permit or Exemption Number associated with the receiving site; and
- Confirmation that the waste hierarchy has been applied.

4.9.5 In addition to the above information, a HWCN must contain the following:

- Consignment note code that starts with the hazardous waste registration code followed by five unique numbers or letters;
- Chemical/biological component in the waste and their concentrations;
- Physical form of the waste (i.e., solid, liquid, gas, sludge, powder or mixed);
- Relevant Hazard Property Code (i.e., HP1 - explosive, HP14 - Ecotoxic etc); and
- A Part E that the receiving site will sign to acknowledge receipt and then sent to the waste producer within three months.

4.9.6 By signing a WTN or HWCN, a site representative is confirming that all the details are correct and that the material is to be sent by a licensed waste carrier to a suitably permitted receiving site, able to receive that type of waste. The signature is binding

of this fact and completes the WTN or HWCN as a legal document, which must be retained for a minimum of two years if it is a WTN and three years if it is a HWCN.

4.9.7 All notes will be retained within the Site office and then transferred to an agreed regional/head office after an appropriate period of time and/or upon completion of the project.

4.9.8 A suitable programme of monitoring will be put in place to:

- Quantify raw material wastage;
- Quantify the generation of each waste stream;
- Record any improvements in current working practices;
- Record the methods by which the waste streams are being handled and stored; and
- Record the available waste disposal routes used.

4.9.9 Any sampling reports undertaken to assess and classify waste will be retained for the duration of the Proposed Development.

4.9.10 Waste Transfer Notes and Hazardous Waste Consignment Notes will be made available to the Flintshire County Council and Natural Resources Wales upon request.

4.9.11 The implementation of the OSWMP will be monitored regularly and following any incident relating to the reuse and recycling of materials. Reports of these reviews will be retained. Should any review determine that the OSWMP has not been followed then these failures will be recorded. If possible, action will be taken to rectify any failures and any learning points recorded for future reference.

4.9.12 Should circumstances change during the course of the Proposed Development, then the OSWMP will be updated to ensure that it is still applicable and outlines efficient waste management on-site.

5 MANAGEMENT OF OPERATIONAL WASTE

5.1 Introduction

5.1.1 This section outlines a basic plan which will be adopted to successfully manage the waste arisings from the Proposed Development once operational. It is noted that this section only assessed the waste generated by the Carbon Capture Plant and the accessory activities (i.e., the Proposed Development). It is to be read alongside the management plans and the Site's Environmental Permit for the existing cement works.

5.1.2 An assessment of the CO_2 emissions associated with the Proposed Development has been undertaken in **Volume 2, Chapter 7: Climate**.

5.2 The Operation

5.2.1 The Proposed Development has the potential to generate various waste items during the operational phase. All waste categories will require appropriate management measures in order to minimise the risks to the environment, communities, and site staff.

5.2.2 Responsibility for waste management on-site during the operational phase (including classification, segregation, handling, storage, treatment and disposal) will be with the Site's operator.

5.2.3 Waste management will be undertaken in accordance with the operator's Environmental Management System which should outline procedures for relevant training, waste classification, storage, handling, disposal and reporting.

5.2.4 The operator will monitor and record the waste quantities generated and identify any opportunities to minimise the quantities of waste produced.

5.2.5 Much of the waste management associated with the Proposed Development will be regulated via the Site's Environmental Permit.

5.2.6 In terms of lifespan, and assuming the demand exists, the Proposed Development has been estimated to be in operation for 25 years from commencement of operations.

5.2.7 The Proposed Development will operate as required. Therefore it is anticipated that the Proposed Development will operate 24 hours a day, 7 days a week. The main kiln operates 330 days per annum.

5.3 Generation of Operational Waste

5.3.1 Very little additional waste is expected to leave the Site as a result of the operation of the Proposed Development and this waste will be controlled under the Site's

Environmental Permit. Some waste types will be suitable for reuse on-site either as kiln fuel or dosed into cement.

5.3.2 Waste produced from the Proposed Development will include:

- Process waste e.g., degraded amine solvent from the Solvent Reclaimer, blowdown from flue gas quencher, flue gas condensate from quencher, cooling tower blowdown, used lubrication oils;
- Chemical wastes (including spent lean amine solvent) from process facilities;
- Air emissions: flue gas, vents, fugitives;
- Wastewater treatment sludge;
- Water: Stormwater and cooling water;
- Hazardous process, air and oil filters, spent catalyst cartridges, and chemical containers, metal paint pots and aerosol cans;
- Various special hazardous wastes and scrap equipment, such as lead acid batteries, dry cell batteries, bolts, gaskets, and valves;
- Non-hazardous wood, paper bags and general packaging materials;
- Non-hazardous domestic wastes, including paper, cans, plastic bottles and scrap glass, Organic kitchen wastes and food remains; and
- Non-hazardous general wastes from offices and workshops.

5.3.3 The volumes of waste produced will be dependent upon the scale of the activities undertaken at the Proposed Development. The quantities of waste are not currently known but are unlikely to be significant. Further assessment will be undertaken as the design of the plant progresses to ensure the Site has the appropriate capacity to store and manage any waste produced on-site.

5.3.4 A dedicated waste storage space for the Proposed Development will be provided on-site and will be developed once the detailed design phase is reached. At this phase, due consideration will be given to the provision of sufficient internal and external space for the storage of separate waste streams.

5.3.5 Wastes will be segregated and stored in an environmentally acceptable and secure manner. Sufficient internal and external space will be provided.

- Individual hazardous waste streams will be stored in separate labelled containers to ensure they are not mixed. Only specified compatible hazardous waste can be mixed (i.e. some hydrocarbons);
- Non-hazardous wastes streams will be segregated. For example:
    - Ferrous and non-ferrous metals;
    - Non-hazardous wood/ hazardous wood;
    - Plastics;
    - Cardboard and paper;
    - Canteen wastes; and

- Inert wastes such as building materials and concrete will be segregated in separate containers.

5.3.6 Any waste storage areas will be designed to ensure that any potential risk from wastes is minimised and to ensure that they comply with the Site's Environmental Management System, i.e. liquid wastes will be stored in containers in appropriately bunded areas, dusty wastes will be covered to reduce airborne dust.

5.4 Collection of Waste

5.4.1 At this stage, it is assumed that the some of the waste generated by the Proposed Development will be reused within the cement works. However, any waste that cannot be reused will be collected by appropriate external waste management contractors. It will be the responsibility of the Applicant to arrange for these wastes to be collected from the Site.

5.4.2 Quantities of waste will be dependant upon how much treatment take place and the efficiency of the system. Calculations will be completed at the detailed design phase of the Proposed Development to estimate collection frequencies and further refined once the Site is operational.

5.4.3 Waste collection frequency will be dependent upon the volume of waste generated, the storage method used (e.g. balers, bins, compactors etc) and the schedule agreed with the waste contractor.

5.4.4 Full duty of care checks and occasional audits will be undertaken to ensure that the waste collected from the Site is being disposed of at an appropriately permitted facility in as safe a manner as possible.

5.4.5 Records of all waste reused at the cement site and all outgoing waste will be retained.

5.5 Emissions

5.5.1 Emissions to air, ground and water will be regulated by Natural Resources Wales via the Environmental Permit. Should it be required, the environmental permit will set out a range of emission limits and monitoring requirements for parameters suitable to each specific emission point on-site.

5.5.2 Suitable mitigations to prevent or minimise any impact to air, ground and water will be implemented on-site in accordance with the environmental permit and Environmental Management System, i.e. to prevent any emissions to ground, the Proposed Development will sit on a concrete pad foundation and any potentially contaminating materials and waste will be stored appropriately in sealed containers and/or in bunded areas where necessary.

6 SUMMARY AND CONCLUSION

6.1 Summary of the Plan

6.1.1 Waste generated on-site will be managed in an appropriate manner and in a sustainable way. The principles of the waste hierarchy will be complied with to ensure the environmental risks are minimised and the policies of Flintshire County Council and Welsh Government are adhered to.

Waste from Site Preparation

6.1.2 A significant quantity of the potential waste generated on-site could be reduced by specifying the reuse of certain materials generated during demolition and excavation works.

6.1.3 Where excavated and demolished waste may not be immediately suitable for reuse, any treatment to make this waste suitable for reuse may be undertaken through an appropriately permitted waste processing facility that complies with the relevant environmental permitting legislation. Where on-site treatment is not feasible, wastes will be sent to an off-site treatment/recycling facility in preference to a landfill wherever possible.

Waste from the Construction Phase

6.1.4 Good practice measures in relation to on-site storage and security of raw materials and waste should be implemented specifically for the segregation of waste to aid recycling, and for waste and materials to be safely and securely stored on-site.

6.1.5 It is estimated, using BRE Waste Benchmark Data, that approximately 6,622.76 tonnes of waste will be generated across the Proposed Development during the construction phase (does not include soils).

6.1.6 It is recommended that prior to commencement of the Proposed Development, a more detailed Site Waste Management Plan is developed based on final designs and any updated waste generation figures.

6.1.7 Appropriate targets should be set in relation to the minimisation and recycling of any construction waste materials to be agreed between the Applicant and the principal contractor with agreed methodologies for waste quantification and monitoring.

Waste from the Operational Phase

6.1.8 Waste generated by the Proposed Development once operational will be either reused on-site or disposed of via an appropriate waste contractor to a suitable site with the relevant environmental permit in place.

6.1.9 Waste storage areas will be appropriately designed to prevent any impact to the environment.

6.1.10 This Outline Site Waste Management Plan demonstrates how the development will comply with Flintshire County Council and Welsh Government's policies regarding waste collection and management to ensure policy is met.

6.1.11 The Proposed Development will, as a minimum, incorporate adequately sized internal and external waste and recycling storage areas for the necessary wastes generated.

6.2 Conclusion

6.2.1 This OSWMP has taken into account the need to lessen the overall impact of waste generation through minimisation, reuse and recycling of materials from both the construction and operational phases.

6.2.2 The proposals identify the requirements of relevant waste policy and follow applicable guidance.

6.2.3 Opportunities to further reduce waste arisings and increase recycling rates from the Proposed Development will be identified as designs and activities progress to ensure it contributes to an improved waste management performance.

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APPENDIX A - BRE WASTE BENCHMARK DATA

BRE SMARTWASTE

BRE Waste Benchmark Data

Issued 23rd November 2016

Background to benchmark data

The benchmarks shown in this document are derived from data from completed projects on the SMARTWaste Plan.

The benchmarks are based on completed ***new build*** construction projects. The benchmarks are also based on the construction phase only and do not include demolition, excavation or groundworks waste, i.e. waste entered on SMARTWaste Plan that arises from groundworks or excavation and all soil waste has been excluded. Benchmarks for refurbishment and demolition projects will be developed in the future as more of these projects are completed.

Data obtained from completed projects was subject to a number of logical and statistical tests, to ensure that the data used to produce the performance indicators (KPI) is valid.

Projects reporting waste arisings in volume

For projects reporting waste arisings in volume, all projects that meet the following criteria were selected for initial analysis.

- The floor area must be greater than 1 m^2.
- The waste volume must be more than 1 m^3.
- The project value must be greater than £1.

The performance indicators of m^3 waste per 100 m^2 floor area and m^3 waste per £100K project value were calculated for these projects based on actual volumes of waste arisings. For new build construction projects, the distribution of these two performance indicators was found to be not normal with a very large range. Therefore, in order to try and exclude projects that had very low or very high performance indicators which might not be reliable, it was decided that only projects with performance indicators that fall between the 5th percentile and the 95th percentile would be used for further analysis.

Projects reporting waste arisings in tonnes

For projects reporting waste arisings in tonnes, all projects that meet the following criteria were selected for initial analysis.

- The floor area must be greater than 1 m^2.
- The waste arising must be more than 1 tonne.
- The project value must be greater than £1.

The performance indicators of tonnes waste per 100 m^2 floor area and tonnes waste per £100K project value were calculated for these projects based on tonnes of waste arisings.

For new build construction projects, the distribution of these two performance indicators was found to be not normal with a very large range. Therefore, in order to try and exclude projects that had very low or very high performance indicators which might not be reliable, it was decided that only projects with performance indicators that fall between the 5th percentile and the 95th percentile would be used for further analysis.

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For projects that passed these logical tests, a count of the number of plausible results, the average, standard deviation and median of the results was obtained. This data analysis is carried out every three months and the results are published in this document which is available to SMARTWaste members by emailing smartwaste@bre.co.uk.

The benchmarks shown in this document are as follows:

- Table 1 shows the average m^3 of waste per $100m^2$ of floor area and the average m^3 of waste per £100K of project value for different project types. The number of projects used to calculate the benchmarks is also shown.
- Table 2 shows the average tonnes of waste per $100m^2$ of floor area and the average tonnes of waste per £100K of project value for different project types. The number of projects used to calculate the benchmarks is also shown.
- Table 3 shows the average m^3 of waste per $100m^2$ of floor area for each waste product for the different project types.
- Table 4 shows the average tonnes of waste per $100m^2$ of floor area for each waste product for the different project types.
- Table 5 shows the average m^3 of waste per £100K of project value for each waste product for the different project types.
- Table 6 shows the average tonnes of waste per £100K of project value for each waste product for the different project types.

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Table 1: Waste Benchmark Data by Project Type

(New Build Only, Volume projects, Projects completed by end August 2016)

Project Type	Number of projects data relates to	Average $m^3/100m^2$	Number of projects data relates to	Average $m^3/£100K$
Residential	1472	18.8	1444	12.5
Public Buildings	107	24.8	110	10.8
Leisure	165	16.3	160	9.8
Industrial Buildings	113	13.7	121	9.3
Healthcare	169	18.4	167	9.1
Education	583	21.0	592	10.2
Commercial Other	19	16.0	20	9.6
Commercial Offices	123	18.0	118	8.8
Commercial Retail	195	20.2	200	13.4
Total number of projects	2946		2932	

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Table 3: Waste Benchmark Data - $m^3/100m^2$ by product for different project types

(New Build Only, Volume projects, Projects completed by end August 2016)

Description	Commercial Retail	Commercial Office	Commercial Other	Education	Healthcare	Industrial Buildings	Leisure	Public Buildings	Residential
Bricks	0.718	0.511	0.404	1.011	0.931	0.377	0.788	1.143	1.257
Tiles and Ceramics	0.122	0.040	0.107	0.051	0.050	0.011	0.108	0.140	0.118
Concrete	2.258	1.070	0.658	1.086	1.283	1.782	0.854	1.598	1.477
Inert	1.348	1.662	3.500	2.279	1.513	2.147	1.393	3.532	3.111
Insulation materials	0.314	0.561	0.516	0.651	0.718	0.326	0.455	0.644	0.553
Metals	1.379	0.616	0.990	0.842	0.729	0.737	0.431	1.357	0.328
Packaging materials	1.351	2.181	2.085	1.863	2.264	1.041	1.861	1.995	1.550
Plasterboard / Gypsum	0.592	0.771	0.748	0.929	1.342	0.379	0.899	0.844	1.237
Binders	0.036	0.052	0.022	0.052	0.109	0.022	0.107	0.055	0.089
Plastic	0.460	0.526	0.482	0.538	0.690	0.227	0.429	0.783	0.653
Timber	1.961	2.233	2.171	2.701	2.833	1.451	2.751	3.324	2.492
Floor coverings (soft)	0.031	0.021	0.016	0.075	0.079	0.012	0.075	0.062	0.054
Electrical and electronic equipment	0.073	0.018	0.054	0.036	0.051	0.010	0.029	0.039	0.041
Furniture	0.066	0.002	0.001	0.018	0.016	0.004	0.011	0.036	0.011
Canteen/Office/Adhoc waste	0.493	3.020	0.778	0.776	0.794	0.541	0.524	0.861	0.549
Liquids	0.067	0.009	0.000	0.034	0.015	0.043	0.076	0.061	0.040
Oils	0.002	0.000	0.004	0.005	0.000	0.000	0.000	0.109	0.002
Bituminous mixtures	0.547	0.144	0.229	0.656	0.233	0.626	0.322	0.235	0.139
Hazardous waste	0.192	0.554	0.174	0.207	0.176	0.234	0.039	0.420	0.129
Other waste	0.740	0.313	0.294	0.663	0.561	0.793	0.857	0.861	0.726
Mixed construction and/or demolition waste	7.406	3.709	2.751	6.556	4.003	2.948	4.304	6.683	4.278
Total (ex soils)	20.16	18.01	15.98	21.03	18.39	13.71	16.31	24.78	18.84

Key: $m^3/100\ m^2$ - volume of waste in m^3 / 100 m^2 of floor area

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Table 4: Waste Benchmark Data - tonnes/100m² by product for different project types

(New Build Only, Tonnage projects, Projects completed by end August 2016)

Description	Commercial Retail	Commercial Offices	Commercial Other	Education	Healthcare	Industrial Buildings	Leisure	Public Buildings	Residential
Bricks	0.237	0.983	0.227	1.502	0.900	0.221	0.546	0.940	1.224
Tiles and Ceramics	0.015	0.006	0.000	0.130	0.080	0.002	0.013	0.003	0.088
Concrete	1.470	3.755	7.666	0.935	1.161	1.029	1.127	1.294	1.759
Inert	3.629	1.668	8.975	3.585	2.836	2.276	4.509	4.654	4.616
Insulation materials	0.025	0.091	0.007	0.148	0.225	0.003	0.056	0.183	0.065
Metals	0.312	0.192	0.214	0.386	0.246	1.214	0.186	0.233	0.209
Packaging materials	0.076	0.170	0.200	0.550	0.674	0.217	0.267	0.239	0.420
Plasterboard / Gypsum	0.135	0.492	0.080	0.608	0.537	0.109	0.220	0.361	0.479
Binders	0.006	0.007	0.000	0.014	0.012	0.017	0.016	0.003	0.018
Plastic (excluding packaging waste)	0.063	0.115	0.210	0.171	0.381	0.079	0.108	0.175	0.294
Timber	0.377	1.023	0.817	1.057	1.042	1.555	0.935	0.946	1.308
Floor coverings (soft)	0.003	0.006	0.000	0.032	0.023	0.001	0.013	0.002	0.008
Electrical and electronic equipment	0.002	0.001	0.000	0.008	0.015	0.000	0.013	0.002	0.007
Furniture	0.002	0.000	0.000	0.001	0.007	0.000	0.002	0.005	0.001
Canteen/Office/Adhoc waste	0.150	0.032	0.147	0.372	0.293	0.157	0.109	0.792	0.139
Liquids	0.015	0.053	0.000	0.003	0.000	0.000	0.000	0.000	0.008
Oils	0.000	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.001
Bituminous mixtures	0.050	0.093	0.547	0.609	0.146	0.268	0.316	0.000	0.082
Hazardous waste	0.097	0.014	0.000	0.178	1.577	0.026	0.016	0.013	0.109
Other waste	0.205	0.247	0.743	0.540	0.556	1.062	1.033	0.282	0.403
Mixed construction and/or demolition waste	4.163	4.147	2.768	4.038	2.510	5.003	5.627	4.399	3.971
Total (ex soils)	11.03	13.10	22.60	14.87	13.22	13.24	15.11	14.53	15.21

Key: tonnes/100 m² - weight of waste in tonnes / 100 m² of floor area

BRE SMARTWASTE

Table 5: Waste Benchmark Data - m^3/£100K by product for different project types

(New Build Only, Volume projects, Projects completed by end August 2016)

Description	Commercial Retail	Commercial Offices	Commercial Other	Education	Healthcare	Industrial Buildings	Leisure	Public Buildings	Residential
Bricks	0.631	0.305	0.177	0.497	0.449	0.320	0.482	0.545	0.833
Tiles and Ceramics	0.074	0.023	0.021	0.027	0.029	0.002	0.060	0.080	0.075
Concrete	1.662	0.585	1.043	0.621	0.653	1.075	0.558	0.615	0.914
Inert	0.846	1.167	1.850	1.267	1.054	1.612	1.186	1.556	1.864
Insulation materials	0.179	0.294	0.190	0.299	0.298	0.238	0.262	0.254	0.375
Metals	0.991	0.275	0.448	0.412	0.316	0.423	0.256	0.458	0.214
Packaging materials	1.062	1.170	1.056	0.851	1.028	0.750	1.048	0.849	1.069
Plasterboard / Gypsum	0.560	0.427	0.173	0.421	0.601	0.224	0.581	0.359	0.800
Binders	0.028	0.028	0.023	0.025	0.060	0.012	0.081	0.025	0.063
Plastic (excluding packaging waste)	0.327	0.255	0.187	0.244	0.333	0.191	0.242	0.300	0.457
Timber	1.423	1.184	0.983	1.255	1.302	0.979	1.660	1.341	1.708
Floor coverings (soft)	0.026	0.009	0.021	0.034	0.038	0.009	0.052	0.035	0.036
Electrical and electronic equipment	0.042	0.011	0.003	0.015	0.024	0.005	0.017	0.030	0.028
Furniture	0.039	0.001	0.001	0.010	0.006	0.002	0.010	0.019	0.006
Canteen/Office/Adhoc waste	0.330	0.315	0.390	0.341	0.373	0.354	0.332	0.354	0.368
Liquids	0.017	0.006	0.000	0.010	0.010	0.224	0.038	0.024	0.029
Oils	0.006	0.000	0.008	0.002	0.000	0.000	0.000	0.015	0.002
Bituminous mixtures	0.443	0.089	0.238	0.287	0.131	0.367	0.138	0.134	0.080
Hazardous waste	0.204	0.217	0.079	0.120	0.061	0.250	0.025	0.162	0.085
Other waste	0.401	0.174	0.137	0.300	0.324	0.414	0.522	0.662	0.497
Mixed construction and/or demolition waste	4.155	2.256	2.544	3.169	2.009	1.889	2.219	2.969	2.944
Total (ex soils)	13.44	8.79	9.57	10.21	9.10	9.34	9.77	10.78	12.45

Key: **m^3/£100K -** volume of waste in m^3 / £100K of project value

BRE SMARTWASTE

Table 6: Waste Benchmark Data - tonnes/£100K by product for different project types

(New Build Only, Tonnage projects, Projects completed by end August 2016)

Description	Commercial Retail	Commercial Office	Commercial Other	Education	Healthcare	Industrial Buildings	Leisure	Public Buildings	Residential
Bricks	0.118	0.496	0.083	0.623	0.691	0.294	0.423	0.435	1.143
Tiles and Ceramics	0.013	0.005	0.000	0.099	0.026	0.002	0.012	0.002	0.076
Concrete	1.197	2.325	2.476	0.518	0.614	0.188	0.942	0.849	1.321
Inert	1.912	1.741	2.928	2.474	1.459	2.074	5.034	4.673	4.219
Insulation materials	0.019	0.063	0.002	0.062	0.105	0.004	0.024	0.097	0.059
Metals	0.272	0.096	0.073	0.161	0.114	0.662	0.090	0.095	0.185
Packaging materials	0.099	0.102	0.071	0.194	0.455	0.139	0.153	0.115	0.429
Plasterboard / Gypsum	0.083	0.151	0.028	0.270	0.427	0.133	0.203	0.170	0.382
Binders	0.010	0.005	0.000	0.005	0.009	0.003	0.013	0.002	0.024
Plastic (excluding packaging waste)	0.051	0.064	0.076	0.100	0.160	0.043	0.096	0.101	0.256
Timber	0.254	0.298	0.293	0.499	0.746	1.056	0.747	0.412	1.441
Floor coverings (soft)	0.003	0.005	0.000	0.012	0.014	0.000	0.011	0.002	0.008
Electrical and electronic equipment	0.003	0.001	0.000	0.002	0.018	0.000	0.011	0.001	0.007
Furniture	0.000	0.000	0.000	0.000	0.003	0.000	0.001	0.003	0.001
Canteen/Office/Adhoc waste	0.051	0.025	0.051	0.119	0.172	0.150	0.068	0.226	0.089
Liquids	0.027	0.116	0.000	0.001	0.000	0.000	0.000	0.000	0.005
Oils	0.002	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000
Bituminous mixtures	0.087	0.053	0.213	0.650	0.132	0.063	0.235	0.000	0.070
Hazardous waste	0.035	0.009	0.000	0.100	0.541	0.027	0.001	0.044	0.071
Other waste	0.083	0.186	0.143	0.268	1.745	0.876	0.420	0.199	0.321
Mixed construction and/or demolition waste	4.164	1.908	0.747	2.494	1.260	1.737	1.599	1.989	2.644
Total (ex soils)	8.48	7.65	7.18	8.65	8.69	7.45	10.09	9.41	12.75

Key: tonnes/£100K - weight of waste in tonnes / £100K of project value