HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

# Wylfa Newydd Project

## 8.15 Carbon and Energy Report

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# 1 Executive Summary

## 1.1 Purpose of the Carbon and Energy Report

1.1.1 The Carbon and Energy Report was prepared to detail the carbon footprint for the proposed Wylfa Newydd Development Consent Order (DCO) Project as part of the application (Application) by Horizon Nuclear Power Wylfa Limited (Horizon) for a DCO for the proposed Project.

## 1.2 Outline of the Approach

1.2.1 The Welsh Government has a clear vision for carbon reduction and moving towards a low carbon economy. They have made a commitment to reduce Wales' carbon footprint, documented in Chapter 4 of Planning Policy Wales Edition 9 (2016) [RD1] and the Climate Change Strategy for Wales (CCSW) (2010) [RD2]. Horizon have reflected the Welsh Government's vision within their Corporate Sustainability Policy [RD3]. The Corporate Sustainability Policy [RD3] includes commitments relating to the integration, implementation and incorporation of sustainability into the Project.

1.2.2 To make steps towards the commitments in the Corporate Sustainability Policy [RD3] Horizon have prepared a carbon footprint and supporting narrative report for the Wylfa Newydd DCO Project. This has included an allowance for flexibility in future design, captured within a Rochdale envelope approach. This approach, which is based on maximum parameters, is representative of a realistic worst-case.

1.2.3 A 'carbon footprint' refers to the collective consideration of Greenhouse Gas (GHG) emissions[1] arising from an activity or set of activities (such as energy use). The significance of climate change emphasises the importance of accounting for GHG emissions in an accurate and methodical manner; fundamental in understanding our contribution to GHGs in the atmosphere and the way in which we can minimise and account for our climate change impact.

1.2.4 When developing a carbon footprint, it is important to define the scope and structure. The scope and structure of the carbon footprint was defined by both 'physical scope' and 'temporal scope' of the Wylfa Newydd DCO Project. The 'physical scope' includes the built aspects of the Wylfa Newydd DCO Project (i.e. within the Power Station site, Wylfa Newydd Development Area, Off-site Power Station Facilities and Associated Development). The physical scope was further sub-divided into the themes of embodied carbon of materials, transportation of materials/ waste, energy/ fuel use, waste disposal and water use (supply and disposal). The 'temporal scope' includes the construction, operational and decommissioning phases of the Wylfa Newydd DCO Project.

[1] Greenhouse gases absorb and re-emit heat in the atmosphere through the greenhouse effect, thereby warming the planet's surface. Examples include water vapour, carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$) and ozone.

1.2.5 The decommissioning assessment should be considered as a high-level appraisal, due to the limited information currently available at this stage, and given that decommissioning will take place after the expected 60 year operational life of the facility. At this time there are likely to be significant changes to the potential GHG emissions arising from activities due to issues such as variations in the source of electricity generation, changes in fuel efficiencies, or other future developments that cannot accurately be represented at this point. The decommissioning phase will be subject to a separate consenting regime once the operational phase is approaching completion. Before decommissioning starts, Horizon will need to obtain consent from the Office for Nuclear Regulation (ONR) under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 [RD4]. It is expected that this would include a requirement for a carbon footprint for decommissioning that would be representative of the GHG emissions at that point in the future.

1.2.6 The carbon footprint was developed using the supplied Project information and from Project information contained within published documents, studies and plans (e.g. the Environmental Statement (Application Reference Numbers: 6.1-6.11) [RD5]). The carbon footprint was developed using the Atkins Carbon Knowledgebase (CKB) tool, which contains a large range of emissions factors suitable for a variety of activities. In measurement terms, carbon footprints are generally expressed as carbon dioxide equivalent ($CO_2e$) given in kilograms or tonnes. However, they can incorporate any number of parameters (e.g. material tonnes used, vehicle/ freight kilometres travelled, and kilowatts of electricity used).

1.2.7 In undertaking the assessment, details were established regarding the Wylfa Newydd DCO Project's key impacts, its main sources of GHG emissions, and the potential carbon and energy offset (a saving or reduction in GHG emissions), associated with the net power generated throughout the operational period. The assessment concluded with a summary of the key carbon and energy management measures that have been incorporated into the Wylfa Newydd DCO Project to date, and looked ahead to what will be considered through the development of detailed design proposals and throughout the Wylfa Newydd DCO Project's lifecycle.

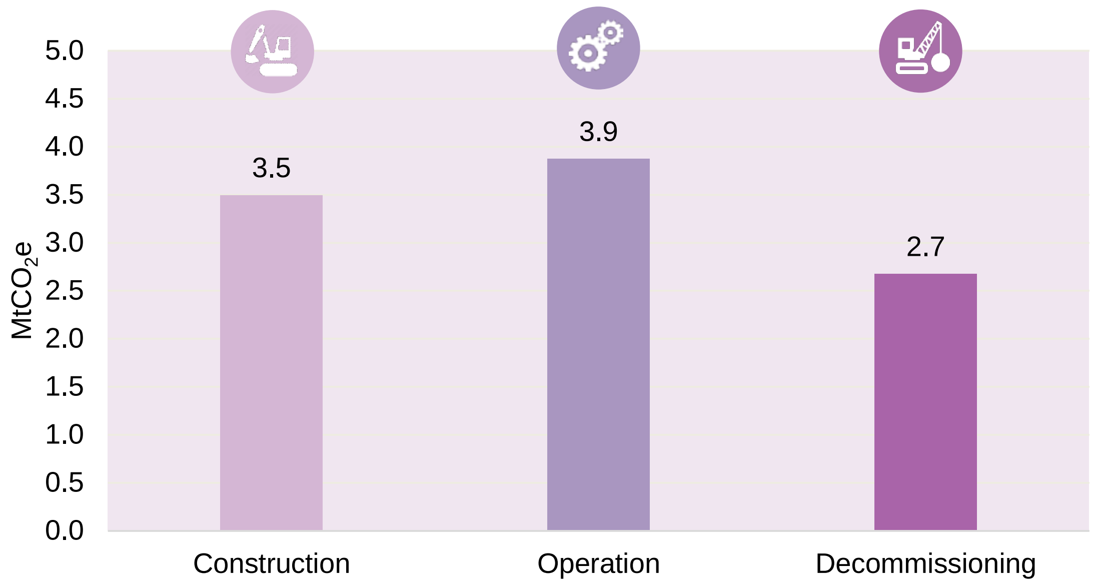
1.2.8 Horizon will continually review and update the carbon footprint as detailed design proposals are developed and during the Wylfa Newydd DCO Project's lifespan for use as both a reporting tool and to identify areas for improvement and/ or the introduction of further management measures.

## 1.3 Principal Findings

1.3.1 The construction and operational phases of the Wylfa Newydd DCO Project were estimated to result in a total GHG emissions impact of 7.4 million tonnes (Mt) of $CO_2e$. This equated to an average annual impact of approximately 123,000 $tCO_2e$ when considering the Project's expected 60 year lifespan. This is equivalent to 0.026% of the UK's provisional GHG emissions estimated for 2016 of 466 $MtCO_2e$ [RD6] and the current annual average emissions of some

15,000 homes at 8.1 $tCO_2e$ per household (including aspects such as transport, energy consumption and waste) [RD7]. When considering the decommissioning phase the average annual impact increased to 10 $MtCO_2e$ or 167,000 $tCO_2e$, equivalent to 0.34% of the UK's provisional GHG emissions estimated for 2016 [RD6] and the current annual emissions of approximately 20,000 homes. The emissions quantified comprise of releases to the atmosphere occurring during both the construction period, the 60-year operational period, and decommissioning, in accordance with the methodology and assumptions utilised as part of the carbon footprint. A breakdown of the key elements is detailed in Figure 1-1.

**Figure 1-1 Carbon Footprint Summary (MtCO2e)**




1.3.2 The construction phase was estimated to account for 35%, or 3.5 $MtCO_2e$, of the total GHG emissions, with the operational phase making up 39%, or 3.9 $MtCO_2e$. Decommissioning was estimated to account for 27%, or 2.7 $MtCO_2e$, of total GHG emissions, the lowest of the key stages. However, as mentioned previously this should be considered as a higher level assessment due to the limited data availability at this time.

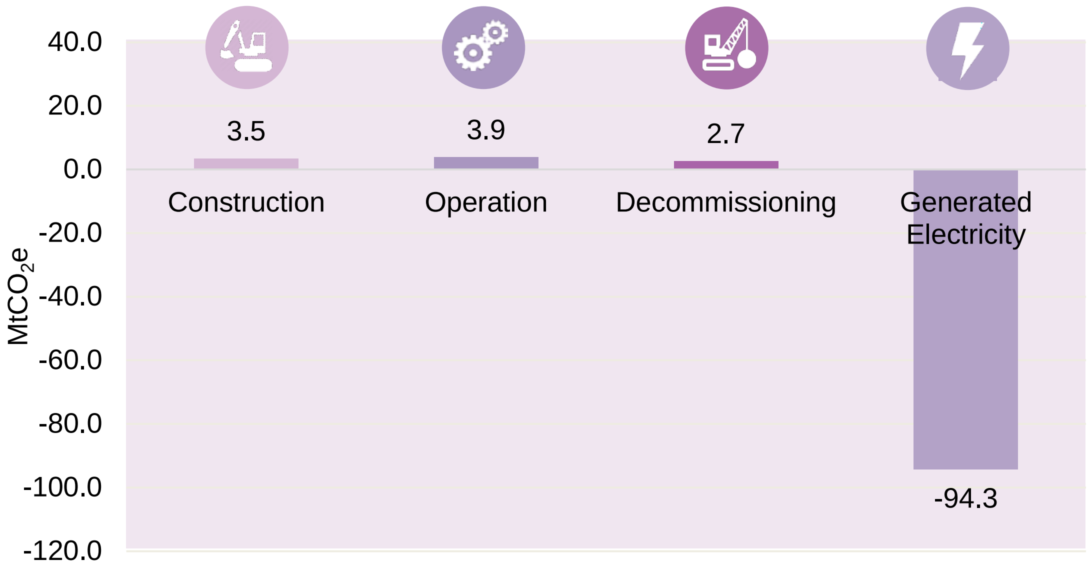
1.3.3 By developing the Wylfa Newydd DCO Project, it could be assumed that the GHG emissions which might otherwise occur from alternative forms of electricity generation, and which are potentially more carbon intensive (such as fossil fuels), can be avoided. This is not a direct removal of GHG emissions from the atmosphere, but represents theoretical lower levels of GHG emissions, than if other technologies were developed instead.

1.3.4 Taking this into account, a significant net carbon and energy offset (total emissions minus the energy offset) of 84 $MtCO_2e$ may occur from development of the Wylfa Newydd DCO Project, through avoided electricity generation GHG emissions, and if it is considered to directly replace other energy generating technologies.

1.3.5 The net carbon offset is based on an assumed exponential forecast trend of the Department for Business, Energy and Industrial Strategy (BEIS) published data [RD38] to the assumed end of the Wylfa Newydd DCO Project's operational life. An average of values from the years 2027 to 2087 was taken as representative for the purposes of this assessment (0.063 kg $CO_2e$/ kWh). The forecast assumes that over time the UK energy mix (i.e. the source of electricity generation such as oil, gas, wind, etc.), as well as the respective generating efficiencies, may change as the energy market is likely to develop over the period that the Wylfa Newydd DCO Project is in operation. Therefore, the sources of electricity which the Wylfa Newydd DCO Project would in theory displace, and the associated GHG emissions which would be theoretically offset, are likely to be greater during the early years of operation, than towards its end, when the energy mix may be made up of a greater proportion of more efficient, cleaner and renewable energy technologies.

1.3.6 Though the forecast provides an indication of the potential impact of the Wylfa Newydd DCO Project, with an inherently uncertain future it is not possible to draw overly precise conclusions in this respect. Over such long timescales, the $CO_2e$ impact of UK grid electricity generation is unknown. The overall $CO_2e$ impact from the UK grid electricity may be higher or lower than that modelled, depending on the technologies and efficiencies adopted. Nevertheless, the facility is expected to contribute greatly towards reducing the $CO_2e$ impact of the UK's existing energy infrastructure, underpinned by the ability to deliver 3,100 MW of low carbon energy using a proven technology, which is of strategic importance in contributing to the security of UK energy supplies. For illustrative purposes, the offset, presented in context with the associated GHG emissions, is shown in Figure 1-2.

**Figure 1-2 Carbon Footprint Summary ($MtCO_2e$)**



# 2 Introduction

2.1.1 A ‘carbon footprint’ commonly refers to the collective consideration of GHG emissions arising from an activity or set of activities, such as energy use. The significance of climate change emphasises the importance of accounting for GHG emissions in an accurate and methodical manner; fundamental in understanding our contribution to GHGs in the atmosphere and the way in which we can minimise and account for our climate change impact.

2.1.2 Carbon footprints typically report the total mass of expected GHG emissions from a project, using predefined boundaries, and in kilograms or tonnes of $CO_2e$. Such information is useful as it can then be used in context with similar developments or other projects to gauge the relative level of sustainability or potential impact for a given development from a climate change perspective, informing design enhancements or eventual decision making. The lower the perceived GHG emissions, the more preferential a development may be in this context.

## 2.2 Drivers for this Carbon and Energy Report

2.2.1 The Welsh Government have a clear vision for carbon reduction and moving towards a low carbon economy. They have made a commitment to reduce Wales’ carbon footprint, documented in Chapter 4 of Planning Policy Wales Edition 9 (2016) [RD1] and the Climate Change Strategy for Wales (2010) [RD2]. Horizon have reflected this within the Corporate Sustainability Policy [RD3] which includes commitments to:

- “Develop a robust governance structure that provides clear leadership and accountability for sustainability;
- Be rigorous and clear to identify sustainability impacts we manage and integrate sustainability into our projects;
- Set and achieve sustainability objectives that form the basis of our sustainability strategy, drive our ambition and embed sustainability:
  - *Develop relevant targets and key performance indicators;*
  - *Ensure staff whose job materially influences a sustainability objective have a clear understanding of their responsibility;*
  - *Build confidence within staff through training and capacity building, to give them the confidence to take personal responsibility for sustainability; and*
  - *Ensure performance is reviewed at Horizon Leadership team level.”*

2.2.2 The precedent for the inclusion of a Carbon and Energy Report (or similar) within DCO applications has been set by National Infrastructure Projects (NSIPs) such as Hinckley Point C, Thames Tideway Tunnel and Silvertown Tunnel. Carbon and Energy Reports for these developments have been used to document the potential carbon and energy impacts associated with each project's activities.

2.2.3 There are no required methodologies for carbon and energy reporting for new nuclear build projects in the UK. Furthermore, neither the Planning Inspectorate nor the Isle of Anglesey County Council (IACC) has published prescriptive requirements for the preparation of Carbon and Energy Reports (or similar) to be submitted in support of applications for DCO or Town and Country Planning Act (TCPA) planning applications. On this basis, Horizon have prepared a carbon footprint (herein referred to as the 'footprint') and this accompanying narrative within the Carbon and Energy Report.

2.2.4 The footprint has included an allowance for flexibility in future design captured within what is known as the Rochdale envelope. This is an approach established by UK planning case law which permits a project description to be broadly defined, within a number of agreed maximum parameters, for the purposes of a consent application. This allows for a certain level of flexibility while a project is in the early stages of development. As development progresses and more detail and certainty become available, further information regarding potential impacts of the project can be provided. This approach, which is based on maximum parameters, is representative of a realistic worst-case.

2.2.5 Chapter 4 of this Carbon and Energy Report describes the methodology that Horizon has developed to undertake the footprint.

## 2.3 Objectives

2.3.1 This Carbon and Energy Report has the following key objectives:

- To provide a summary of the policies and plans which have been reviewed to set the context for this Carbon and Energy Report;
- To describe the methodology used for the development of the footprint for the Wylfa Newydd DCO Project;
- To publish the footprint for the Wylfa Newydd DCO Project;
- To assess the results and outline the key findings of the footprint analysis;
- To report on existing carbon and energy management measures, as an inherent element of sustainability, incorporated within the Wylfa Newydd DCO Project to date; and
- To report on how carbon and energy management measures will be considered as part of the Wylfa Newydd DCO Project, both with the

iterative design development and throughout the Wylfa Newydd DCO Project's lifecycle.

## 2.4 Structure

2.4.1 This report is structured as follows:

- **Chapter 1:** Executive Summary - provides a summary of the context to the Wylfa Newydd DCO Project, the work undertaken to prepare this Carbon and Energy Report and the results of the footprint.
- **Chapter 2:** Introduction - provides the introduction, context and structure of the Wylfa Newydd DCO Project and this Carbon and Energy Report.
- **Chapter 3:** Policies and Plans Context - describes the applicable UK, national and local policies and plans reviewed to set the context for this Wylfa Newydd DCO Project Carbon and Energy Report.
- **Chapter 4:** Carbon and Energy Footprinting Methodology - provides information on the approach (scope and structure) and methodology for the footprint for the Wylfa Newydd DCO Project. Throughout this Chapter, information is provided on the assumptions, exclusions and limitations of the footprint.
- **Chapter 5:** Carbon Footprint - summarises the results, key findings and hotspots of the Wylfa Newydd DCO Project's footprint by temporal scope (construction, operation and decommissioning), physical component and theme (embodied carbon of materials, transportation of materials/ waste, energy/ fuel use, waste disposal and water use (supply and disposal)). The full detail of the footprint is contained in Appendix 8-2.
- **Chapter 6:** Carbon and Energy Management Measures - summarises how existing carbon and energy management measures, as an inherent element of sustainability, have been incorporated within the Wylfa Newydd DCO Project to date. This Chapter also looks ahead as to how measures for carbon and energy management will be considered as part of the Wylfa Newydd DCO Project, both within the development of detailed design proposals, and throughout the Wylfa Newydd DCO Project's lifecycle.
- **Chapter 7:** Conclusion - summarises the overall purpose of this Carbon and Energy Report and draws together the key findings.
- **Chapter 8:** References - lists the publicly available literature that has informed the preparation of this Carbon and Energy Report.

## 2.5 The Wylfa Newydd Project

2.5.1 Horizon is proposing to construct and operate the Wylfa Newydd Project, which comprises the Wylfa Newydd DCO Project, the Licensable Marine Activities and the Enabling Works. Each of these elements is described further below. The Wylfa Newydd DCO Project will be consented under a DCO and the Licensable Marine Activities will be consented under a Marine Licence. There is some overlap between the two; the Marine Works (see below) will be consented under both the DCO and the Marine Licence.

### Wylfa Newydd DCO Project

2.5.2 The Wylfa Newydd DCO Project comprises those parts of the Wylfa Newydd Project which are to be consented by a DCO, namely:

**The Nationally Significant Infrastructure Project (NSIP)**

- Power Station: the proposed new nuclear power station at Wylfa, including two UK Advanced Boiling Water Reactors, the Cooling Water System, supporting facilities, buildings, plant and structures, radioactive waste and spent fuel storage buildings and the Grid Connection;
- Other on-site development: including landscape works and planting, drainage, surface water management systems, public access works including temporary and permanent closures and diversions of public rights of way, new Power Station Access Road and internal site roads, car parking, construction works and activities including construction compounds and temporary parking areas, laydown areas, working areas and temporary works and structures, temporary construction viewing area, diversion of utilities, perimeter and construction fencing, and electricity connections;
- Marine Works comprising:
  - Permanent Marine Works: the Cooling Water System, the Marine Off-loading Facility, breakwater structures, shore protection works, surface water drainage outfalls, waste water effluent outfall (and associated drainage of surface water and waste water effluent to the sea), fish recovery and return system, fish deterrent system, navigation aids and Dredging;
  - Temporary Marine Works: temporary cofferdams, a temporary access ramp, temporary navigation aids, temporary outfalls and a temporary barge berth;
- Off-site Power Station Facilities: comprising the Alternative Emergency Control Centre (AECC), Environmental Survey Laboratory (ESL) and a Mobile Emergency Equipment Garage (MEEG);

**Associated Development**

- the Site Campus within the Wylfa Newydd Development Area;
- temporary Park and Ride facility at Dalar Hir for construction workers (Park and Ride);
- temporary Logistics Centre at Parc Cybi (Logistics Centre);
- the A5025 Off-line Highway Improvements;
- Wetland habitat creation and enhancement works as compensation for any potential impacts on the Tre'r Gof Site of Special Scientific Interest (SSSI) at the following sites:
  - Tŷ Du;
  - Cors Gwawr;
  - Cae Canol-dydd

2.5.3 The following terms are used when describing the geographical areas related to the Wylfa Newydd DCO Project and the Licensable Marine Activities:

- Power Station Site – the indicative areas of land and sea within which the majority of the permanent Power Station, Marine Works and other on-site development would be situated; and
- Wylfa Newydd Development Area – the indicative areas of land and sea including the Power Station Site and the surrounding areas that would be used for the construction and operation of the Power Station, the Marine Works, the Site Campus and other on-site development (WNDA Development).

### Licensable Marine Activities

2.5.4 The Licensable Marine Activities comprise the Marine Works and the disposal of material from Dredging at the Disposal Site.

### Enabling Works

2.5.5 The Enabling Works comprise the Site Preparation and Clearance Proposals (SPC Proposals) and the A5025 On-line Highway Improvements.

2.5.6 Horizon has submitted applications for planning permission for the Enabling Works under the Town and Country Planning Act 1990 to the Isle of Anglesey County Council (IACC).

2.5.7 In order to maintain flexibility in the consenting process for the Wylfa Newydd DCO Project, the SPC Proposals have also been included in the DCO application. The A5025 On-line Highway Improvements are not part of the DCO application.

# 3 Policies and Plans Context

3.1.1 This Chapter summarises the policies and plans which have been reviewed to set the context for this Wylfa Newydd DCO Project Carbon and Energy Report, sub-divided into UK, national (Wales) and local (Gwynedd and the Isle of Anglesey) regions.

3.1.2 A review of all policies and plans applicable to the Wylfa Newydd DCO Project is provided in the Planning Statement [RD8].

## 3.2 UK

### *National Policy Statement for Energy (2011)*

3.2.2 The Planning Act 2008 [RD9] introduced National Policy Statements (NPSs), which provide the primary basis for decision making in relation to NSIPs. It is a statutory requirement under the 2008 Act, that NPSs are produced and designated with the objective to contribute to the achievement of sustainable development (NPS, para. 1.1.2).

3.2.3 The NPS for Energy (NPS EN-1) [RD10], designated by the Secretary of State in July 2011, sets out the overarching national policy for delivery of major energy infrastructure projects and thus is applicable to the Wylfa Newydd DCO Project.

### *National Policy Statement for Nuclear Power Generation (2011)*

3.2.4 The NPS for Nuclear Power Generation (NPS EN-6) [RD11] designated by the Secretary of State in July 2011 sets out national policy on new Nuclear Power Stations identified as potentially suitable for deployment by 2025. NPS EN-6 in addition includes an Appraisal of Sustainability (AoS) for the Wylfa candidate site [RD12]. This examined the potential sustainability effects of the development of the Wylfa NPS Site as a new nuclear power station. NPS EN-6 reports the main findings of the AoS, which, with reference to carbon and energy, incudes the potential to bring significant benefits in meeting the Government's climate change and energy security objectives. A new NPS for nuclear power generation which covers the deployment of nuclear generating capacity between 2026 and the end of 2035 opened for consultation in December 2017. Consultation is expected to close in March 2018.

### *Climate Change Act (2008)*

3.2.5 The Climate Change Act 2008 [RD13] establishes a long-term framework to tackle climate change in the UK. It aims to encourage the transition to a low carbon economy in the UK through legally binding GHG emission reduction targets (a reduction in $CO_2e$ emissions of 80% by 2050 compared to a 1990 baseline (interim targets are also included).

3.2.6 The Act also requires the production of a regular climate change risk assessment which would assess the risks to the UK from the impact of climate change (first produced in 2012). Increasing the number of low carbon energy supplies, through developments such as the Wylfa Newydd DCO Project, will support targets for reducing GHG emissions.

### *Energy Act (2011)*

3.2.7 The Energy Act 2011 [RD14] provides some key elements of the UK Government's energy programme, including a step change in the provision of energy efficiency measures to homes and businesses. It also makes improvements to the framework for enabling and securing low carbon energy supplies and fair competition in the energy markets.

### *Securing the Future – The UK Government Sustainable Development Strategy (2005)*

3.2.8 The UK Government Sustainable Development Strategy [RD15], published in 2005, established five shared UK principles to be used to achieve sustainable development, agreed by the UK Government, Scottish Executive, Welsh Assembly Government and the Northern Ireland Administration. The principles include:

- Living within our environmental limits;
- Ensuring a strong, healthy and just society;
- Achieve a sustainable economy;
- Promoting good governance; and
- Using sound science responsibly.

3.2.9 In addition, the document sets out the following four shared priorities for UK action on sustainable development:

- Sustainable consumption and production;
- Climate change and energy;
- Natural resource protection and environmental enhancement; and
- Sustainable communities.

3.2.10 The Wylfa Newydd DCO Project, from a carbon and energy perspective, will contribute to the shared priorities of sustainable consumption and production and climate change and energy.

### *The UK Low Carbon Transition Plan (2009)*

3.2.11 The UK Low Carbon Transition Plan [RD16] sets out how the UK will meet the target of cutting GHG emissions by 34% from 1990 levels (or an 18% cut on 2008 levels) by 2020. Part of the Plan for delivery by 2020 is for 40% of electricity to be from low carbon sources, including renewables, nuclear and clean coal. The Plan also refers to the UK Government's policies and initiatives to facilitate the building of new Nuclear Power Stations, such as the Wylfa Newydd DCO Project.

### *The Clean Growth Strategy (2017)*

3.2.12 Alongside the UK Low Carbon Transition Plan [RD16] the Clean Growth Strategy [RD48] is indented to support the UK targets to cut GHG emissions. The Strategy highlights the importance of decarbonisation from all sectors inclusive of homes, businesses, transportation and the energy industry. Furthermore, the Strategy draws on the wider benefits of decarbonisation both to society and the economy (i.e. associated with increased job opportunities and reduced energy prices for businesses and homes). In order to support the reduction target the Strategy contains a number of key policies and proposals. The most notable to the Wylfa Newydd DCO Project is the proposal to deliver new nuclear power and the proposal to support innovation in nuclear power delivery.

## 3.3 National

### *Environment (Wales) Act (2016)*

3.3.2 This Environment (Wales) Act [RD17] introduces a new approach to sustainable management of natural resources at a national and local level. It also enhances the regulatory framework through measures such as:

- Providing Natural Resources Wales (NRW) with powers to undertake land management agreements and experimental schemes;
- Facilitating changes to laws and bylaws related to land drainage;
- Providing a requirement for public authorities to maintain and enhance biodiversity;
- Reforming the law on charges for carrier bags;
- Providing powers to Welsh Ministers in relation to waste recycling, treatment and energy recovery;
- Providing a climate change statutory framework;
- Providing provision for regulated orders for fisheries for shellfish;
- Implementing a fee based system for marine licences; and
- Establishing a Flood and Coastal Erosion Committee.

3.3.3 The Wylfa Newydd DCO Project must comply with all aspects of the enhanced regulatory framework.

### *Well-being of Future Generations (Wales) Act (2015)*

3.3.4 This Well-being of Future Generations (Wales) Act [RD18] seeks to improve the economic, social, environmental and cultural well-being of Wales. Under this Act, public bodies have a duty to carry out sustainable development, including the identification of well-being objectives and taking reasonable steps to meet these.

3.3.5 The Act defines sustainable development:

> *"… as the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals."*

3.3.6 Public bodies must work towards achieving seven well-being goals identified under the Act and demonstrate progress towards these. Each of the well-being goals are supported by several objectives [RD28]. The Wylfa Newydd DCO Project, with specific regard to carbon and energy, is considered by Horizon to have the potential to make a substantial contribution to several of the objectives, particularly:

- Supporting the transition to a low carbon and climate resilient society;
- Connecting communities through sustainable and resilient infrastructure (e.g. highways and public rights of way improvements); and
- Fostering conditions for sustainable economic development and employment, whilst stimulating innovation and growth for a modern low carbon economy.

### *Planning Policy Wales Edition 9 (2016)*

3.3.7 Planning Policy Wales (PPW) [RD1] sets out the land use planning policies of the Welsh Government, forming a strategic framework to guide development. It is supplemented by topic based Technical Advice Notes (TANs), procedural guidance contained in Welsh Office, National Assembly for Wales and Welsh Government circulars and policy clarification letters. PPW:

*"translates our (Welsh Government) commitment to sustainable development into the planning system so that it can play an appropriate role in moving towards sustainability".*

3.3.8 With specific regards to carbon and energy, Chapter 4, titled 'Planning for Sustainability', sets out the Welsh Government's goals for carbon reduction, moving towards a low carbon economy and its commitments to reducing Wales' carbon footprint.

### Technical Advice Note 12: Design (2016)

3.3.9 The focus of TAN 12 [RD19] is on good sustainable design and achieving sustainable design through consideration of accessibility, character, community safety, environmental sustainability (protection of natural resources, biodiversity and designing for change) and movement (sustainable travel).

### *Environment Strategy for Wales (2006)*

3.3.10 The Environment Strategy for Wales [RD20] has five environmental themes: addressing climate change, sustainable resource use, distinctive biodiversity landscapes and seascapes, local environment and environmental hazards. For each theme, the Strategy sets out the outcomes the Welsh Government wishes to achieve along with associated indicators and timelines. The Wylfa Newydd DCO Project will support a number of the environmental themes set out in the Strategy primarily through providing a low carbon energy supply which will support GHG emissions reductions and thereby contribute to addressing climate change.

### *Energy Wales: A Low Carbon Transition (2012)*

3.3.11 The Energy Wales: A Low Carbon Transition [RD21] aims for a transition to low carbon energy, covering electricity, heating and transport. It aims to enhance the economic, social and environmental well-being of Welsh people (particularly those impacted by energy infrastructure).

3.3.12 The document draws out the importance of the Wylfa Newydd DCO Project in future proofing energy supplies, complementing the intermittency of renewable sources and acting as a catalyst for wider energy development.

### *Energy Wales: A Low Carbon Delivery Plan (2014)*

3.3.13 The Energy Wales: A Low Carbon Delivery Plan [RD22] outlines how the Energy Wales: A Low Carbon Transition 2012 will be implemented. The Welsh Government states that it will:

- “engage and support businesses that help us to achieve our low carbon ambition – ensuring that Wales is the best possible place to do business by being responsive to the needs of businesses and industry as a cornerstone of our approach;
- strive to ensure that our regulatory processes are as simplified and efficient as they can be and provide businesses with clarity and stability;
- engage the UK Government to ensure that there is a credible framework for capital investment to support the transition to a low carbon economy, that the market mechanisms proposed by the Electricity Market Reform are implemented with greater clarity and speed and that they address current inequalities;

- support our vital energy intensive industries in the transition to a low carbon economy, engaging the UK Government to ensure that during transition there is clarity on and mitigation for the exposure of energy intensive industries to policy costs that could otherwise drive them out of business or oversees;
- relentlessly pursue energy efficiency so that we do more with less – energy efficiency is cost effective in terms of carbon savings, the most effective way to reduce energy bills and able to boost expenditure in local economies as a result of a high labour-market multiplier;
- focus on low carbon sources of energy generation and approaches which will help to deliver lower overall emissions;
- assist the most vulnerable in Welsh society and work to ensure that costs of reform do not fall disproportionately on poor households; and
- make the most sustainable use of Wales' resources by taking forward the work in our Green Paper Sustaining a Living Wales and our resource efficiency strategy Towards Zero Waste".

### *Climate Change Strategy for Wales (2010)*

3.3.14 The Climate Change Strategy for Wales (CCSW) [RD2] sets out how Wales will act to reduce GHGs emissions in Wales (all sectors) by 3% annually and prepare for the impacts of climate change. Specific targets for the transport, residential, business, agriculture and land use, public and waste sectors are provided.

3.3.15 The CCSW seeks to maximise the opportunities to cut GHG emissions, adapt to climate change, promote sustainable development and enable the move towards a low carbon economy. It clarifies that the response to climate change is not optional but in doing so there are opportunities, which include creating jobs and economic benefit, from low carbon technologies. The Wylfa Newydd DCO Project will support such opportunities.

### *One Wales: One Planet – The Sustainable Development Scheme of the Welsh Assembly Government (2009)*

3.3.16 The Sustainable Development Scheme of the Welsh Assembly Government (now Welsh Government) [RD23] presents sustainable development as the overarching strategic aim of all policies of the Welsh Government. The vision of a sustainable Wales is to be achieved through high-level sustainable development actions and reducing the ecological footprint of Wales. The interpretation of sustainable development within the document aligns with the UK shared framework for sustainable development, whereby:

*"In Wales, sustainable development means enhancing the economic, social and environmental wellbeing of people and communities, achieving a better quality of life for our own and future generations:*

- In ways which promote social justice and equality of opportunity; and

- In ways which enhance the natural and cultural environment and respect its limits - using only our fair share of the earth's resources and sustaining our cultural legacy.

*Sustainable development is the process by which we reach the goal of sustainability".*

### *A Sustainable Wales Better Choices for a Better Future – Consultation on Proposals for a Sustainable Development Bill (White Paper on Sustainable Development) (2012)*

3.3.17 In 2012 the Welsh Government drafted a White Paper proposing the development of a bill to establish sustainable development as the central organising principle of Welsh Government and public-sector organisations in Wales and to establish the framework to create an independent sustainable development body for Wales. The White Paper entitled 'A Sustainable Wales Better Choices for a Better Future - consultation on proposals for a Sustainable Development Bill' [RD24] was published for consultation in 2012 as part of the drafting process.

3.3.18 The White Paper details proposals to bring forward legislation on four fundamental elements. The most pertinent to the Wylfa Newydd DCO Project is:

*"… establishing an independent body on a statutory basis to support organisations to embed sustainable development and join up in working towards the improved wellbeing of Wales".*

## 3.4 Local

### *Sustainability Appraisal Deposit Plan (Adopted 2017), Gwynedd and Môn - Joint Local Development Plan*

3.4.2 The Adopted Anglesey and Gwynedd Joint Local Development Plan (JLDP) [RD25] covers the local authorities of the IACC and Gwynedd Council. The JDLP replaces the extant development plans for both authorities and form the basis for land use planning in these areas for the period 2011 to 2026.

3.4.3 The Sustainability Appraisal of the Deposit Plan version of the JLDP (JLDP SA Report) has been published as part of the adopted JLDP. The JLDP SA Report contains a number of objectives developed by the Joint Planning Policy Unit (JPPU) of Gwynedd Council and IACC for undertaking the sustainability appraisal of the JLDP. These objectives cover themes that are considered by the JPPU to be relevant to the consideration of sustainability in plan-making. With particular reference to the Carbon and Energy Report the themes include reducing GHG emissions, supporting energy efficient and climate resilient developments and promoting renewable energy and low carbon energy schemes.

### *Sustainability Appraisal for the New Nuclear Build at Wylfa: Supplementary Planning Guidance (2014)*

3.4.4 The IACC adopted the 'Sustainability Appraisal for the New Nuclear Build at Wylfa: Supplementary Planning Guidance' (Wylfa SPG) [RD26] in July 2014. The Wylfa SPG sits within the context of existing UK, Welsh and local policies and its overall purpose is to provide supplementary advice to ensure that locally direct or indirect measures are fully assessed and mitigated by developers promoting new nuclear power stations at the Wylfa NPS Site. Information is presented in the Wylfa SPG with regards site setting and environmental considerations.

### *Isle of Anglesey County Council Energy Island Programme (2010)*

3.4.5 The Anglesey Energy Island Programme (EIP) [RD27] is a collective effort between the Welsh Government and businesses, *"working in partnership to put Anglesey at the forefront of energy research and development"*, bringing with it potentially huge growth and development opportunities, as well as economic rewards. This includes maximising the benefit of energy development projects including the Wylfa Newydd DCO Project.

3.4.6 The EIP is described by the Welsh Government as a key exciting opportunity for the Welsh energy sector and as a vehicle for both employment growth and development opportunities. It is estimated that it could contribute nearly £12 billion to the Anglesey and North Wales economy over the next 15 years. It would harness a rich mix of energy streams (including nuclear, wind, tidal, biomass and solar), together with associated servicing projects, providing major potential to achieve economic, social and environmental gains for Anglesey and the wider North Wales region.

# 4 Carbon Footprinting Methodology

4.1.1 This Chapter explains the scope, structure and methodology for the Wylfa Newydd DCO Project footprint, including the assumptions, exclusions and limitations.

## 4.2 Approach

4.2.1 The overall approach for defining the footprint has been influenced by a combination of aspects, including:

- The level of design detail for the Wylfa Newydd DCO Project;
- The common and consistent principles of published footprinting standards and guidance documents;
- The physical scope of the Wylfa Newydd DCO Project;
- The temporal scope of the Wylfa Newydd DCO Project; and
- The scope of GHG emissions (GHG emissions scope).

4.2.2 Details regarding each of the aspects referenced above are provided throughout this Chapter.

### *Carbon Footprint Calculations*

4.2.3 The most common method for calculating a carbon footprint is using emission factors. A given set of data such as kilowatt hours of electricity used can be translated to its equivalent kilograms or tonnes of carbon dioxide equivalent ($CO_2e$) using an appropriate value reflective of the activity (for example gas, oil or coal generated electricity). This can be represented by the following equation:

$$C_f = a \times f$$

Where:

$C_f$ = carbon footprint (as kilograms of $CO_2e$).

$a$ = activity data (various units e.g. gigajoules of energy, litres of fuel etc.).

$f$ = GHG emissions factor (various units e.g. $kgCO_2e$/gigajoule, $kgCO_2e$/ litre etc.).

4.2.4 A number of organisations publish GHG emissions factors and it's important to be aware that the choice of these affect the outcome of a footprint. Details of the factors used for the footprint are provided below in paragraphs 4.2.25 and 4.2.25.

4.2.5 In measurement terms, footprints are generally expressed as $CO_2$e given in kilograms or tonnes. However, they can incorporate any number of parameters (e.g. material tonnes used, vehicle/ freight kilometres travelled, and kilowatts of electricity used), with these 'carbon intensity' measurements ranging from mass of carbon dioxide per product, capital spent to unit of energy used.

4.2.6 To quantify and integrate the effect of known GHGs additional to carbon dioxide into the footprint, the GHGs must be converted to $CO_2$e. This is achieved using the global warming potential, the measure of a gas or set of gases' contribution to global warming (over a specified time period), relative to the same mass of carbon dioxide. By multiplying an emission of a GHG by its global warming potential, commonly considered over a 100-year period, its $CO_2$e emissions can be given. The global warming potential is the standard method for comparing emissions of different GHGs. By way of example the global warming potential of 1 kg of methane ($CH_4$) is 25 times that of carbon dioxide.

The footprint for the Wylfa Newydd DCO Project has utilised $CO_2$e factors (which incorporate the GHG emissions of other climate influencing gases) and those which reflect the 'cradle to gate' GHG emissions, from manufacture to use. For example, for a given material such as concrete, this includes the embodied GHGs which may result from its extraction and manufacture, and for transportation this includes the delivery of materials and the removal of waste.

### *Footprinting Standards and Associated Guidance*

4.2.7 Although there is a lack of a defined methodology for carbon footprinting and reporting for nuclear new build projects in the UK, an assessment of generic footprinting standards and associated guidance has been undertaken (as summarised in Appendix 8-1). These included:

- GHG Protocol (2001, as amended) [RD29]:
  - Corporate Accounting and Reporting Standard;
  - Value Chain (Scope 3) Accounting and Reporting Standard;
  - Product Life Cycle Accounting and Reporting Standard; and
  - GHG Protocol for Project Accounting.
- ISO 14064:2006, Part 1: Greenhouse Gases - Part 1: Specification with Guidance at the Organisation Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals [RD30];
- ISO/TS 14067:2014: Greenhouse Gases. Carbon Footprint of Products. Requirements and Guidelines for Quantification and Communication [RD31];
- PAS 2050:2011: Specification for the Assessment of the Life Cycle Greenhouse Gas Emissions of Goods and Services [RD32];

- PAS 2060:2014: Specification for the Demonstration of Carbon Neutrality [RD33];
- PAS 2080:2016: Carbon Management in Infrastructure [RD34];
- BS EN 15978:2011: Sustainability of Construction Works. Assessment of Environmental Performance of Buildings. Calculation Method [RD35]; and
- BS EN ISO 14044:2006: Environmental Management. Life Cycle Assessment. Requirements and Guidelines [RD36].

4.2.8 The standards and guidance documents identified above include extensive technical detail. However, the overall principles are common and consistent throughout. The footprint methodology and the interpretation of the results for the Wylfa Newydd DCO Project has been developed in accordance with these consistent principles, including but not limited to:

- A lifecycle approach to quantifying and reporting GHG emissions (or equivalent) of products/ goods and services;
- Drawing out the benefits of the Project with regards to GHG emissions (where appropriate);
- Focussing on the wider and inherent benefits of GHG emissions management measures (e.g. increased likelihood of cost, programme and time reductions); and
- Recognising the importance of a Project in supporting GHG emissions (or equivalent) reduction targets (e.g. the Climate Change Act (2008) [RD13] sets binding targets for a reduction in $CO_2$ emissions of 80% by 2050 compared to a 1990 baseline) and the development of low carbon infrastructure.

### *Scope*

4.2.9 Footprints can encompass an array of GHG emission sources; from direct processes, such as energy use, transportation and waste disposal to indirect sources further down or up the supply chain. The exact GHG emissions quantified and the extent to which the GHG emission sources within these categories are included in the footprint is defined by the project's scope.

4.2.10 The scope of the footprint for the Wylfa Newydd DCO Project and the associated GHG emissions is defined based on the physical scope (i.e. the built development) and the temporal scope (i.e. construction, operation and decommissioning), in accordance with the principles of the standards and associated guidance outlined above.

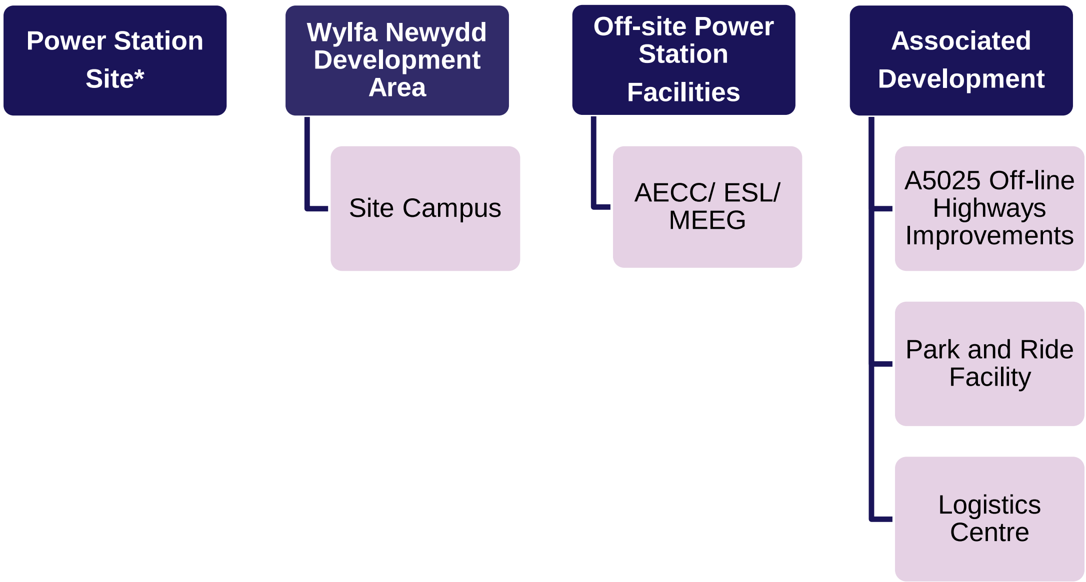
4.2.11 Details of the scope are defined for each of the key aspects in the following sections.

## Physical Scope

4.2.12 The physical scope includes the built aspects (inclusive of excavation, landscaping and surface works, etc.) of the Wylfa Newydd DCO Project (i.e. within the Power Station site, Wylfa Newydd Development Area, Off-site Power Station Facilities and Associated Development).

The physical scope has been defined based on the information contained within the Environmental Statement (Application Reference Numbers: 6.1-6.11) [RD5] and other applicable sources of Project information. The physical scope of the footprint is detailed in Figure 4-1.

**Figure 4-1 Carbon Footprint Physical Scope**




*Includes all components within the order limits of the Power Station Site (as per the Site Layout Plan (Application Reference Number: 6.6.1) [RD37]). The Site Campus is defined within the Wylfa Newydd Development Area.

4.2.13 All aspects of the Wylfa Newydd Project that will be subject to planning applications under the Town and Country Planning Act 1990 (as amended) (the 'TCPA'), such as on-line highways improvements, have been excluded from the footprint as these will be subject to alternative applications.

## Temporal Scope

4.2.14 The temporal scope of the assessment includes the construction, operational and decommissioning phases of the Wylfa Newydd DCO Project, defined within the boundaries of the DCO application.

4.2.15 The construction phase includes all construction activities within the remit of the physical scope (Figure 4-1) as well as any key construction activities which are due to take place during the operational phase. This includes the operation and demolition/ deconstruction/ disassembly (as appropriate) of the Site Campus, Park and Ride Facility and the Logistics Centre.

4.2.16 The operational phase accounts for energy generated by the Power Station and operational activities such as the use and transportation of the fuel assemblies and the associated uranium, waste transportation, waste disposal, energy/ fuel use and water use (supply and disposal) over the 60-year operational period. The operational phase also includes the operational activities associated with the use of the AECC/ ESL/ MEEG. It is acknowledged that there will be variations in the activities per annum. However, due to the level of design detail available to date these have been averaged across the lifecycle of the plant. The assessment also accounts for facility outages when the plant will not be operational due to:

- The initial 12 monthly fuel cycle and subsequent 18 monthly fuel cycles, each of which will be followed by a 30 day outage; and
- The In-Service Inspection (ISI) which will occur every 10 years, and will include a 45-day outage.

4.2.17 Operational emissions associated with the A5025 Off-line Highways Improvements have been excluded as it is understood that any maintenance or other operational activities associated with this aspect will be the responsibility of the highway authority (the IACC). GHG emissions associated with ad hoc, planned and response maintenance are excluded from all elements of the footprint as such information will not be developed until between 2020 and 2023.

4.2.18 The decommissioning assessment should be considered as a guideline only due to the limited information available at this stage. Furthermore, decommissioning will take place after the expected 60 year operational life of the facility, and when there will be significant changes to GHG emissions as a result of variations in factors such as the source of electricity generation, fuel efficiencies or other future developments that cannot accurately be represented at this point.

4.2.19 The decommissioning phase will be subject to a separate consenting regime once the operational phase is approaching completion. Before decommissioning starts, Horizon will need to obtain consent from the Office for Nuclear Regulation (ONR) under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999 [RD4]. It is expected that this would include a requirement for a carbon footprint for decommissioning that would be representative of the GHG emissions at that point in the future.

4.2.20 The temporal scope of the footprint is detailed in Figure 4-2.

**Figure 4-2 Carbon Footprint Temporal Scope**

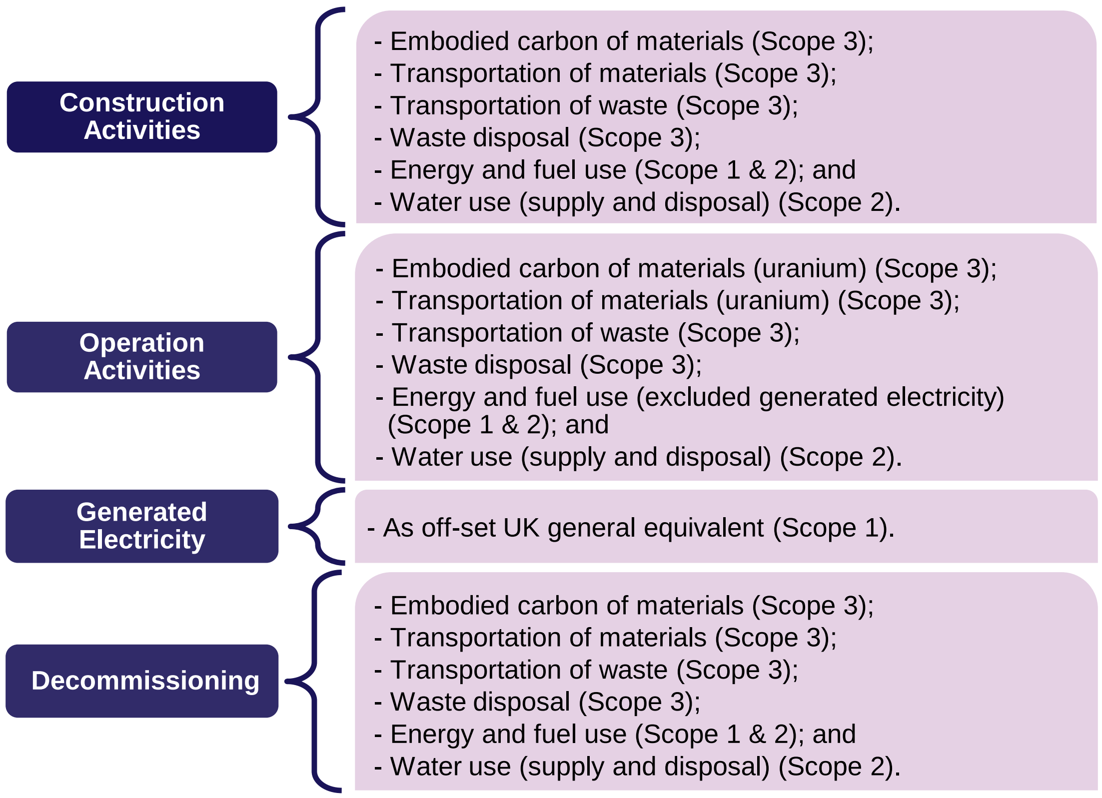
### Greenhouse Gas Emissions Scope

4.2.21 In carbon footprinting terms, GHG emissions are commonly categorised into three groups, as defined by one of the most widely used international accounting methods, the GHG Protocol [RD29]. These are:

- Scope 1 Emissions - GHG emissions from sources that are owned or controlled by the organisation (e.g. emissions from a building's heating/ cooling system);
- Scope 2 Emissions - GHG emissions from the consumption of purchased electricity, steam, or other sources of energy generated upstream from the organisation; and
- Scope 3 Emissions - GHG emissions that are a consequence of the operations of an organisation, but are not directly owned or controlled by the organisation (e.g. transportation of materials to site).

4.2.22 The scope of GHG emissions for the Wylfa Newydd DCO Project footprint is shown in Figure 4-3. Subject to the limitations outlined throughout, and where Project information has been available, this has included all direct (Scope 1) and indirect electricity (Scope 2) emissions, with limited inclusion of indirect (Scope 3) emissions. Even though the information below is related to the scope of the Wylfa Newydd DCO Project, the footprint accounts for all scopes as it is necessary to represent the lifecycle GHG emissions.

**Figure 4-3 Greenhouse Gas Emissions Scope**



### Structure

4.2.23 The footprint has been developed using the CKB, which is a web-based tool developed by Atkins for the building and construction industry that can be used to calculate carbon footprints with an extensive database of GHG emissions factors. The CKB assists in effective and efficient development and structuring of carbon footprints for projects through its ability to:

- Flexibly develop unique structures for footprints optimal to specific projects;
- Efficiently develop footprints through a wide range of intuitive functions;
- Access a large database of carbon factors; and
- Easily extract outputs to facilitate analysis.

4.2.24 The CKB has a proven track record of application on infrastructure projects, including NSIPs (e.g. Thames Tideway Tunnel), and is considered to be the most effective means to develop the carbon footprint for the Wylfa Newydd DCO Project.

4.2.25 Contained within the CKB is a detailed library of GHG emissions factors. The library includes GHG emissions factors from a variety of sources, such as the Inventory of Carbon and Energy (ICE) (versions 1.6(a) and 2.0), originally published by Bath University, UK, the Department for Environment, Food and Rural Affairs (DEFRA) Greenhouse Gas Reporting Conversion Factors, and the EMEP/ CORINAIR Emission Inventory Guidebook.

4.2.26 The ICE factors have predominantly been used for calculating the embodied (cradle to gate) GHG emissions for materials, whereas the DEFRA and EMEP/ CORINAIR conversion factors have predominantly been used to calculate GHG emissions associated with energy and fuel use. These databases are currently some of the industry's most comprehensive publicly available sources of GHG emission conversion factors and are consequently the most widely used. The GHG emissions factors used in the footprint for the Wylfa Newydd DCO Project are primarily from these sources.

4.2.27 The footprint has been structured with construction, operation, electricity generation and decommissioning as headline (top-level) folders to ensure easily comparable headline values for each. Within the headline folders there is an initial sub-structure of folders for the built aspects of the Wylfa Newydd DCO Project (physical scope). Where components of the Wylfa Newydd DCO Project will be demolished/ deconstructed/ disassembled during the construction phase, the physical elements have not been carried through to operation as they will no longer be in-situ during this phase.

4.2.28 For construction, operation and decommissioning, there is a further sub-structure of embodied carbon of materials, transportation of materials/ waste, energy/ fuel use, waste disposal and water use (supply and disposal). The operational materials sub-structure accounts for the fuel assemblies and the associated uranium. Data relating to other operational materials was unavailable at the time that the footprint was produced. All aspects fall under the built aspects of the Wylfa Newydd DCO Project (physical scope).

4.2.29 For generated electricity, the sub-structure shows total generated electricity, in terms of off-set standard UK grid GHG emissions on an assumed exponential forecast trend of BEIS published data [RD38] to the assumed end of the Wylfa Newydd DCO Project's operational life. The total generated electricity data takes account of the fuel cycle outage periods and the in-Service Inspections expected to occur during operation.

4.2.30 A representative diagram of the structure of the footprint is shown overleaf in Figure 4-4.

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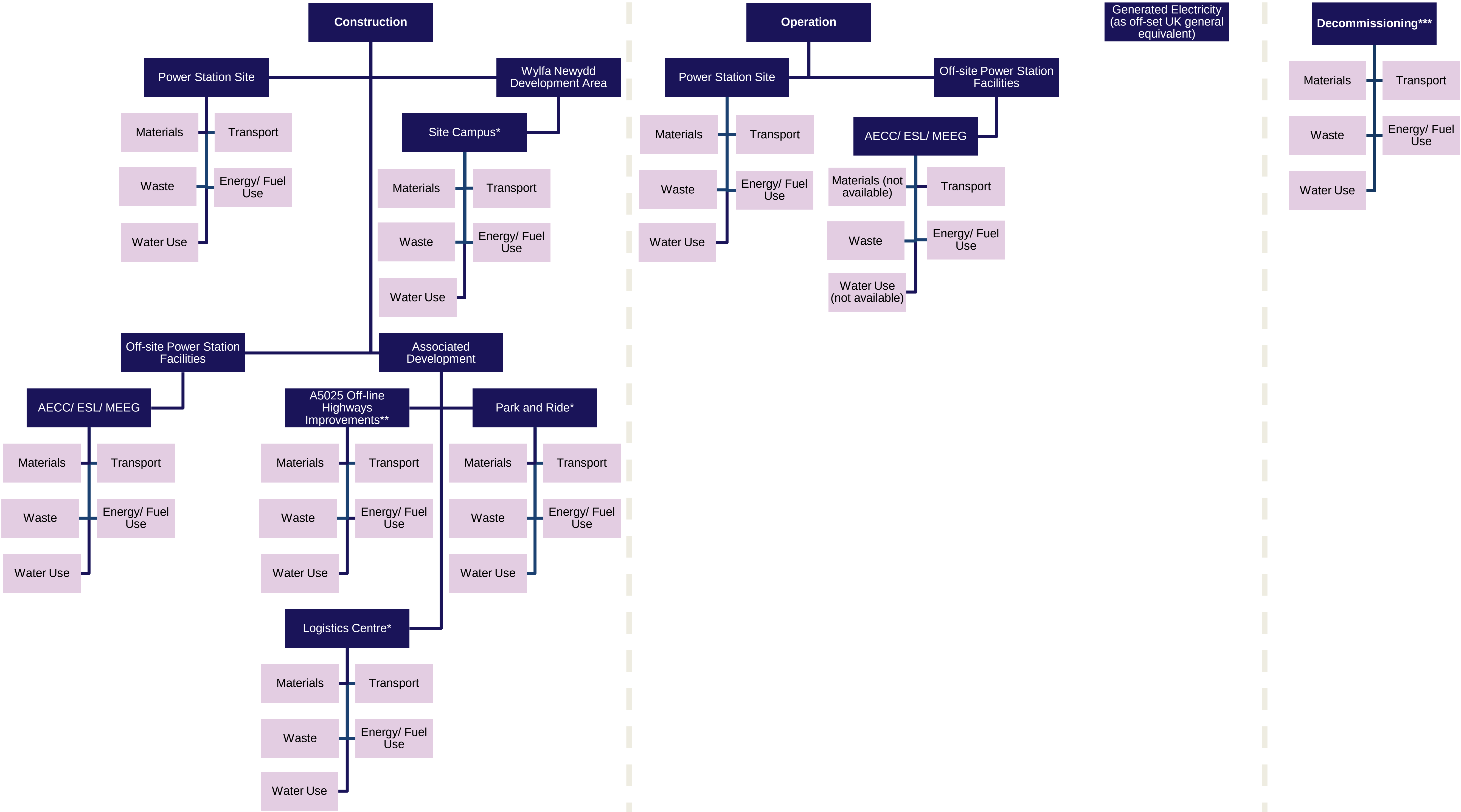
**Figure 4-4 Wylfa Newydd DCO Project Footprint Structure**




*The construction phase includes all construction activities within the remit of the physical scope as well as any key construction activities which are due to take place during the operational phase. This includes the operation and demolition/ deconstruction/ disassembly (as appropriate) of the Site Campus, Park and Ride Facility and the Logistics Centre.

**Operational emissions associated with the A5025 Off-line Highways Improvements have been excluded as it is understood that any maintenance or other operational activities associated with this aspect will be the responsibility of the highway authority (the IACC).

*** Data should be considered as a high-level guideline only due to the limited information available at this stage. Furthermore, decommissioning will take place after the expected 60 year operational life of the facility when there will be significant changes to GHG emissions as a result of variations in the source of electricity generation, fuel efficiencies or other future developments that cannot accurately be represented at this point.

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## 4.3 Methodology

4.3.1 Project information was analysed and interpreted to obtain the required information for use in the CKB, as shown in Table 4-1.

**Table 4-1 Footprint Information Gathered and Interpreted**

| Activity | Information Gathered/ Interpreted | Unit for CKB |
|---|---|---|
| **Construction** | | |
| Materials (embodied carbon) | • Construction Materials (quantities and type) for each physical Project component. | • Tonnage of materials by material type per physical Project component. |
| Transport | • Construction Materials (quantities and type)/ quantity of waste generated for each physical Project component; and<br>• Anticipated travel distance of the materials/ waste. | • Tonnage of materials/ waste by type and travel distance per physical Project component. |
| Waste | • Quantity of waste generated for each physical Project component. | • Tonnage of waste per physical Project component. |
| Energy and Fuel Use | • Construction plant (type and total operating hours) for each physical Project component. | • Operating hours for each plant type per physical Project component. |
| Water Use | • Total number of construction worker days for each physical Project component with a water use (supply and disposal) index per construction worker; or<br>• Or total water use (supply and disposal) per day for each physical Project component. | • Cubic meters per construction worker per man day; or<br>• Cubic meters per physical Project component per day. |
| **Operational** | | |
| Materials (embodied carbon) | • Materials (quantities and type) for each physical Project component. | • Tonnage of materials by material type per physical Project component. |

| Activity | Information Gathered/ Interpreted | Unit for CKB |
|---|---|---|
| Transport | • Material (quantities and type)/ quantity of waste generated for each physical Project component; and<br>• Anticipated travel distance of the materials/ waste. | • Tonnage of materials/ waste by type and travel distance per physical Project component. |
| Waste | • Quantity of waste generated for each physical Project component; and<br>• Anticipated travel distance of the waste. | • Tonnage of waste. |
| Energy and Fuel Use | • Energy (electricity use) per annum of each physical Project component; and<br>• Fuel use per annum for the boilers, generators and fire pumps. | • Kilowatt hour usage for each physical Project component; and<br>• Tonnes of fuel for the boilers, generators and fire pumps. |
| Water Use | • Total consumption (supply) and disposal per day for each physical Project component. | • Cubic meters per physical Project component per day. |
| **Decommissioning** | | |
| Materials (embodied carbon) | • Materials (quantities and type). | • Tonnage of materials by material type. |
| Transport | • Material (quantities and type)/ the total number of vehicle movements; and<br>• Anticipated travel distance of the materials/ waste. | • Tonnage of materials/ waste by type and travel distance. |
| Waste | • Quantity of waste generated; and<br>• Anticipated travel distance of the waste. | • Tonnage of waste. |
| Energy and Fuel Use | • Total energy (fuel and electricity use). | • Total kilowatt hours usage; and<br>• Total tonnes of fuel. |
| Water Use | • Total consumption (supply) and disposal. | • Total cubic meters. |

4.3.2 Project information, once interpreted to obtain the units shown above, was included in the CKB to generate the footprint.

4.3.3 References to the applicable documents are included within each of the calculations. Where assumptions/ additional calculations were necessary these were included within the appropriate CKB section.

4.3.4 Appropriate GHG emissions factors were selected in the CKB based on the suitability and robustness of the GHG emissions factors and to ensure consistency across the Wylfa Newydd DCO Project footprint (i.e. between physical and temporal scope components).

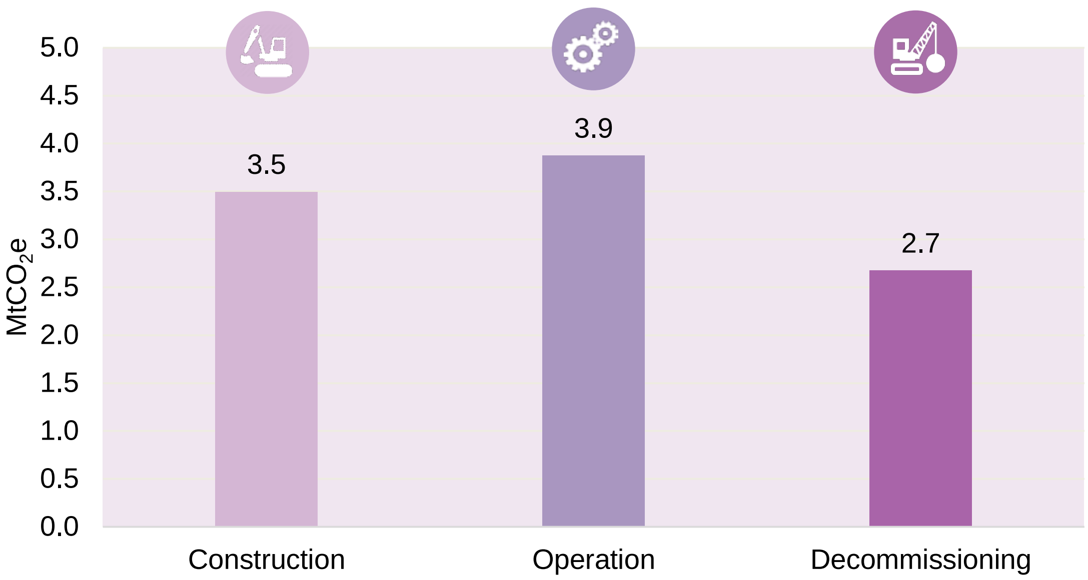
4.3.5 Results and analysis of the footprint are presented within Chapter 5. A full breakdown of the footprint is provided in Appendix 8-2.

# 5 Carbon Footprint

5.1.1 The construction and operational phases of the Wylfa Newydd DCO Project were estimated to result in a total GHG emissions impact of 7.4 $MtCO_2e$. This equated to an average annual impact of approximately 123,000 tCO2e when considering the Project's expected 60 year lifespan. This is equivalent to 0.026% of the UK's provisional GHG emissions estimated for 2016 of 466 $MtCO_2e$ [RD6] and the current annual average emissions of some 15,000 homes at 8.1 $tCO_2e$ per household (including aspects such as transport, energy consumption and waste) [RD7]. When considering the decommissioning phase the average annual impact increased to 10 $MtCO_2e$ or 167,000 $tCO_2e$ equivalent to 0.34% of the UK's provisional GHG emissions estimated for 2016 [RD6] and the current annual emissions of approximately 20,000 homes. The emissions comprise of releases to the atmosphere occurring during the construction period, the 60-year operational period and decommissioning.

5.1.2 A breakdown of the key elements is detailed in Figure 5-1.

**Figure 5-1 Carbon Footprint Summary ($MtCO_2e$)**




5.1.3 The Wylfa Newydd DCO Project is being developed because of a nationally recognised need to provide security for the UK's future energy supplies to support the decarbonisation of the electricity grid [RD10 & RD11], and, to support the $CO_2e$ reduction targets set out in the Climate Change Act 2008 [RD13].

5.1.4 By developing the Wylfa Newydd DCO Project, it could be assumed that the GHG emissions which might otherwise occur from alternative forms of electricity generation, and which are potentially more carbon intensive (such as fossil fuels), may be avoided. This is not a direct removal of GHG emissions from the atmosphere, but represents theoretical lower levels of GHG emissions, than if other technologies were developed instead.

5.1.5 When quantifying carbon offsets (savings or reductions in GHG emissions) it is important to ensure that a project represents a genuine reduction in GHG emissions. Issues arise when projects that reduce GHG emissions would have occurred regardless of any GHG policies or plans, and without concern for GHG emissions. If a project would have occurred regardless then quantifying offsets for its reductions could result in a positive net increase in GHG emissions, which undermines targets of reduction programmes.

5.1.6 This hypothetical ‘do nothing’ or counterfactual scenario considers what may happen if the Wylfa Newydd DCO Project was not carried out. It provides a useful indication of the impact the Wylfa Newydd DCO Project may have in this context.

5.1.7 This finds that a significant net carbon and energy offset (total emissions minus the energy offset) of 84 $MtCO_2e$ may occur from development of the Wylfa Newydd DCO Project, through avoided electricity GHG emissions, and if it is considered to directly replace other energy generating technologies. The net carbon and energy offset is based on an assumed impact of 0.063 kg $CO_2e$/ kWh over the lifespan of the project.

5.1.8 The carbon offset value was determined from the projected energy supply and carbon impact for the UK, published by the BEIS up to 2035 [RD38], and calculation of an exponential trend line using the BEIS data, to create a forecast through to the assumed end of the Wylfa Newydd DCO Project’s life. An average of values from the years 2027 to 2087 was taken as representative for the purposes of this assessment (0.063 kg $CO_2e$/ kWh). The categories used included Power stations, Refineries, and Industry: other energy supply. The projections for the energy and emissions data, and carbon factors, are shown in 5.1.7 and Figure 5-3.

**Figure 5-2 Energy and Emissions Projections**

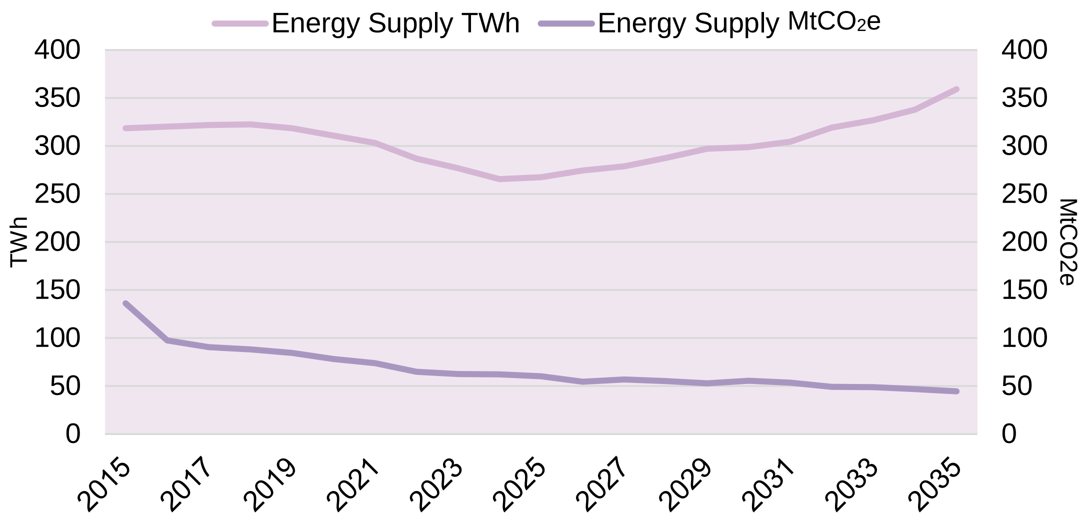
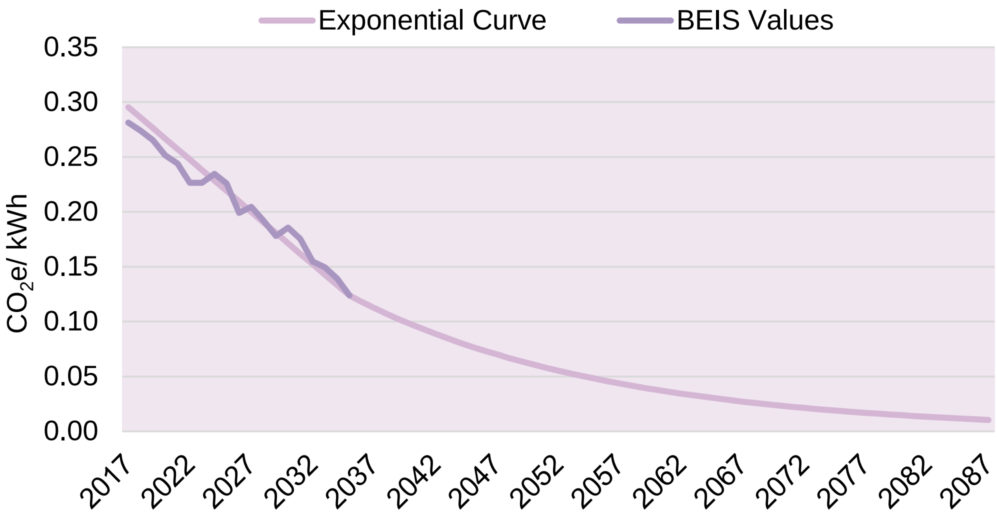


**Figure 5-3 Emissions Factor Projections**

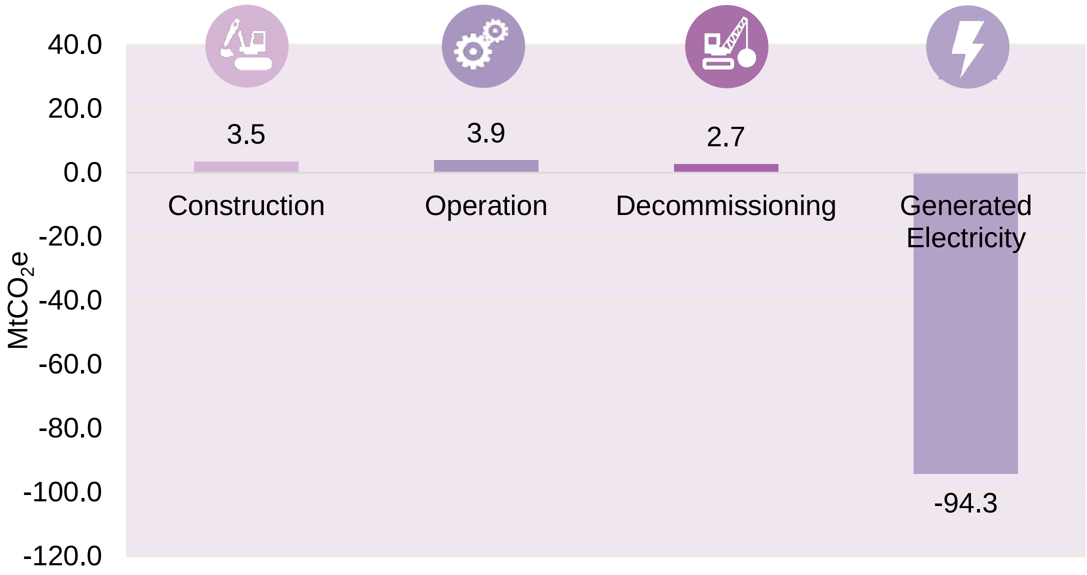



5.1.9 The forecast assumes that over time the UK energy mix (i.e. the source of electricity generation such as oil, gas, wind etc.), as well as the respective generating efficiencies, may change as the energy market is likely to develop over the period that the Wylfa Newydd DCO Project is in operation. Therefore, the sources of electricity which the Wylfa Newydd DCO Project would in theory displace, and the associated GHG emissions which would be theoretically offset, are likely to be greater during the early years of operation, than towards its end, when the energy mix may be made up of a greater proportion of more efficient, cleaner and renewable energy technologies.

5.1.10 Though the forecast provides an indication of the potential impact of the Wylfa Newydd DCO Project, with an inherently uncertain future it is not possible to draw overly precise conclusions in this respect. Over such long timescales the GHG emissions impact of UK grid electricity generation is unknown. The overall GHG emissions impact from UK grid electricity may be higher or lower than that modelled, depending on the technologies and efficiencies adopted and built. Nevertheless, the facility is expected to contribute greatly towards reducing the GHG emissions impact of the UK's existing energy infrastructure. For illustrative purposes, the offset, presented in context with the associated emissions, is shown in Figure 5-4.

5.1.11 A more detailed examination of the Wylfa Newydd DCO Project's expected GHG emissions impact from the construction, operational and decommissioning phases is contained in the following sections.

**Figure 5-4 Carbon Footprint Summary ($MtCO_2e$)**




## 5.2 Construction

5.2.1 The Wylfa Newydd DCO Project is estimated to result in a GHG emissions impact of 3.5 $MtCO_2e$ from the construction phase, 35% of the Wylfa Newydd DCO Project's overall footprint.

5.2.2 The Power Station Site, being the most significant element of the Wylfa Newydd DCO Project, unsurprisingly results in the most intensive impact from this phase, amounting to approximately 94% of the total $CO_2e$ produced from this phase.

5.2.3 When the results are broken down by activity type, the use of materials is the most significant source of GHG emissions, quantified as approximately 63% of the total, followed by energy and fuel use at approximately 35%. Deliveries, transport of waste and water use (supply and disposal) are all relatively low in comparison and collectively amount to less than 3% of the total construction GHG emissions impact.

5.2.4 The relative GHG emissions impacts of the main physical components and activities are detailed in Figure 5-5 and Figure 5-6. Further details on each activity type are contained in the subsequent sections. The assumptions used for each specific element are contained within the footprint within the CKB.

**Figure 5-5 Construction Impact by Physical Component ($tCO_2e$)**

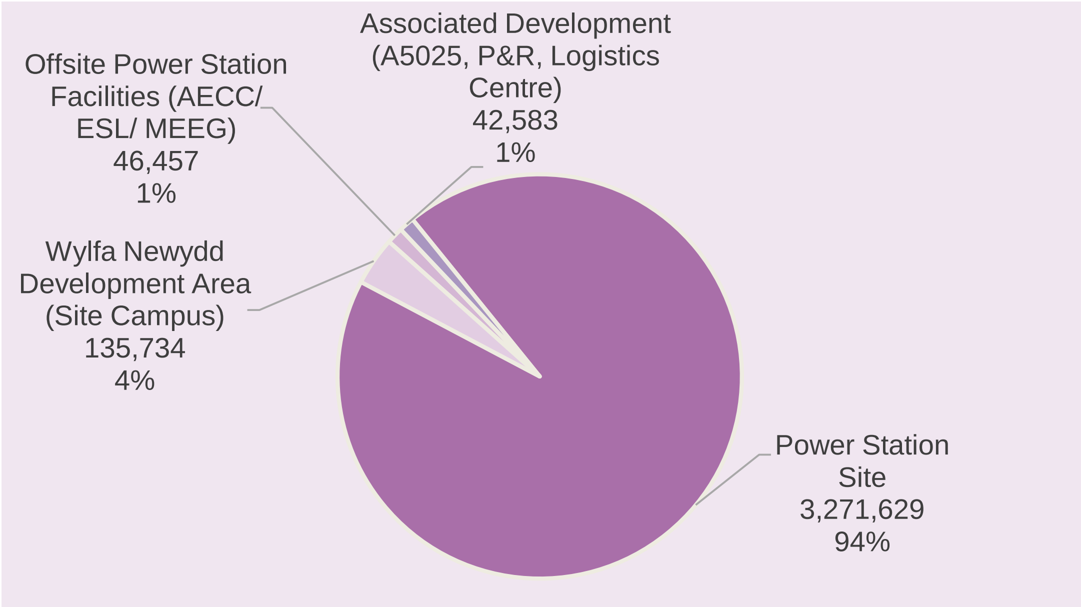
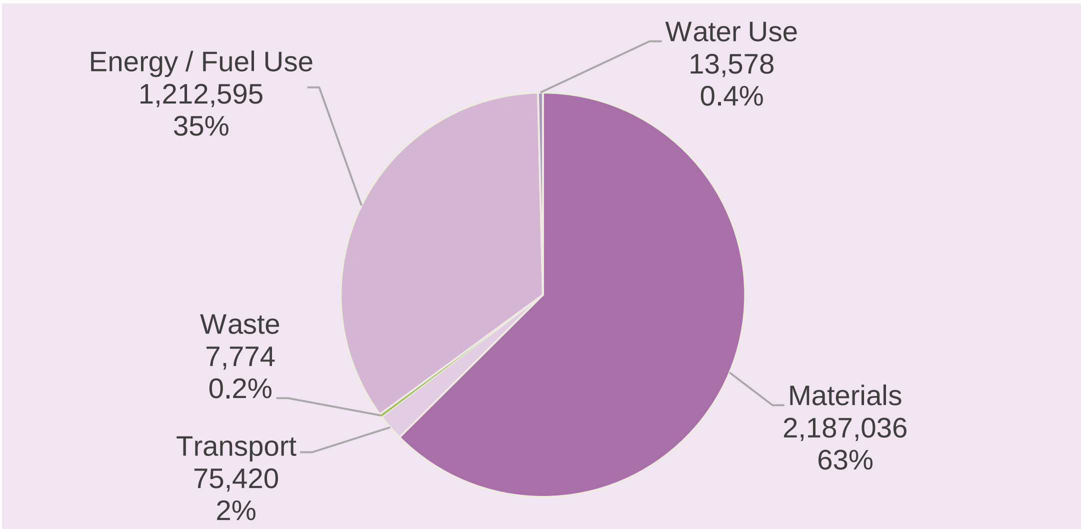



**Figure 5-6 Construction Impact by Activity ($tCO_2e$)**




### *Materials*

5.2.5 The GHG emissions impact associated with the material usage of the Wylfa Newydd DCO Project is variable according to both material type and the intensity of its associated GHG emissions factor, as well as the quantity of each material, as per the supplied Project information. Where known, the properties of each material type included the expected proportions of recycled content.

5.2.6 Of all the materials assessed, the most carbon intensive was general plastic. It is estimated that 10,000 tonnes of general plastic would be used during the construction phase. This would result in a total material GHG emissions impact of 33,000 $tCO_2e$ with embodied (cradle to gate) GHG emissions of 3.31 $kgCO_2e$/ kg. Plastic, however, did not account for the greatest impact to the footprint in terms of GHG emissions.

5.2.7 The greatest impact was from general steel and steel bar and rod, which collectively amounted to over 70% of the total material GHG emissions impact. Some 600,000 tonnes of general steel and steel bar and rod resulted in over 1.4 $MtCO_2e$ with GHG emissions factors of 1.95 $kgCO_2e$/ kg and 1.86 $kgCO_2e$/ kg, respectively. This was followed by concrete, which had a large impact due to the quantity of material at over 3.5 million tonnes. This amounted to some 345,000 $tCO_2e$, despite having one of the lower GHG emissions factors at 0.089 $kgCO_2e$/ kg.

### *Transport*

5.2.8 Transportation for the construction phase included delivery of materials to each of the construction sites considered for the Wylfa Newydd DCO Project components, and the removal of waste. Two key modes were identified; transfer by diesel powered heavy goods vehicle (HGV), and transport by ship/ barge. The former was applicable to both waste and materials with the latter for materials only.

5.2.9 For the purposes of selecting appropriate GHG emissions factors for the assessment, HGVs were considered to be equivalent to large articulated trucks of between 3.5 to 33 tonnes with an average UK vehicle load. An average round trip travel distance of up to 400 km was assumed for both materials and waste transportation, as per the supplied Project information. This equated to a total GHG emissions impact of circa 62,000 $tCO_2e$ for material deliveries and circa 8,000 $tCO_2e$ for waste removal assuming 0.17423 $kgCO_2e$ per tonne kilometre travelled by HGVs.

5.2.10 Shipping of materials was significantly less intensive at 0.00418 $kgCO_2e$ per tonne km travelled. In most cases the assumed 'local' travel distance for materials of 400 km was adopted with the exception of the key reactor material which was expected to be shipped 18,400 km from Japan. Collectively this amounted to some 4,900 $tCO_2e$.

### *Waste*

5.2.11 For the purposes of the calculations, the majority of waste from the construction phase was considered to be inert type waste with some proportions of municipal waste from the operational of buildings during the construction phase such as the Site Campus and the P&R.

5.2.12 Processing of waste considered the worst-case scenario, that all waste would be disposed of in landfill, and with emissions factors taken from the DEFRA (2017) Government Emission Conversion Factors [RD39].

5.2.13 The disposal of inert waste to landfill would amount to some 300 $tCO_2e$ with 1.4 $kgCO_2e$ from every tonne of material, whilst disposal of municipal waste to landfill would result in some 7,500 $tCO_2e$ with 588.9 $kgCO_2e$ per tonne of material. The increased intensity from municipal waste can be associated with its organic content and the generation of the potent GHG methane as it decays.

### *Energy/ Fuel Use*

5.2.14 The most significant burden on energy and fuel consumption during the construction phase was from the use of diesel and electrical plants such as excavators, piling rigs, articulated waste trucks, etc., as well as any energy consumed by onsite facilities that will be in use during the construction period (i.e. Site Campus, P&R and Logistics Centre).

5.2.15 Collectively diesel fuelled vehicles, electricity used during construction and electrical plant use amounted to some 1.2 Mt$CO_2$e. With regards to diesel fuelled vehicles variable engine sizes (and GHG emissions factors) were considered based on either the vehicle type or as per the supplied Project information. Larger engines were associated with a greater GHG emissions impact.

5.2.16 Onsite energy consumption (UK grid equivalent), for the buildings that will be operational during the construction phase equated to 3,300 t$CO_2$e, less than 1% of the overall GHG emissions impact from energy/ fuel use.

5.2.17 GHG emissions from electricity were based on an average of the BEIS forecasts occurring over the construction period (2018 to 2027) and including an uplift of 9% for transmission and distribution losses, as per typical UK performance. This amounted to 0.256 kg $CO_2$e/ kWh.

### *Water Use*

5.2.18 The water impact considered both water consumption (supply) and the subsequent waste water treatment (disposal). This amounted to a GHG emissions impact of approximately 13,500 t$CO_2$e, less than 1% of the total GHG emissions during the construction phase. It should be noted that the water GHG emissions impact is based on maximum water use (supply and disposal) for all project components as it was not possible to disaggregate the data to account for fluctuations in activities/ occupational levels. As such, it is anticipated that the GHG emissions associated with water use (supply and disposal) will be lower than estimated.

## 5.3 Operation

5.3.1 The Wylfa Newydd DCO Project is estimated to result in a total GHG emissions impact of circa 3.9 Mt$CO_2$e from the operational phase, over 60 years (excluding generated electricity). This is 39% of the Wylfa Newydd DCO Project's GHG emissions impact.

5.3.2 As with the construction phase, the Power Station Site is the most carbon intensive aspect of this phase, amounting to over 99% of the overall GHG emissions produced from this phase.

5.3.3 When the results are broken down by activity type, energy and fuel use is clearly the most significant source of GHG emissions, at 70% of the overall $CO_2$e from this phase. The majority of this can be associated with the fuel use (fuel oil) required to operate the boilers, generators and fire pumps (onsite and offsite), as much of the electrical energy needs are met via the plants own generating capacity. The majority of grid electricity is therefore likely to be consumed by the Power Station only during periods of downtime.

5.3.4 Material use was the second most intensive element amounting to 23% of the GHG emissions impact. This was associated with the activities connected with producing and fuelling the fuel assemblies (e.g. mining and milling, conversion, enrichment of uranium, zirconium and steel).

5.3.5 The impact of waste disposal, which included general waste and spent fuel assemblies, was circa 7% of the total, with water use providing the smallest GHG emissions impact at circa 0.2%.

5.3.6 The relative GHG emissions impacts of the main physical components and activities are detailed in Figure 5-7 and Figure 5-8. Further details on each activity type are contained in the subsequent sections.

**Figure 5-7 Operational Impact by Physical Component ($tCO_2e$)**

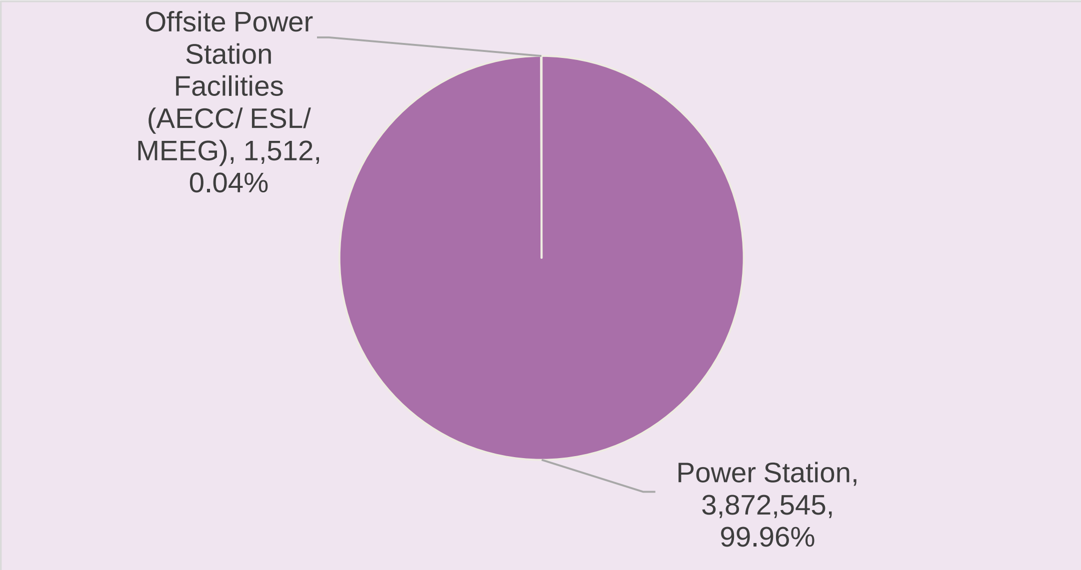
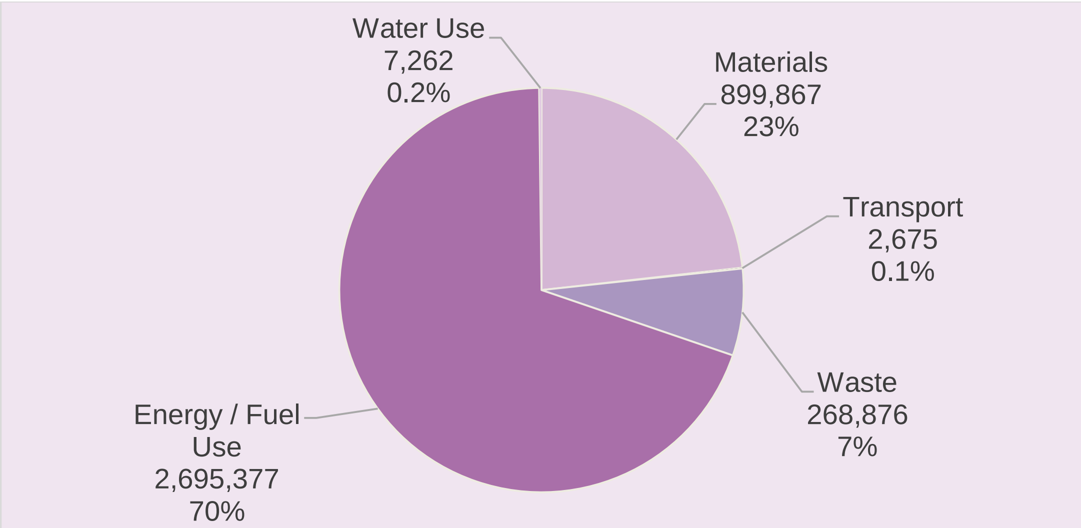



**Figure 5-8 Operational Impact by Activity ($tCO_2e$)**



### Materials

5.3.7 The materials for the operational phase considered the consumption of uranium to fuel the plant and the fuel assemblies. This included the embodied GHG emissions associated with the mining, milling, conversion, enrichment and fuel fabrication of the uranium, and the embodied GHG emissions of the zirconium and stainless steel which make up the composition of the fuel assemblies. Smaller consumables were not included as part of the assessment due to limited Project information, though these are unlikely to have a significant impact up the results.

5.3.8 The calculations were based on provided design information which assumed 19,200 fuel assemblies would be used in the plant over the 60-year operational period. Each fuel assembly was assumed to weigh approximately 300 kilograms and contain approximately 200 kilograms of uranium.

5.3.9 The GHG emissions impact from uranium was based on a study of the lifecycle GHG emissions from over 100 nuclear power plants and which estimated that the average embodied impact was 0.025 kgCO2e/ kWh [RD40]. Built in GHG emissions factors of 103.03 kg$CO_2$e/ kg for zirconium and 6.52 kg$CO_2$e/ kg for stainless steel were used for the main materials which make up the fuel assemblies.

5.3.10 This amounted to a total GHG emissions impact of almost 900,000 t$CO_2$e for the fuel assemblies and the associated uranium over the lifetime of the Power Station.

### Transport

5.3.11 The transportation elements considered for the operational phase were delivery of materials to the site and removal of waste, including spent fuel assemblies. Waste materials were assumed to be transported by diesel HGV, whilst the uranium and fuel assemblies were considered to be delivered by ship, from Canada and Japan, respectively.

5.3.12 The GHG emissions impact from delivery of the fuel assemblies, and the associated uranium, was some 264 t$CO_2$e. Conveying municipal wastes amounted in approximately 2,300 t$CO_2$e for an assumed 400 km distance to a disposal facility, whilst transferring the spent fuel assemblies offsite resulted in circa 100 t$CO_2$e.

### Waste

5.3.13 Processing of waste considered both municipal type wastes and the spent fuel cell assemblies from the plant. In the case of municipal waste, the worst-case scenario was assumed and where all waste would be disposed of in landfill. As above, the emissions factor for municipal waste disposal was taken from the DEFRA (2017) Government Emission Conversion Factors [RD39] whilst the emissions impact from the disposal of the spent fuel assemblies was based on the lifecycle GHG emissions study referenced previously, which included associated emissions from over 100 nuclear power plants [RD40]

5.3.14 Disposal of municipal waste to landfill amounted in some 38,500 $tCO_2e$ with 588.9 $kgCO_2e$ per tonne of material. Disposal of the fuel cell assemblies amounted in an impact of some 230,000 $tCO_2e$ based on an assumed factor for backend processing of 0.0092 $kgCO_2e$/ kWh as determined from the lifecycle study [RD40]. Backend processing of the fuel cell assemblies included fuel processing, conditioning, reprocessing, interim and permanent storage.

### *Energy/ Fuel Use*

5.3.15 The most significant burden on energy and fuel consumption during the operational phase is expected to be from the Power Station itself. However, during normal operation the Power Station is expected to power its auxiliary systems and common load through its own power generation. Auxiliary systems will only be powered from grid generated electricity during periods of maintenance or downtime. Whilst the source of power generation for the station common load during periods of downtime has not yet been determined, this has also been assumed to be powered from the grid generated electricity, as a worst case.

5.3.16 Based on these assumptions some 53,000 $tCO_2e$ has been estimated. This assumes the average lifetime GHG emissions factor quantified in Section 5.1.7, and accounting for a further 9% uplift for transmission and distribution losses, as per typical UK performance, amounting to 0.069 $CO_2e$/ kWh. Fuel oil, associated with the boilers, generators and fire pumps is also required to maintain the operation of the Power Station and this is expected to result in a further 2.6 $MtCO_2e$, which is the largest operational GHG emissions impact.

5.3.17 The rest of the Wylfa Newydd DCO Project's energy burden comes from the building energy consumption associated with the Off-site Power Station Facilities (AECC/ ESL/ MEEG). Collectively this amounted to some 930 $tCO_2e$.

### *Water Use*

5.3.18 As for the construction phase, the water impact considered both water consumption (supply) and the subsequent waste water treatment (disposal). The data for the Power Station Site accounts for both period of full time operation and partial outages. The data for the offsite facilities (AECC, ESL or MEEG) accounts for water use (supply and disposal) during normal operations and incidents. In total, this amounted to a GHG emissions impact of approximately 7,300 $tCO_2e$, circa 0.2% of the total GHG emissions during the operational phase.

## 5.4 Decommissioning

5.4.1 The Wylfa Newydd DCO Project is estimated to result in a GHG emissions impact of 2.7 $MtCO_2e$ from the decommissioning phase, comprising 27% of the Wylfa Newydd DCO Project's overall footprint.

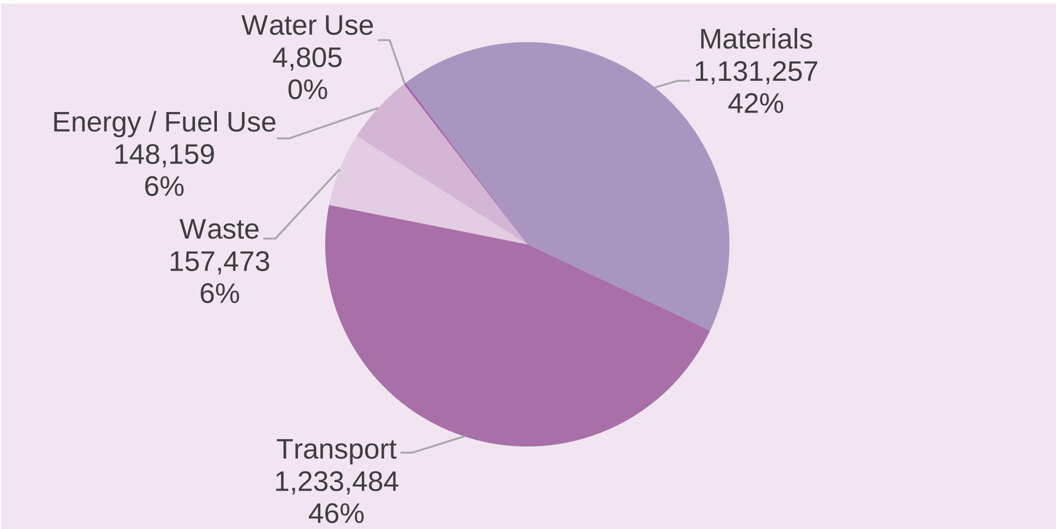
5.4.2 The decommissioning phase has been included in this report to provide context on how this phase would impact the overall footprint of the project. However, it should be noted that the information used in the model contains a high degree of uncertainty, as the available figures are very high level at this stage. Decommissioning is not expected to take place until the end of the facility's forecast 60 year lifespan.

5.4.3 Due to the limited detail available, the decommissioning data presented within the footprint is representative of the whole development, rather than broken down by each building or main development feature. The decommissioning phase was split by activity type: materials, transport, waste, energy/ fuel use and water use, in line with the previous phases.

5.4.4 Transport was estimated to be the most significant source of GHG emissions, at approximately 46% of the total, followed by use of materials at approximately 42%. Waste, energy/ fuel use and water use (supply and disposal) are all predicted to be relatively low in comparison and were collectively estimated as circa 12% of the total decommissioning GHG emissions.

5.4.5 The total estimated GHG emissions for the decommissioning phase broken down by activity type, is summarised in Figure 5-9. Further details on each of the activities considered are contained in the subsequent sections. The assumptions used for each specific element are contained within the CKB.

**Figure 5-9 Decommissioning Impact by Activity (tCO2e)**




### *Materials*

5.4.6 The use of materials is estimated to account for 42% of the total decommissioning emissions with an impact of approximately 1.1 $MtCO_2e$.

5.4.7 The material with the greatest impact is predicted to be foamed concrete grout, which amounted to approximately 52% of the total emissions. It is estimated that approximately 790,000 tonnes of foamed concrete grout would result in over 590,000 $tCO_2e$ with a GHG emissions factor of 0.74 $kgCO_2e$/ kg. This is followed by general fill materials, which had estimated quantities of 1.6 million tonnes, amounting to 360,000 $tCO_2e$, with a GHG emissions factor of 0.14 $kgCO_2e$/ kg.

### *Transport*

5.4.8 Transportation for the decommissioning phase includes the delivery of materials and the removal of waste. Transport was estimated to account for 46% of the total GHG emissions from the decommissioning phase. This equated to a total GHG emissions impact of over 1.2 $MtCO_2e$, the vast majority of which was for material deliveries, with just over 7,800 $tCO_2e$ for waste removal, based on 1.06 $kgCO_2e$ per tonne kilometre travelled by HGVs.

5.4.9 All transport movements were considered to be by diesel powered heavy goods vehicle (HGV). For the purposes of selecting appropriate GHG emissions factors for the assessment, HGVs were considered to be equivalent to large articulated trucks of between 3.5 to 33 tonnes with an average UK vehicle load. An average round trip travel distance of approximately 400 km was assumed for materials, approximately 325 km for non-radioactive wastes and approximately 800 km for radioactive and fuel wastes, as per the supplied Project information. Due to information available, the number of vehicle movements was considered for the footprint for waste, whilst the tonnage was used for material movements.

### *Waste*

5.4.10 The waste from the decommissioning phase is estimated to account for 6% of the calculated total with a GHG emissions impact of circa 160,000 $tCO_2e$. The waste was split into two types: conventional (or non-radioactive) and radioactive wastes.

5.4.11 The footprint for waste considered the worst-case scenario, that all waste would be disposed of. Conventional wastes were assumed to be disposed of in non-hazardous landfill whilst radioactive wastes were assumed to be disposed of in specialist disposal facilities for nuclear wastes. As limited data was available regarding GHG emissions factors per tonne of nuclear waste disposed of, an equivalent factor for a hazardous waste landfill was used. GHG emissions factors were taken from the DEFRA (2017) Government Emission Conversion Factors [RD39] for conventional waste disposal and the Environmental Protection Department (EPD) (2008) Hazardous Landfill Waste Conversion Factor [RD47] for radioactive waste.

5.4.12 The disposal of conventional wastes to landfill was estimated to be circa 140,000 $tCO_2e$, with 589 $kgCO_2e$ from every tonne of material, whilst disposal of radioactive waste was estimated to be over 18,000 $tCO_2e$, with 587 $kgCO_2e$ per tonne of material.

### *Energy/ Fuel Use*

5.4.13 Energy/ fuel use is estimated to account for approximately 6% of the total decommissioning phase footprint with an estimated GHG emissions impact of just over 148,000 $tCO_2e$.

5.4.14 Onsite energy consumption (UK grid equivalent), for the decommissioning phase is estimated to equate to 83,000 $tCO_2e$, approximately 61% of the overall GHG emissions impact from energy/ fuel use. Diesel consumption comprised the remaining GHG emissions, at approximately 65,000 $tCO_2e$.

### *Water Use*

5.4.15 The water GHG emissions impact considered both water consumption (supply) and the subsequent waste water treatment (disposal). This was estimated to amount to the lowest GHG emissions impact for the phase at approximately 4,800 $tCO_2e$ or approximately 0.2% of the total GHG emissions for decommissioning.

# 6 Carbon and Energy Management Measures

6.1.1 As demonstrated in Chapter 5 the Wylfa Newydd DCO Project is anticipated to have a significant net carbon offset (total emissions minus the energy offset) of approximately 84 $MtCO_2e$, if it is considered to directly replace other more GHG emissions intensive energy generating technologies over its lifespan. The carbon offset is underpinned by the ability of the Wylfa Newydd Power Station to deliver 3,100 MW of low carbon energy using a proven low carbon technology, which is of strategic importance in contributing to the security of UK energy supplies and supports the plans and policies summarised in Chapter 3.

6.1.2 It is important to note that the Wylfa Newydd DCO Project has been enhanced by carbon and energy management measures that have already been incorporated into the design to help reduce its impact (examples provided in Section 6.2.2). Opportunities, however, remain to further embed a process for the consideration of carbon and energy management measures (as inherent outcomes of sustainability) into all aspects and stages of the Wylfa Newydd DCO Project. The implementation of such a process will be a critical tool for improving the overall impact of the Wylfa Newydd DCO Project.

6.1.3 This Chapter summarises and provides examples of some of the key carbon and energy management measures that have been incorporated in the Wylfa Newydd DCO Project to date. This Chapter also outlines the process by which Horizon intends to implement relevant sustainability considerations into the future stages of design evolution and Project refinement. Further information with regards to carbon and energy management measures and the embedded process for the consideration of sustainability into all aspects and stages of the Wylfa Newydd DCO Project are provided in the Sustainability Statement (Application Reference Number: 8.17) [RD41].

6.1.4 Horizon intends to continually review and update the carbon footprint as the design progresses and throughout the Wylfa Newydd DCO Project's lifecycle for use as both a reporting tool and to identify areas for improvement and/ or the introduction of further management measures.

## 6.2 Incorporated to Date

6.2.1 The majority of the carbon and energy management measures incorporated in the Wylfa Newydd DCO Project to date have been outcomes of either the value engineering/ design optimisation processes or commitments introduced in the Pre-Application Consultation (PAC) materials and written into strategies that form part of the DCO application.

6.2.2 Examples of some of the key value engineering/ design optimisation outcomes and their inherent relationship to carbon and energy management, are summarised below:

- A reduction in the overall built footprint of the Power Station Site and the number of buildings on it compared to the proposals published at both PAC1 and PAC2 (see the overarching Wylfa Newydd DCO Project Glossary [RD44] for a description of the pre-application consultation stages), thereby:

  - Reducing the overall requirement for construction materials and therefore the associated embodied carbon and transport GHG emissions impacts of the materials; and
  - Reducing the construction programme and the quantity/ running time of the construction plant.
- Including the use of modular buildings or designing buildings for disassembly thereby reducing the construction programme and the quantity/ running time of construction and/ or disassembly plant. Where buildings can be re-used, or re-purposed this will significantly reduce wastage rates as the buildings can be relocated (if necessary) and refurbished for use by other projects and organisations.
- Where practicable, the design of the buildings across the Wylfa Newydd DCO Project makes use of technologies to provide heat optimisation thereby reducing the demand and the use of cooling and heating systems once operational.
- Inclusion of areas of photovoltaics on the roofs of both the P&R, Logistics Centre and the amenity building (within the Site Campus), as non-residential buildings, to support energy demands within these buildings. The sizing of the photovoltaic areas will be in accordance with Part L of the Building Regulations (2014) [RD45] and the cross referenced British Standards. The use of photovoltaics introduces a low carbon energy source and will reduce the demand placed on the grid electricity supply.
- The creation and enhancement of wetland habitat at the Tŷ Du, Cors Gwawr and Cae Canol-dydd sites to compensate for any potential impacts on the Tre’r Gof SSSI. Creation of new habit can contribute to an increase in the carbon uptake from vegetation.

6.2.3 Examples of some of the key commitments in the Wylfa Newydd DCO Strategies that inherently link to carbon and energy management, are summarised below:

- As outlined Schedule of Environmental Commitments, included in the Environmental Statement (Application Reference Numbers: 6.1-6.11) [RD5], during construction the fleet mix will utilise newer non-road mobile machinery (NRMM) complying with the EU Stage IV NRMM emissions standards (i.e. plant generally manufactured after 2014), which emit 80% less NOx than Stage IIIB plant;
- As outlined Schedule of Environmental Commitments, included in the Environmental Statement (Application Reference Numbers: 6.1-6.11) [RD5], during construction Horizon will ensure the active and on-going management of the plant and machinery operating in close proximity to the key exceedance areas where an impact is predicted;

- As outlined in the Wylfa Newydd CoCP (Application Reference Numbers: 8.6) [RD42], Horizon has developed and will construct the Wylfa Newydd DCO Project under environmental management systems accredited to BS EN ISO 14001; Horizon will be compliant with, and maintain, ISO 14001 accreditation throughout the construction phase of the Wylfa Newydd DCO Project. The accreditation will be periodically audited by accredited external bodies in line with ISO 14001 procedures; and
- Through the Wylfa Newydd CoCP (Application Reference Number: 8.6) [RD42], Horizon will encourage sustainable water and energy consumption initiatives where practicable across all working methods.

6.2.4 These measures can help to reduce the overall footprint of the Wylfa Newydd DCO Project.

## 6.3 Future Incorporation

6.3.1 The processes identified in this Section relate to the ways in which Horizon intends to incorporate relevant sustainability considerations in the future stages of design evolution and Project refinement. The processes reflect relevant elements of Horizon's internal governance and decision-making processes, adapted in this document to illustrate how the sustainability considerations would feature (usually as one part of a number of other relevant considerations). These governance arrangements would be part of the means by which the mechanisms for securing each of the entries on Horizon's Mitigation Route Map (Application Reference Number: 8.14) [RD46] were followed, whilst also adhering to the quality controls embedded in Horizon's protocols.

### *Sustainability in Design*

6.3.2 Ensuring a comprehensive, cyclical and iterative process for embedding the consideration of sustainability into all aspects and stages of the Project post submission of the application for a DCO application is essential. It is critical that such a process is committed to holistically by Horizon (i.e. at a corporate/ management level).

6.3.3 A detailed explanation of how the process was developed is provided in the Sustainability Statement (Application Reference Numbers: 8.17) [RD41]. The proposed process is aligned with the RIBA design stages going forwards, as shown in Figure 6-1. The process fosters good sustainable design practices, relating to design decisions that are in the first instance practicable (i.e. cost effective) and demonstrate positive outcomes against the Sustainability Appraisal (SA) Objectives. As noted for RIBA-3, it is acknowledged that all designs will be reviewed against Horizon’s SA objectives. It is recommended that the input material provided by design author(s) for reviewers to consider should specifically highlight where good sustainable design measures have been incorporated.

### Figure 6-1 Embedding Sustainability Considerations in Design and Operation

| RIBA Design Stage | Sustainable Design Relationship |
|---|---|
| RIBA 3 (Developed Design) | Continue to incorporate good sustainable design practices into all Project design components.<br>Specification of sustainable design practices in Wylfa Newydd Project Strategies.<br>Preparation of evidence of complying with applicable design requirements (e.g. Building Regulations Part L) and Horizon's design aspirations, in accordance with the Design and Access Statement(s). |
| RIBA 4 (Technical Design) | Inclusion of sustainable design roles and responsibilities in construction Project Strategies and Contractor Management Plans.<br>Prepare specification of sustainable materials and management process measures for all construction TIER contracts (products and services). |
| RIBA 5 (Construction) | Ensure Project Strategies and Contractor Management Plans are continually maintained and updated.<br>Continually monitor and report against materials and management measures. |
| RIBA 6 (Handover & Close Out) | Collate summary reports on materials and management measures.<br>Inclusion of sustainable design roles and responsibilities in operational Wylfa Newydd Project Strategies/ Contractor Management Plans.<br>Prepare specification of sustainable products and management process measures throughout all operational TIER contracts (products and services). |
| RIBA 7 (In Use) | Ensure Wylfa Newydd Project Strategies/ Contractor Management Plans are continually maintained and updated.<br>Continually monitor and report against product and management measures. |

### *Sustainable Procurement*

6.3.4 Horizon is committed to fostering sustainable procurement by promoting opportunities for all and ensuring that expectations in key performance areas including safety, security, quality, human rights, environment and Welsh language and culture are understood and implemented where appropriate throughout the supply chain. To be successful Horizon needs a supply chain that understands the expectations in these key areas and is committed to the success of the Project. An explanation of the structures and tools that Horizon is developing to support the implementation of its ambition for sustainable procurement is summarised below.

#### Horizon's Supply Chain Charter

6.3.5 Horizon's Supply Chain Charter establishes the strategic principles and headline expectations that will apply to the conduct of Horizon, Menter Newydd and all members of the supply chain for the Project. It sits alongside the strategic aspirations of the Project relating to the planned pattern of spending and delivery of business and job opportunities.

#### Supply Chain Commitments to Support Delivery of the Supply Chain Charter

6.3.6 Horizon recognises the importance of achieving supply chain commitments set out in the Supply Chain Charter. The following tools will aid the delivery of the Supply Chain Charter:

- Supply Chain Action Plan and Supply Chain Service: The Supply Chain Action Plan will set out strategic objectives and desired outcomes into the detailed actions and processes required to deliver our goals - it will also determine how Horizon will monitor these aspirations and commitments. The Supply Chain Service will oversee the delivery of the action plan;
- Supply Chain Portal: Horizon is developing a Supply Chain Portal; a web based procurement platform that allows interested suppliers to register once for opportunities at Wylfa Newydd, thus simplifying the process, also allows the buying entity across the various tiers at Wylfa Newydd to share opportunities arising at the project; and the
- Jobs and Skills Service: Horizon’s Jobs and Skills Service is aimed at sourcing local (within 90 minutes) persons for employment at Wylfa Newydd. It will also support the upskilling of persons for the project if the need exists and support any displacement issues.

#### Sustainable Procurement - Codes and Standards

6.3.7 The Supply Chain Charter will be supported by a layer of documents that establish the codes and standards that must be adhered to throughout the supply chain. A number of documents will explain how Horizon will ensure compliance by prospective members of the supply chain in key performance areas, the documents will follow themes of:

- **Supplier Code of Conduct:** To clarify what we expect from our suppliers, Horizon has developed a Supplier Code of Conduct to supplement the Supply Chain Charter and clearly specify what behaviours, practices and regulations we expect to see demonstrated and complied with. It is based on the policies used for our own practices. The Code of Conduct sets out the minimum standard of business behaviour expected of the suppliers so that they act in a way that is ethical, corporately responsible and aims to ensure compliance with applicable laws and regulations.
- **Procurement Practices:** Key principles of Horizon's procurement practices are:
  - Encouraging a diverse base of suppliers;
  - Supporting the Wylfa Newydd jobs and skills brokerage;
  - Providing ongoing engagement and support to the nuclear readiness programme of works;
  - Exploring opportunities for working with voluntary and community sector organisations in supply and service delivery;
  - Adhering to the Horizon pledge to support and enhance Welsh language and culture;
  - Ensuring the commitments of the Supply Chain Charter are met;
  - Providing opportunities and timely publicising these where appropriate;
  - Ensuring the whole supply chain working in partnership with all stakeholders; and
  - Creating a competitive environment which promotes exceptional performance.
- **Health and Safety:** Horizon's suppliers will make provision for the health, safety and welfare of their people, visitors and contractors and those in the community who may be affected by their activities.
- **Promoting Fair Employment Practices:** Horizon's ongoing programme of contract review will seek to ensure Horizon moves towards a position that, where appropriate, contractors receive a fair wage reflecting the environment in staff which they work, and that they enjoy contractual terms which represent reasonable minimum standards and which provide for family friendly, flexible and diverse working environments.
- **Promoting Workforce Welfare:** Horizon's ongoing programme of contract review will seek to ensure that wherever appropriate, Horizon's contract terms require Horizon's suppliers to make provision for the welfare of their workforce.
- **Meeting Strategic Labour Needs and Enabling Training Opportunities:** Horizon will seek to incorporate provisions into contracts, where appropriate, to offer training and employment opportunities for

local communities and to address under-representation of particular groups in particular sectors, and the need for providing skills and opportunities for people experiencing long-term unemployment.

- **Community Benefits:** Horizon will take measures to understand the impact our procurement activities have on local communities. Horizon will encourage a positive contribution from Horizon's suppliers to the local communities in which they work on our behalf. Horizon will fully explore the opportunities for developing appropriate provisions to deliver specific community benefits.
- **Ethical Sourcing Practices:** When sourcing suppliers for Horizon's contracts, Horizon will seek to work with suppliers who encourage ethical sourcing practices amongst suppliers, partner organisations and the broader market.
- **Promoting Greater Environmental Sustainability: Horizon will** promote greater environmental sustainability through procurement measures which are inclusive of but not limited to:
  - ensuring environmental issues are proactively addressed in all aspects of the procurement process;
  - seeking to reduce waste through reviewing the amount and type of materials purchased, and by exploring the opportunities to purchase refurbished, recycled and recyclable equipment, products and materials; and
  - where appropriate, examining the environmental management practices of our current and potential suppliers.
- **Monitoring:** Suppliers should keep documentation to demonstrate compliance with the Suppliers Code of Conduct and must provide access to that documentation upon request.
- **Supporting the Implementation Process:** All suppliers appointed to undertake construction will have demonstrated to Horizon a commitment to the procurement requirements and practices outlined above.

### *Corporate Sustainability*

6.3.8 The Horizon Corporate Sustainability function sets sustainability direction, objectives and targets, and monitors progress. The principle governing Corporate Sustainability's way of working is that responsibility for promoting sustainability should – as far as possible – lie with the relevant function or team in the Project. The Corporate Sustainability function then acts in a complementary fashion; supporting the development of particular aspects of the Project, tracking progress and highlighting gaps and opportunities in the consideration of sustainability matters as and when they arise. This approach is designed to ensure the consideration of sustainability and the roll-out of behaviours, key themes and topics of the Corporate Sustainability Strategy permeate across the whole of the Horizon business to encourage integration, rather than sitting apart as a separate review and advisor function.

6.3.9 Corporate Sustainability is the responsibility of the Director, Corporate Affairs. The Director is assisted by a small Corporate Sustainability team comprising a Corporate Sustainability Manager, one graduate post and retained external advisors.

6.3.10 The role of the Corporate Sustainability function is as follows:

- Horizon-scanning for external developments relevant to Horizon (e.g. Changes in corporate reporting requirements, emerging non-government organisation campaigns, activity among peer companies);
- Setting and maintaining the Corporate Sustainability Strategy on behalf of the Board;
- Overseeing the setting of annual Corporate Sustainability Objectives in line with the Corporate Sustainability Strategy and to complement the SA Objectives for the Project. In setting objectives, the Corporate Sustainability function will review those already set, challenge if required and propose objectives to fill gaps;
- Monitoring progress against Corporate Sustainability Objectives and reporting to the Board;
- Liaison with other teams and functions within Horizon to provide advice and expertise, for example, attending Environment Group meetings and participating in design review activities;
- To lead external Sustainability communications including supplying content to other individuals and teams in Horizon who own key stakeholder relationships; and
- Defining and collating company sustainability indicators for internal and external reporting.

6.3.11 Corporate Sustainability is accountable to the Board via a process of six-monthly Reports.

6.3.12 The role of the Board is as follows:

- The periodic approval of the Corporate Sustainability Strategy, Objectives and Annual Targets;

- Commitment to implement agreed targets in own areas of responsibility; and
- Agreement to liaise openly with Corporate Sustainability, for example, through issuing invitation to meetings and supplying information on request.

# 7 Conclusion

7.1.1 The construction and operational phases of the Wylfa Newydd DCO Project were estimated to result in a total GHG emissions impact of 7.4 $MtCO_2e$, based on the methodology and assumptions utilised as part of this assessment. This equated to an average annual impact of 123,000 tCO2e when considering the Project's expected 60 year lifespan. This is equivalent to 0.026% of the UK's provisional GHG emissions estimated for 2016 of 466 $MtCO_2e$ [RD6] and the current annual average emissions of some 15,000 homes at 8.1 $tCO_2e$ per household (including aspects such as transport, energy consumption and waste) [RD7].

7.1.2 When considering the decommissioning phase the average annual impact increased to 10 $MtCO_2e$ or 167,000 $tCO_2e$, equivalent to 0.34% of the UK's provisional GHG emissions estimated for 2016 [RD6] and the current annual emissions of approximately 20,000 homes. The emissions comprise of releases to the atmosphere occurring during the construction period, the 60-year operational period and decommissioning.

7.1.3 The construction phase was estimated to account for 35% or 3.5 $MtCO_2e$ of the total GHG emissions impact, with the operational phase making up 39% or 3.9 $MtCO_2e$. Decommissioning was estimated to account for 27% or 2.7 $MtCO_2e$, the lowest of the key stages. Though this should be considered as a higher level assessment due to the limited data availability at this time.

7.1.4 By developing the Wylfa Newydd DCO Project, it could be assumed the GHG emissions which might otherwise occur from conventional electricity generation, such as fossil fuel sources, will be avoided. This is not a direct removal of GHG emissions from the atmosphere, but represents theoretical lower levels of GHG emissions, than if other technologies (such as fossil fuel) were developed instead.

7.1.5 Taking this into account a significant net carbon and energy offset (total emissions minus the energy offset) of 84 $MtCO_2e$ may occur from development of the Wylfa Newydd DCO Project, through avoided electricity emissions, and if it is considered to directly replace other more GHG emission intensive energy generating technologies over its lifespan.

7.1.6 The net carbon and energy offset was based on the projected energy supply and carbon intensity, forecasted through to the assumed end of the Wylfa Newydd DCO Project life, using an exponential trendline. The forecast assumes that over time the UK energy mix (i.e. the source of electricity generation such as oil, gas, wind etc.), as well as the respective generating efficiencies, may change as the energy market is likely to develop over the period that the Wylfa Newydd DCO Project is in operation. Therefore, the sources of electricity which the Wylfa Newydd DCO Project would in theory displace, and the associated GHG emissions which would be theoretically offset, are likely to be greater during the early years of operation, than towards its end, when the energy mix may be made up of a greater proportion of more efficient, cleaner and renewable energy technologies.

7.1.7 Though the forecast provides an indication of the potential GHG emissions impact of the Wylfa Newydd DCO Project, with an inherently uncertain future it is not possible to draw overly precise conclusions in this respect. Over such long timescales the $CO_2e$ impact of UK grid electricity generation is unknown. The overall $CO_2e$ impact from UK grid electricity may be higher or lower than that modelled, depending on the technologies and efficiencies adopted. Nevertheless, the facility is expected to contribute significantly towards reducing the $CO_2e$ impact of the UK's existing energy infrastructure, underpinned by the ability to deliver 3,100 MW of low carbon energy using a proven technology, which is of strategic importance in contributing to the security of UK energy supplies and supports the plans and policies summarised in Chapter 3.

7.1.8 Reflected in the final footprint are a number of carbon and energy management measures which have been incorporated into the Wylfa Newydd DCO Project to date. These have primarily been outcomes of either the value engineering/ design optimisation processes, or commitments introduced in the PAC materials and written into strategies that form part of the DCO application.

7.1.9 It is acknowledged that there remain significant opportunities to embed further consideration of sustainability (thereby carbon and energy management measures) into all aspects and stages of the Wylfa Newydd DCO Project. Horizon have proposed a process for embedding consideration of sustainability going forwards. The proposed process fosters good sustainable design practices, relating to design decisions that are practicable (i.e. cost effective).

7.1.10 Horizon intends to continually review and update the carbon footprint as detailed design proposals develop and throughout the Wylfa Newydd DCO Project's lifecycle for use as both a reporting tool and to identify areas for improvement and/ or the introduction of further management measures.

# 8 References

8.1.1 Table 8-1 provides a schedule of references cited in the previous sections of the report.

**Table 8-1 Schedule of References**


| ID | Reference |
|---|---|
| RD1 | Welsh Government, 2016, Planning Policy Wales, Edition 9. |
| RD2 | Welsh Government, 2010, Climate Change Strategy for Wales. |
| RD3 | Horizon Nuclear Power Limited, 2017, Horizon Corporate Sustainability Policy. |
| RD4 | Office for Nuclear Regulation, 1999, Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations. |
| RD5 | Horizon Nuclear Power Limited, 2017, Environmental Statement. (Application Reference Numbers: 6.1-6.11) |
| RD6 | Department for Business, Energy and Industrial Strategy, 2016, UK Provisional Greenhouse Gas Emissions. |
| RD7 | Committee on Climate Change, 2016, The Fifth Carbon Budget - How every household can help reduce the UK's carbon footprint. |
| RD8 | Horizon Nuclear Power Limited, 2016, Wylfa Newydd Project Planning Statement Framework. |
| RD9 | Planning Act 2008 (c.29). |
| RD10 | Department of Energy and Climate Change, 2011, National Policy Statement for Energy. |
| RD11 | Department of Energy and Climate Change, 2011, National Policy Statement for Nuclear Power Generation. |
| RD12 | Department of Energy and Climate Change, 2010, Appraisal of Sustainability: Site Report for Wylfa. |
| RD13 | Climate Change Act 2008 (c.27). |
| RD14 | Energy Act 2011 (c.16). |
| RD15 | Department for Environment Food and Rural Affairs, 2005, Securing the Future – The UK Government Sustainable Development Strategy. |
| RD16 | HM Government, 2009, The UK Low Carbon Transition Plan. |
| RD17 | Environment (Wales) Act 2016 (anaw. 3). |
| RD18 | Well-being of Future Generations (Wales) Act 2015 (anaw. 2). |
| RD19 | Welsh Government, 2016, Technical Advice Note 12: Design. |

| ID | Reference |
|---|---|
| RD20 | Welsh Assembly Government, 2006, Environment Strategy for Wales. |
| RD21 | Welsh Government, 2012, Energy Wales: A Low Carbon Transition. |
| RD22 | Welsh Government, 2014, Energy Wales: A Low Carbon Delivery Plan. |
| RD23 | Welsh Assembly Government, 2009, One Wales: One Planet – The Sustainable Development Scheme of the Welsh Assembly Government. |
| RD24 | Welsh Government, 2012, A Sustainable Wales Better Choices for a Better Future - Consultation on Proposals for a Sustainable Development Bill (White Paper on Sustainable Development). |
| RD25 | Isle of Anglesey County Council, 2017, Anglesey and Gwynedd Joint Local Development Plan. |
| RD26 | Isle of Anglesey County Council, 2014, Sustainability Appraisal for the New Nuclear Build at Wylfa: Supplementary Planning Guidance. |
| RD27 | Isle of Anglesey County Council, 2010, Energy Island Programme. |
| RD28 | Welsh Government, 2016, Taking Wales Forward: Welsh Government’s Well-being Objectives. |
| RD29 | World Business Council for Sustainable Development & World Resources Institute, 2001 (as amended), GHG Protocol. |
| RD30 | International Organization for Standardisation, 2006, ISO 14064:2006, Part 1: Greenhouse Gases - Part 1: Specification with Guidance at the Organisation Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals. |
| RD31 | International Organization for Standardisation, 2014, ISO/TS 14067:2014: Greenhouse Gases. Carbon Footprint of Products. Requirements and Guidelines for Quantification and Communication. |
| RD32 | Publicly Available Specification, 2011, PAS 2050:2011: Specification for the Assessment of the Life Cycle Greenhouse Gas Emissions of Goods and Services. |
| RD33 | Publicly Available Specification, 2014, PAS 2060:2014: Specification for the Demonstration of Carbon Neutrality. |
| RD34 | Publicly Available Specification, 2016, PAS 2080:2016: Carbon Management in Infrastructure. |

| ID | Reference |
|---|---|
| RD35 | British Standards Institute, 2011, BS EN 15978:2011: Sustainability of Construction Works. Assessment of Environmental Performance of Buildings. Calculation Method. |
| RD36 | British Standards Institute, 2006, BS EN ISO 14044:2006: Environmental Management. Life Cycle Assessment. Requirements and Guidelines. |
| RD37 | Horizon Nuclear Power Limited, 2017, Wylfa Newydd DCO Site Layout Plan (Application Reference Number: 6.6.1). |
| RD38 | Department for Business, Energy & Industrial Strategy, 2018, Updated Energy and Emissions Projections: 2017. |
| RD39 | Department for Environment, Food & Rural Affairs, 2017, Government Emission Conversion Factors. |
| RD40 | B.K. Sovacool, 2008, Energy Policy 36, Valuing the Greenhouse Gas Emissions from Nuclear Power: A Critical Survey. |
| RD41 | Horizon Nuclear Power Limited, 2017, Sustainability Statement (Application Reference Number: 8.17). |
| RD42 | Horizon Nuclear Power Limited, 2017, Wylfa Newydd Code of Construction Practice (Application Reference Numbers: 8.6). |
| RD43 | Horizon Nuclear Power Limited, 2017, Wylfa Newydd Code of Operation Practice. |
| RD44 | Horizon Nuclear Power Limited, 2017, Wylfa Newydd DCO Project Glossary. |
| RD45 | Welsh Government, 2014, Part L of the Building Regulations (Conservation of Fuel and Power), Cardiff: Welsh Government. |
| RD46 | Horizon Nuclear Power Limited, 2017, Mitigation Route Map (Application Reference Number: 8.14). |
| RD47 | Environmental Protection Department, 2008, Hazardous Landfill Waste Conversion Factor. |
| RD48 | HM Government, 2017, The Clean Growth Strategy. |

# Appendix 8-1 Footprinting Standards and Associated Guidance

### *GHG Protocol (2001)*

8.1.2 The Greenhouse Gas (GHG) Protocol (2001, as revised) [RD29] was developed by the World Resources Institute and World Business Council on Sustainable Development and set a global standard for how to measure, manage, and report GHG emissions. The specific standards are as follows:

- Corporate Accounting and Reporting Standard;
- Value Chain (Scope 3) Accounting and Reporting Standard;
- Product Life Cycle Accounting and Reporting Standard; and
- GHG Protocol for Project Accounting.

8.1.3 The Corporate Standard is for companies to quantify and report their direct and indirect operational GHG emissions, and the Scope 3 Standard is for companies to quantify and report their indirect emissions from their up and downstream supply chains. Consequently, together the Corporate and Scope 3 Standards provide the requirements and guidance for companies and other organizations to prepare and publicly report a GHG emissions inventory that includes the whole life cycle of their operations.

8.1.4 The Product Standard defines how to quantify and report GHG emissions and removals associated with individual products throughout their life cycle. The Project Accounting Protocol is a guide for quantifying reductions from GHG-mitigation projects.

### *ISO 14064:2006, Part 1: Greenhouse Gases - Part 1: Specification with Guidance at the Organisation Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals (2006)*

8.1.5 ISO 14064:2006 [RD 30] was developed by the International Organization for Standardization (ISO) and sets an international standard for quantification and reporting of GHG emissions and removals. It is split into two parts and specifies principles and requirements for quantification and reporting of GHG emissions and removals, as follows:

- Part 1: For organisations; and
- Part 2: For individual GHG emission reductions activities (projects).

### *ISO/TS 14067:2014: Greenhouse Gases. Carbon Footprint of Products. Requirements and Guidelines for Quantification and Communication (2014)*

8.1.6 ISO/TS 14067:2014 [RD31] was prepared by the ISO and approved by European Committee for Standardization and sets the requirements and guidelines for quantification and communication of carbon footprints for products.

### *PAS 2050:2011: Specification for the Assessment of the Life Cycle Greenhouse Gas Emissions of Goods and Services and PAS 2060:2014: Specification for the Demonstration of Carbon Neutrality (2014)*

8.1.7 Publicly Available Specifications (PAS) are produced by the British Standards Institution (BSI), and PAS 2050 and 2060 are the two specifications that relate to carbon footprinting, as summarised below:

- PAS 2050:2011: for the assessment of the life cycle GHG emissions of goods and services [RD32]; and
- PAS 2060:2014: for demonstration of carbon neutrality [RD33].

### *PAS 2080:2016: Carbon Management in Infrastructure (2016)*

8.1.8 The PAS 2080:2016 [RD34] Carbon Management in Infrastructure technical standard builds on the Infrastructure Carbon Review (published by HM Treasury in 2013) to provide guidance for all parties involved (as stated below) on development of low carbon infrastructure projects. It sets out a comprehensive carbon management process for infrastructure developments.

8.1.9 PAS 2080:2016 [RD34] is intended to be applied to all parties across the supply (value) chain including: owner/ manager; designers; constructors; and product materials suppliers. Specifically, it requires that the asset owner/ manager set the carbon strategy for the project in question and all parties across the supply chain buy into the implementation of the strategy. Furthermore, it sets out requirements for all value chain members under a range of headings including:

- Section 5 – Leadership and Governance;
- Section 6 – Carbon Management Process;
- Section 7 – Quantification;
- Section 8 – Targets, Baseline and Monitoring;
- Section 9 – Reporting;
- Section 10 – Continual Improvement; and
- Section 11 – Assessment of Carbon Reductions.

### *BS EN 15978:2011: Sustainability of Construction Works. Assessment of Environmental Performance of Buildings. Calculation Method (2011)*

8.1.10 BS EN 15978:2011 [RD35] is the calculation method for the assessment of environmental performance of buildings and was prepared by Technical Committee CEN/TC 350 "Sustainability of Construction Works", the secretariat of which is held by AFNOR, and it was published by the BSI.

8.1.11 Specifically, it defines the calculation method, based on Life Cycle Assessment (LCA) and other quantified environmental information, to assess the environmental performance of a building, and gives the means for the reporting and communication of the outcome of the assessment. It is applicable to new and existing buildings and refurbishment projects.

### *BS EN ISO 14044:2006: Environmental Management. Life Cycle Assessment. Requirements and Guidelines (2006)*

8.1.12 BS EN ISO 14044:2006 [RD36] was developed by ISO and specifies generic requirements and guidelines for life cycle assessment (LCA) studies and inventories.

# Appendix 8-2 Carbon Footprint

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**Project Name:** Wylfa Newydd Carbon Footprint

**Print Date:** 06/02/2018

**Project Notes:** None

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Wylfa Newydd Carbon Footprint | | | | |
| Construction | | 3,496,402,774 | 3,496,402,774 | 3,496,402,774 |
| Power Station Site | | 3,271,628,969 | 3,271,628,969 | 3,271,628,969 |
| Materials | | 2,084,618,380 | 2,084,618,380 | 2,084,618,380 |
| Batching Plant | 55,083 tonnes | 89 | 4,902,387 | 4,902,387 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 4,902,387 |
| Security Fencing | 450 tonnes | 1,950 | 877,500 | 877,500 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 877,500 |
| Pre-Cast Units | 299,640 tonnes | 89 | 26,667,960 | 26,667,960 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 26,667,960 |
| Temporary Offices | 504 tonnes | 0 | 0 | 0 |
| Non AIL Equipment | 9,116 tonnes | 1,950 | 17,776,200 | 17,776,200 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 17,776,200 |
| AIL Equipment | 51,975 tonnes | 1,950 | 101,351,250 | 101,351,250 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 101,351,250 |
| Circulation Water Piping | 26,639 tonnes | 2,520 | 67,130,280 | 67,130,280 |
| HDPE - Pipe<br>Carbon Factor Value: 2.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 2,520 | 2,520 | 67,130,280 |
| Piping (Large Bore) | 9,645 tonnes | 2,520 | 24,305,400 | 24,305,400 |
| HDPE - Pipe<br>Carbon Factor Value: 2.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 2,520 | 2,520 | 24,305,400 |
| Piping (Small Bore) | 308 tonnes | 2,520 | 776,160 | 776,160 |
| HDPE - Pipe<br>Carbon Factor Value: 2.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 2,520 | 2,520 | 776,160 |
| Valves | 2,712 tonnes | 1,930 | 5,234,160 | 5,234,160 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 1,930 | 1,930 | 5,234,160 |
| Large Bore Piping Support | 2,105 tonnes | 1,930 | 4,062,650 | 4,062,650 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 1,930 | 1,930 | 4,062,650 |
| Small Bore Piping Support | 318 tonnes | 1,930 | 613,740 | 613,740 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 1,930 | 1,930 | 613,740 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Panel | 5,153 tonnes | 3,310 | 17,056,430 | 17,056,430 |
| Plastic - General<br>Carbon Factor Value: 3.31 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 3,310 | 3,310 | 17,056,430 |
| Instrument Rack | 293 tonnes | 1,950 | 571,350 | 571,350 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 571,350 |
| Cable Tray | 3,831 tonnes | 3,310 | 12,680,610 | 12,680,610 |
| Plastic - General<br>Carbon Factor Value: 3.31 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 3,310 | 3,310 | 12,680,610 |
| Conduit | 966 tonnes | 3,310 | 3,197,460 | 3,197,460 |
| Plastic - General<br>Carbon Factor Value: 3.31 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 3,310 | 3,310 | 3,197,460 |
| Cable Grounding Wire | 3,241 tonnes | 840 | 2,722,440 | 2,722,440 |
| Copper - EU Tube & Sheet - Recylced<br>Carbon Factor Value: 0.84 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 840 | 840 | 2,722,440 |
| Instrumentation Pipe | 1,481 tonnes | 2,520 | 3,732,120 | 3,732,120 |
| HDPE - Pipe<br>Carbon Factor Value: 2.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 2,520 | 2,520 | 3,732,120 |
| HVAC Equipment | 525 tonnes | 1,950 | 1,023,750 | 1,023,750 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 1,023,750 |
| Duct | 4,664 tonnes | 1,950 | 9,094,800 | 9,094,800 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 9,094,800 |
| Main Exhaust Duct | 218 tonnes | 1,950 | 425,100 | 425,100 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 425,100 |
| HVAC Piping | 510 tonnes | 1,950 | 994,500 | 994,500 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 994,500 |
| HVAC Piping Support | 271 tonnes | 1,950 | 528,450 | 528,450 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 528,450 |
| Operation Platform | 2,114 tonnes | 1,950 | 4,122,300 | 4,122,300 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 4,122,300 |
| Lifting Fixture | 237 tonnes | 1,950 | 462,150 | 462,150 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 462,150 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Concrete | 3,522,941 tonnes | 89 | 313,541,749 | 313,541,749 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 313,541,749 |
| Rebar | 461,593 tonnes | 1,860 | 858,562,980 | 858,562,980 |
| Steel - Bar and Rod - World Average Recycled Content<br>Carbon Factor Value: 1.86 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,860 | 1,860 | 858,562,980 |
| Steel Building Truss | 2,415 tonnes | 1,860 | 4,491,900 | 4,491,900 |
| Steel - Bar and Rod - World Average Recycled Content<br>Carbon Factor Value: 1.86 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,860 | 1,860 | 4,491,900 |
| Structural Steel | 46,447 tonnes | 1,950 | 90,571,650 | 90,571,650 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 90,571,650 |
| Scaffolding | 29,952 tonnes | 1,860 | 55,710,720 | 55,710,720 |
| Steel - Bar and Rod - World Average Recycled Content<br>Carbon Factor Value: 1.86 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,860 | 1,860 | 55,710,720 |
| Plywood | 59,194 tonnes | 1,100 | 65,113,400 | 65,113,400 |
| Plywood - General<br>Carbon Factor Value: 1.1 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK, Germany<br>Mass: 1,000 kg | | 1,100 | 1,100 | 65,113,400 |
| Building Fixtures | 4,080 tonnes | 1,950 | 7,956,000 | 7,956,000 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 7,956,000 |
| Rubble and Hardcore | 14,983 tonnes | 5.2 | 77,912 | 77,912 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 77,912 |
| Brick and Blockwork | 27,554 tonnes | 240 | 6,612,960 | 6,612,960 |
| Bricks - General<br>Carbon Factor Value: 0.24 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 240 | 240 | 6,612,960 |
| Tiles & Ceramics | 551 tonnes | 590 | 325,090 | 325,090 |
| Ceramics - Tile<br>Carbon Factor Value: 0.59 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 590 | 590 | 325,090 |
| Glass | 172 tonnes | 1,350 | 232,200 | 232,200 |
| Glass - Toughened<br>Carbon Factor Value: 1.35 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 1,350 | 1,350 | 232,200 |
| Ferrous Metal | 103,328 tonnes | 1,950 | 201,489,600 | 201,489,600 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 201,489,600 |
| Non Ferrous Metal | 1,722 tonnes | 840 | 1,446,480 | 1,446,480 |
| Copper - EU Tube & Sheet - Recycled<br>Carbon Factor: Copper - EU Tube & Sheet - Recylced Value: 0.84 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 840 | 840 | 1,446,480 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Gypsum | 3,446 tonnes | 130 | 447,980 | 447,980 |
| Plaster (Gypsum) - General<br>Carbon Factor Value: 0.13 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 130 | 130 | 447,980 |
| Timber | 2,067 tonnes | 720 | 1,488,240 | 1,488,240 |
| Timber - General<br>Carbon Factor Value: 0.72 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 720 | 720 | 1,488,240 |
| Binder | 477 tonnes | 76 | 36,252 | 36,252 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 36,252 |
| Chippings | 699 tonnes | 17 | 11,883 | 11,883 |
| Stone - Gravel/Chippings<br>Carbon Factor Value: 0.017 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 17 | 17 | 11,883 |
| Thin Surface Course Systems (TSCS)<br>Mass: 1,000 kg | 6,989 tonnes | 41 | 283,753 | 283,753 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 2.6 | 2.6 | 18,171 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 38 | 38 | 265,582 |
| Binder Course | 10,524 tonnes | 76 | 799,824 | 799,824 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 799,824 |
| Type 1 Granular Fill | 41,868 tonnes | 5.2 | 217,714 | 217,714 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 217,714 |
| Drainage Granular Fill | 3,033 tonnes | 5.2 | 15,772 | 15,772 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 15,772 |
| Food | 44,182 tonnes | 3,400 | 150,218,800 | 150,218,800 |
| Total Carbon Footprint of Household Food Consumption in the UK (Excluding Waste)<br>Carbon Factor Value: 3.4 kgCO2e/kg<br>Property Calculation: 1,000 kg<br>Source: A New Source Region: UK | 1,000 kg | 3.4 | 3,400 | 150,218,800 |
| Tools/ Equipment | 24,513 tonnes | 0 | 0 | 0 |
| Office/ Cleaning Supplies | 2,451 tonnes | 1,685 | 4,129,935 | 4,129,935 |
| Paper - Finepaper<br>Carbon Factor Value: 1.58 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 700 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 70 % Mass: 1,000 kg | | 1,106 | 1,106 | 2,710,806 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 300 kg<br>Source: Bath ICE (2.0) Region: Europe<br>% Composition: 30 % Mass: 1,000 kg | | 579 | 579 | 1,419,129 |
| Small Deliveries | 5,426 tonnes | 1,940 | 10,526,440 | 10,526,440 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: Europe<br>% Composition: 50 % Mass: 1,000 kg | | 965 | 965 | 5,236,090 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: Global<br>% Composition: 50 % Mass: 1,000 kg | | 975 | 975 | 5,290,350 |
| Transport | | 54,354,714 | 54,354,714 | 54,354,714 |
| Batching Plant | 55,083 tonnes | 35 | 1,919,422 | 1,919,422 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,919,422 |
| Security Fencing | 450 tonnes | 35 | 15,681 | 15,681 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 15,681 |
| Pre-Cast Units | 299,640 tonnes | 0.84 | 250,499 | 250,499 |
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 0.84 | 0.84 | 250,499 |
| Temporary Offices | 504 tonnes | 35 | 17,562 | 17,562 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 17,562 |
| Non AIL Equipment | 9,116 tonnes | 35 | 317,656 | 317,656 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 317,656 |
| AIL Equipment | 51,975 tonnes | 38 | 1,998,751 | 1,998,751 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 9,200 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 18,400 km Weight: 0.5 tonne | | 38 | 38 | 1,998,751 |
| Circulation Water Piping | 26,639 tonnes | 35 | 928,263 | 928,263 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 928,263 |
| Piping (Large Bore) | 9,645 tonnes | 35 | 336,090 | 336,090 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 336,090 |
| Piping (Small Bore) | 308 tonnes | 35 | 10,733 | 10,733 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 10,733 |
| Valves | 2,712 tonnes | 35 | 94,502 | 94,502 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 94,502 |
| Large Bore Piping Support | 2,105 tonnes | 35 | 73,351 | 73,351 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 73,351 |
| Small Bore Piping Support | 318 tonnes | 35 | 11,081 | 11,081 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 11,081 |
| Panel | 5,153 tonnes | 35 | 179,561 | 179,561 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 179,561 |
| Instrument Rack | 293 tonnes | 35 | 10,210 | 10,210 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 10,210 |
| Cable Tray | 3,831 tonnes | 35 | 133,495 | 133,495 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 133,495 |
| Conduit | 966 tonnes | 35 | 33,661 | 33,661 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 33,661 |
| Cable Grounding Wire | 3,241 tonnes | 35 | 112,936 | 112,936 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 112,936 |
| Instrumentation Pipe | 1,481 tonnes | 35 | 51,607 | 51,607 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 51,607 |
| HVAC Equipment | 525 tonnes | 35 | 18,294 | 18,294 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 18,294 |
| Duct | 4,664 tonnes | 35 | 162,522 | 162,522 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 162,522 |
| Main Exhaust Duct | 218 tonnes | 35 | 7,596 | 7,596 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 7,596 |
| HVAC Piping | 510 tonnes | 35 | 17,771 | 17,771 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 17,771 |
| HVAC Piping Support | 271 tonnes | 35 | 9,443 | 9,443 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 9,443 |
| Operation Platform | 2,114 tonnes | 35 | 73,664 | 73,664 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 73,664 |
| Lifting Fixture | 237 tonnes | 35 | 8,259 | 8,259 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 8,259 |
| Concrete | 3,522,941 tonnes | 7.7 | 27,219,743 | 27,219,743 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 40.52 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.1013 tonne | | 7.1 | 7.1 | 24,871,257 |
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 159.48 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 400 km Weight: 0.3987 tonne | | 0.67 | 0.67 | 2,348,485 |
| Rebar | 461,593 tonnes | 8.3 | 3,828,634 | 3,828,634 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 43.86 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.10965 tonne | | 7.6 | 7.6 | 3,527,368 |
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 156.14 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 400 km Weight: 0.39035 tonne | | 0.65 | 0.65 | 301,266 |
| Steel Building Truss | 2,415 tonnes | 0.84 | 2,019 | 2,019 |
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 0.84 | 0.84 | 2,019 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Structural Steel | 46,447 tonnes | 35 | 1,618,492 | 1,618,492 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,618,492 |
| Scaffolding | 29,952 tonnes | 35 | 1,043,707 | 1,043,707 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,043,707 |
| Plywood | 59,194 tonnes | 35 | 2,062,674 | 2,062,674 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 2,062,674 |
| Building Fixtures | 4,080 tonnes | 35 | 142,172 | 142,172 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 142,172 |
| Rubble and Hardcore | 14,983 tonnes | 35 | 522,098 | 522,098 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 522,098 |
| Brick and Blockwork | 27,554 tonnes | 35 | 960,147 | 960,147 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 960,147 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Tiles & Ceramics | 551 tonnes | 35 | 19,200 | 19,200 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 19,200 |
| Glass | 172 tonnes | 35 | 5,994 | 5,994 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 5,994 |
| Ferrous Metal | 103,328 tonnes | 35 | 3,600,567 | 3,600,567 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 3,600,567 |
| Non Ferrous Metal | 1,722 tonnes | 35 | 60,005 | 60,005 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 60,005 |
| Gypsum | 3,446 tonnes | 35 | 120,079 | 120,079 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 120,079 |
| Timber | 2,067 tonnes | 35 | 72,027 | 72,027 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 72,027 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Binder | 477 tonnes | 35 | 16,622 | 16,622 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 16,622 |
| Chippings | 699 tonnes | 35 | 24,357 | 24,357 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 24,357 |
| Thin Surface Course Systems (TSCS) | 6,989 tonnes | 35 | 243,539 | 243,539 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 243,539 |
| Binder Course | 10,524 tonnes | 35 | 366,719 | 366,719 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 366,719 |
| Type 1 Granular Fill | 41,868 tonnes | 35 | 1,458,932 | 1,458,932 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,458,932 |
| Drainage Granular Fill | 3,033 tonnes | 35 | 105,688 | 105,688 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 105,688 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Food | 44,182 tonnes | 35 | 1,539,566 | 1,539,566 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,539,566 |
| Tools/ Equipment | 24,513 tonnes | 35 | 854,180 | 854,180 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 854,180 |
| Office/ Cleaning Supplies | 2,451 tonnes | 35 | 85,408 | 85,408 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 85,408 |
| Small Deliveries | 5,426 tonnes | 35 | 189,074 | 189,074 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 189,074 |
| Off-Site Waste Construction | 40,190 tonnes | 35 | 1,400,461 | 1,400,461 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,400,461 |
| Waste | | 56,266 | 56,266 | 56,266 |
| Disposal Waste Construction | 40,190 tonnes | 1.4 | 56,266 | 56,266 |
| Landfill Inert<br>Carbon Factor Value: 1.4 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 1.4 | 1.4 | 56,266 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Energy / Fuel Use | | 1,121,352,886 | 1,121,352,886 | 1,121,352,886 |
| Tunnelling and Outfall | | 44,571,156 | 44,571,156 | 44,571,156 |
| Twin Mast Drilling Jumbo | 5,736 hours | 82 | 467,943 | 467,943 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 467,943 |
| Basket Lifters (2) | 20,649 hours | 82 | 1,684,545 | 1,684,545 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 1,684,545 |
| Tunnel Excavator/Loader Per Tunnel | 2,868 hours | 140 | 400,086 | 400,086 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 400,086 |
| Articulated Dump Truck Per Tunnel | 3,059 hours | 199 | 609,353 | 609,353 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 609,353 |
| Shotcrete Robot Per Tunnel | 3,441 hours | 58 | 200,266 | 200,266 |
| Diesel Engine - 70kW / 94.5hp<br>Carbon Factor Value: 58.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 58 | 58 | 200,266 |
| Concrete Remixer Trucks Per Tunnel (4) | 13,766 hours | 58 | 801,181 | 801,181 |
| Diesel Engine - 70kW / 94.5hp<br>Carbon Factor Value: 58.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 58 | 58 | 801,181 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Sandvik Roadheader | 7,571 hours | 438 | 3,318,369 | 3,318,369 |
| Diesel Engine - 550kW / 742.5hp<br>Carbon Factor Value: 438.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 438 | 438 | 3,318,369 |
| Tracked Excavator >30T | 55,407 hours | 120 | 6,621,137 | 6,621,137 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 6,621,137 |
| Articulated Dump Truck >30T | 13,551 hours | 199 | 2,699,359 | 2,699,359 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 2,699,359 |
| Tractor Track | 5,047 hours | 399 | 2,011,230 | 2,011,230 |
| Diesel Engine - 500kW / 675hp<br>Carbon Factor Value: 398.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 399 | 399 | 2,011,230 |
| Diesel Generator | 20,075 hours | 359 | 7,198,895 | 7,198,895 |
| Diesel Engine - 450kW / 607.5hp<br>Carbon Factor Value: 358.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 359 | 359 | 7,198,895 |
| Ventilation Fan 75kW:1219mm dia | 36,135 hours | 23 | 848,269 | 848,269 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 75 kW<br>Source: A New Source Region: UK | 75 kW | 0.31 | 23 | 848,269 |
| Ventilation Fan 110kW:900mm dia | 36,135 hours | 34 | 1,244,128 | 1,244,128 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 110 kW<br>Source: A New Source Region: UK | 110 kW | 0.31 | 34 | 1,244,128 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Pump Electric Submersible | 72,270 hours | 3.4 | 248,826 | 248,826 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 11 kW<br>Source: A New Source Region: UK | 11 kW | 0.31 | 3.4 | 248,826 |
| Compressor | 21,681 hours | 17 | 373,238 | 373,238 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 55 kW<br>Source: A New Source Region: UK | 55 kW | 0.31 | 17 | 373,238 |
| Concrete Pump Trailer | 16,261 hours | 23 | 381,727 | 381,727 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 75 kW<br>Source: A New Source Region: UK | 75 kW | 0.31 | 23 | 381,727 |
| Concrete Remixer Agitators (2) | 22,283 hours | 3.8 | 83,695 | 83,695 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 12 kW<br>Source: A New Source Region: UK | 12 kW | 0.31 | 3.8 | 83,695 |
| Loader Wheel Caterpillar | 14,454 hours | 140 | 2,016,333 | 2,016,333 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 2,016,333 |
| Tracked Mobile Crawler Crane | 4,517 hours | 199 | 899,786 | 899,786 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 899,786 |
| Telescopic Leader Rig (Hydraulic Vibratory Hammer) | 4,517 hours | 319 | 1,440,020 | 1,440,020 |
| Diesel Engine - 400kW / 540hp<br>Carbon Factor Value: 318.8 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 319 | 319 | 1,440,020 |
| Tractor | 4,517 hours | 73 | 331,638 | 331,638 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Diesel Engine - 90kW / 121.5hp<br>Carbon Factor Value: 73.42 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 73 | 73 | 331,638 |
| Rock Wheel Cutter | 3,915 hours | 359 | 1,403,919 | 1,403,919 |
| Diesel Engine - 450kW / 607.5hp<br>Carbon Factor Value: 358.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 359 | 359 | 1,403,919 |
| Crane 200t | 3,915 hours | 199 | 779,868 | 779,868 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 779,868 |
| Compressor (180 CFM) | 3,915 hours | 9.4 | 36,762 | 36,762 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 30 kW<br>Source: A New Source Region: UK | 30 kW | 0.31 | 9.4 | 36,762 |
| Pumps Electric Submerged | 13,049 hours | 12 | 151,120 | 151,120 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 37 kW<br>Source: A New Source Region: UK | 37 kW | 0.31 | 12 | 151,120 |
| Generator | 7,528 hours | 717 | 5,399,834 | 5,399,834 |
| Diesel Engine - 900kW / 1215hp<br>Carbon Factor Value: 717.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 717 | 717 | 5,399,834 |
| Concrete Pump Trailer | 6,023 hours | 6.6 | 39,589 | 39,589 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 21 kW<br>Source: A New Source Region: UK | 21 kW | 0.31 | 6.6 | 39,589 |
| Truck Mixer | 18,068 hours | 159 | 2,880,039 | 2,880,039 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 2,880,039 |
| Marine | | 174,882,426 | 174,882,426 | 174,882,426 |
| 110t Long Reach Excavator | 1,434 hours | 438 | 628,522 | 628,522 |
| Diesel Engine - 550kW / 742.5hp<br>Carbon Factor Value: 438.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 438 | 438 | 628,522 |
| Backhoe Dredger (2) | 10,539 hours | 1,275 | 13,437,647 | 13,437,647 |
| Diesel Engine - 1000kW / 1350hp<br>Carbon Factor Value: 796.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1.6 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1.6 hr | | 1,275 | 1,275 | 13,437,647 |
| Jack Up Barges (4) | 26,155 hours | 82 | 2,133,725 | 2,133,725 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 2,133,725 |
| 70t Excavator | 8,905 hours | 279 | 2,483,605 | 2,483,605 |
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 2,483,605 |
| 40t Artic Dump Truck | 28,779 hours | 279 | 8,026,463 | 8,026,463 |
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 8,026,463 |
| BG 42 Rotary Drill | 903 hours | 438 | 395,785 | 395,785 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 550kW / 742.5hp<br>Carbon Factor Value: 438.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 438 | 438 | 395,785 |
| 45t Excavator | 5,936 hours | 239 | 1,419,298 | 1,419,298 |
| Diesel Engine - 300kW / 405hp<br>Carbon Factor Value: 239.1 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 239 | 239 | 1,419,298 |
| 60t Excavators (2) | 6,582 hours | 359 | 2,360,305 | 2,360,305 |
| Diesel Engine - 450kW / 607.5hp<br>Carbon Factor Value: 358.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 359 | 359 | 2,360,305 |
| 250t Crawler Cranes (2) | 8,795 hours | 199 | 1,751,964 | 1,751,964 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 1,751,964 |
| 150t Crawler Crane | 4,001 hours | 199 | 796,999 | 796,999 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 796,999 |
| Compressor and Tools | 21,939 hours | 9.4 | 206,007 | 206,007 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 30 kW<br>Source: A New Source Region: UK | 30 kW | 0.31 | 9.4 | 206,007 |
| 90t Crawler Crane | 2,323 hours | 199 | 462,742 | 462,742 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 462,742 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| 300t Crawler Crane | 2,452 hours | 279 | 683,863 | 683,863 |
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 683,863 |
| Drill and Blast Rigs (2) | 8,905 hours | 179 | 1,596,667 | 1,596,667 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 1,596,667 |
| 35t Excavator | 8,388 hours | 179 | 1,503,968 | 1,503,968 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 1,503,968 |
| 30t Arctic Dump Truck | 3,614 hours | 239 | 864,107 | 864,107 |
| Diesel Engine - 300kW / 405hp<br>Carbon Factor Value: 239.1 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 239 | 239 | 864,107 |
| 70t Crawler Crane | 645 hours | 159 | 102,813 | 102,813 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 102,813 |
| Leader Rig | 387 hours | 319 | 123,376 | 123,376 |
| Diesel Engine - 400kW / 540hp<br>Carbon Factor Value: 318.8 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 319 | 319 | 123,376 |
| Transport Barge | 13,250 hours | 1,195 | 15,838,388 | 15,838,388 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Diesel Engine - 1000kW / 1350hp<br>Carbon Factor Value: 796.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1.5 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1.5 hr | | 1,195 | 1,195 | 15,838,388 |
| Tug Holyhead Towing | 13,565 hours | 3,347 | 45,401,784 | 45,401,784 |
| Diesel Engine - 1000kW / 1350hp<br>Carbon Factor Value: 796.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 4.2 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 4.2 hr | | 3,347 | 3,347 | 45,401,784 |
| 200mm Pumps (Electric Submersible) | 8,905 hours | 12 | 103,129 | 103,129 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 37 kW<br>Source: A New Source Region: UK | 37 kW | 0.31 | 12 | 103,129 |
| Vibratory Screen | 1,936 hours | 82 | 157,939 | 157,939 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 157,939 |
| Loader Wheeled | 1,936 hours | 140 | 270,072 | 270,072 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 270,072 |
| Safety Boat | 789 hours | 65 | 51,490 | 51,490 |
| Diesel Engine - 80kW / 108hp<br>Carbon Factor Value: 65.26 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 65 | 65 | 51,490 |
| Multicat MTS Vector Work Boat | 3,943 hours | 717 | 2,828,314 | 2,828,314 |
| Diesel Engine - 900kW / 1215hp<br>Carbon Factor Value: 717.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 717 | 717 | 2,828,314 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Split Hopper Barge | 15,773 hours | 1,474 | 23,253,582 | 23,253,582 |
| Diesel Engine - 1000kW / 1350hp<br>Carbon Factor Value: 796.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1.85 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1.85 hr | | 1,474 | 1,474 | 23,253,582 |
| Mobile Elevating Work Platform | 1,226 hours | 30 | 36,216 | 36,216 |
| Diesel Engine - 35kW / 47.25hp<br>Carbon Factor Value: 29.54 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 30 | 30 | 36,216 |
| Mobile Concrete Pump | 710 hours | 179 | 127,303 | 127,303 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 127,303 |
| Tractor and Trailer | 14,454 hours | 73 | 1,061,213 | 1,061,213 |
| Diesel Engine - 90kW / 121.5hp<br>Carbon Factor Value: 73.42 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 73 | 73 | 1,061,213 |
| Diesel Generators | 39,003 hours | 42 | 1,621,355 | 1,621,355 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 1,621,355 |
| Cutter Suction Dredger | 2,294 hours | 19,683 | 45,153,788 | 45,153,788 |
| Diesel Engine - 1000kW / 1350hp<br>Carbon Factor Value: 796.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 24.7 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 24.7 hr | | 19,683 | 19,683 | 45,153,788 |
| Concrete Production, Distribution and Placing | | 66,985,554 | 66,985,554 | 66,985,554 |
| Batching Plant 200m3/Hr | 66,248 hours | 47 | 3,110,344 | 3,110,344 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 150 kW<br>Source: A New Source Region: UK | 150 kW | 0.31 | 47 | 3,110,344 |
| Cement Silo | 264,990 hours | 4.7 | 1,244,128 | 1,244,128 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 15 kW<br>Source: A New Source Region: UK | 15 kW | 0.31 | 4.7 | 1,244,128 |
| Batching Plant 40m3/HR | 33,726 hours | 25 | 844,499 | 844,499 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 80 kW<br>Source: A New Source Region: UK | 80 kW | 0.31 | 25 | 844,499 |
| Generator | 5,521 hours | 638 | 3,520,190 | 3,520,190 |
| Diesel Engine - 800kW / 1080hp<br>Carbon Factor Value: 637.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 638 | 638 | 3,520,190 |
| Loader Wheel | 33,726 hours | 120 | 4,030,257 | 4,030,257 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 4,030,257 |
| Concrete Reclaimer | 33,726 hours | 2.5 | 84,450 | 84,450 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 8 kW<br>Source: A New Source Region: UK | 8 kW | 0.31 | 2.5 | 84,450 |
| Compressors Electric 812cfm (2) | 132,495 hours | 3.1 | 414,709 | 414,709 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 10 kW<br>Source: A New Source Region: UK | 10 kW | 0.31 | 3.1 | 414,709 |
| Concrete Pump Trailer | 99,974 hours | 6.6 | 657,129 | 657,129 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 21 kW<br>Source: A New Source Region: UK | 21 kW | 0.31 | 6.6 | 657,129 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Concrete Remixer Agitator | 99,974 hours | 3.8 | 375,502 | 375,502 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 12 kW<br>Source: A New Source Region: UK | 12 kW | 0.31 | 3.8 | 375,502 |
| Truck Mixers (3) | 298,716 hours | 159 | 47,615,330 | 47,615,330 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 47,615,330 |
| Distributor Booms (5) | 596,228 hours | 1.6 | 933,097 | 933,097 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 5 kW<br>Source: A New Source Region: UK | 5 kW | 0.31 | 1.6 | 933,097 |
| Compressor Diesel 180cfm | 99,974 hours | 42 | 4,155,919 | 4,155,919 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 4,155,919 |
| Cut and Bend Reinforcement, Couplers and Distribution | | 40,264,767 | 40,264,767 | 40,264,767 |
| Integrated Rebar Cutting | 17,245 hours | 78 | 1,349,421 | 1,349,421 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 250 kW<br>Source: A New Source Region: UK | 250 kW | 0.31 | 78 | 1,349,421 |
| Tower Crane | 34,491 hours | 25 | 863,655 | 863,655 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 80 kW<br>Source: A New Source Region: UK | 80 kW | 0.31 | 25 | 863,655 |
| Tractor Unit | 68,982 hours | 73 | 5,064,658 | 5,064,658 |
| Diesel Engine - 90kW / 121.5hp<br>Carbon Factor Value: 73.42 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 73 | 73 | 5,064,658 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Artic Flat Trailer | 206,945 hours | 159 | 32,987,033 | 32,987,033 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 32,987,033 |
| Craneage | | 182,858,840 | 182,858,840 | 182,858,840 |
| Cranes:Tower:Saddle Jib:6t@40m:Liebherr 250EC-B12:35m UH (8) | 185,493 hours | 31 | 5,805,931 | 5,805,931 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 100 kW<br>Source: A New Source Region: UK | 100 kW | 0.31 | 31 | 5,805,931 |
| Cranes:Tower:Saddle Jib:4.5t@25m:Liebherr 110EC-6BFR:27m (16) | 385,440 hours | 25 | 9,651,418 | 9,651,418 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 80 kW<br>Source: A New Source Region: UK | 80 kW | 0.31 | 25 | 9,651,418 |
| Cranes:Tower:Saddle Jib:Liebherr 630HC-H40:55m UH (4) | 96,360 hours | 31 | 3,016,068 | 3,016,068 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 100 kW<br>Source: A New Source Region: UK | 100 kW | 0.31 | 31 | 3,016,068 |
| Cranes:Tower:Saddle Jib:Liebherr 550HC-H20:60m UH (2) | 56,612 hours | 31 | 1,771,956 | 1,771,956 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 100 kW<br>Source: A New Source Region: UK | 100 kW | 0.31 | 31 | 1,771,956 |
| Cranes:Tower:Saddle Jib:6t@40m:Max 25t:Potain MD 485:60m UH (2) | 56,612 hours | 31 | 1,771,956 | 1,771,956 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 100 kW<br>Source: A New Source Region: UK | 100 kW | 0.31 | 31 | 1,771,956 |
| Cranes:Tower:Saddle Jib:Liebherr 380EC-B12:45m UH (6) | 137,715 hours | 31 | 4,310,480 | 4,310,480 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 100 kW<br>Source: A New Source Region: UK | 100 kW | 0.31 | 31 | 4,310,480 |
| Cranes:Tower:Saddle Jib:Liebherr 1000HC-H40:35m UH (2) | 56,612 hours | 31 | 1,771,956 | 1,771,956 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 100 kW<br>Source: A New Source Region: UK | 100 kW | 0.31 | 31 | 1,771,956 |
| Cranes:Crawler:100t:Manitowoc MTW12000:Lattice Boom (6) | 247,726 hours | 199 | 49,347,019 | 49,347,019 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 49,347,019 |
| Cranes: Rough Terrain: 90t (2) | 214,401 hours | 199 | 42,708,679 | 42,708,679 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 42,708,679 |
| Cranes: All Terrain: 30t (2) | 314,776 hours | 199 | 62,703,379 | 62,703,379 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 62,703,379 |
| Structures Access | | 2,491,714 | 2,491,714 | 2,491,714 |
| Hoists Goods/Passenger (5) | 322,003 hours | 5.3 | 1,713,378 | 1,713,378 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 17 kW<br>Source: A New Source Region: UK | 17 kW | 0.31 | 5.3 | 1,713,378 |
| Access Platforms 13 - 20m Telescopic (2) | 91,542 hours | 6.8 | 622,669 | 622,669 |
| Diesel Engine - 8kW / 10.8hp<br>Carbon Factor Value: 6.802 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 6.8 | 6.8 | 622,669 |
| Access Platform 6m Scissor | 45,771 hours | 3.4 | 155,667 | 155,667 |
| Diesel Engine - 4kW / 5.4hp<br>Carbon Factor Value: 3.401 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 3.4 | 3.4 | 155,667 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Site Logistics and General | | 140,712,657 | 140,712,657 | 140,712,657 |
| Workman's Buses (3) | 402,217 hours | 159 | 64,113,390 | 64,113,390 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 64,113,390 |
| Pick Up | 111,273 hours | 102 | 11,349,846 | 11,349,846 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 11,349,846 |
| Van | 111,273 hours | 65 | 7,261,676 | 7,261,676 |
| Diesel Engine - 80kW / 108hp<br>Carbon Factor Value: 65.26 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 65 | 65 | 7,261,676 |
| Forklift Rough Terrain | 223,693 hours | 42 | 9,298,918 | 9,298,918 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 9,298,918 |
| Telehandler | 223,693 hours | 58 | 13,018,933 | 13,018,933 |
| Diesel Engine - 70kW / 94.5hp<br>Carbon Factor Value: 58.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 58 | 58 | 13,018,933 |
| Agri Tractor | 77,432 hours | 73 | 5,685,057 | 5,685,057 |
| Diesel Engine - 90kW / 121.5hp<br>Carbon Factor Value: 73.42 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 73 | 73 | 5,685,057 |
| Flat Truck | 223,693 hours | 42 | 9,298,918 | 9,298,918 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 9,298,918 |
| Pump Electric Submersibles 50mm (2) | 1,300,860 hours | 0.31 | 407,169 | 407,169 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 1 kW<br>Source: A New Source Region: UK | 1 kW | 0.31 | 0.31 | 407,169 |
| Pump Electric Submersibles 150mm (2) | 1,404,103 hours | 6.3 | 8,789,685 | 8,789,685 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 20 kW<br>Source: A New Source Region: UK | 20 kW | 0.31 | 6.3 | 8,789,685 |
| Weighbridge | 27,245 hours | 1.6 | 42,638 | 42,638 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 5 kW<br>Source: A New Source Region: UK | 5 kW | 0.31 | 1.6 | 42,638 |
| Bowser Water Truck Mounted/ Road Sweeper Truck Mounted (2) | 95,786 hours | 120 | 11,446,427 | 11,446,427 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 11,446,427 |
| Landscaping | | 468,585,770 | 468,585,770 | 468,585,770 |
| Tracked Excavators 75t:352kW (6) | 120,718 hours | 279 | 33,668,250 | 33,668,250 |
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 33,668,250 |
| Tractor Tracks 442kW (4) | 35,542 hours | 399 | 14,163,487 | 14,163,487 |
| Diesel Engine - 500kW / 675hp<br>Carbon Factor Value: 398.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 399 | 399 | 14,163,487 |
| Artic Dump Trucks 39.5t (6) | 590,654 hours | 279 | 164,733,401 | 164,733,401 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 164,733,401 |
| Tractor Tracks 228kW (3) | 30,074 hours | 199 | 5,990,741 | 5,990,741 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 5,990,741 |
| Rollers Steel/Rubber 16t (3) | 27,971 hours | 102 | 2,853,042 | 2,853,042 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 2,853,042 |
| Compactor 32t (3) | 27,130 hours | 199 | 5,404,296 | 5,404,296 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 5,404,296 |
| Tractor Tracks 123kW (2) | 10,305 hours | 140 | 1,437,548 | 1,437,548 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 1,437,548 |
| Tracked Excavators 50t:317kW (5) | 46,058 hours | 239 | 11,012,468 | 11,012,468 |
| Diesel Engine - 300kW / 405hp<br>Carbon Factor Value: 239.1 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 239 | 239 | 11,012,468 |
| Graders 26t (2) | 12,619 hours | 199 | 2,513,705 | 2,513,705 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 2,513,705 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Drill Rigs (6) | 376,244 hours | 179 | 67,460,549 | 67,460,549 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 67,460,549 |
| ANFO Mixer Truck (2) | 18,928 hours | 159 | 3,017,123 | 3,017,123 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 3,017,123 |
| Explosives Transport Truck (2) | 18,928 hours | 159 | 3,017,123 | 3,017,123 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 3,017,123 |
| Cranes All Terrain (2) | 18,928 hours | 199 | 3,770,458 | 3,770,458 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 3,770,458 |
| Artic Dump Trucks 55t (2) | 94,850 hours | 359 | 34,013,210 | 34,013,210 |
| Diesel Engine - 450kW / 607.5hp<br>Carbon Factor Value: 358.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 359 | 359 | 34,013,210 |
| Excavators EX1900-6 (2) | 70,664 hours | 638 | 45,055,366 | 45,055,366 |
| Diesel Engine - 800kW / 1080hp<br>Carbon Factor Value: 637.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 638 | 638 | 45,055,366 |
| Excavators EX2500 (2) | 28,392 hours | 797 | 22,625,585 | 22,625,585 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 1000kW / 1350hp<br>Carbon Factor Value: 796.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 797 | 797 | 22,625,585 |
| Crushers and Screens (2) | 33,439 hours | 239 | 7,995,265 | 7,995,265 |
| Diesel Engine - 300kW / 405hp<br>Carbon Factor Value: 239.1 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 239 | 239 | 7,995,265 |
| Loader Wheels 966K (2) | 38,487 hours | 159 | 6,134,828 | 6,134,828 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 6,134,828 |
| Artic Dump Trucks 22.7t (3) | 76,342 hours | 199 | 15,207,326 | 15,207,326 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 15,207,326 |
| Screen Simba Grids 300 (2) | 38,487 hours | 199 | 7,666,610 | 7,666,610 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 7,666,610 |
| Loader Wheel 980K | 10,095 hours | 199 | 2,010,924 | 2,010,924 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 2,010,924 |
| Bowser Fuel Truck Mounted/ Mobile Workshop Lubrication Truck (2) | 66,247 hours | 120 | 7,916,517 | 7,916,517 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 7,916,517 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Tyre Truck | 22,082 hours | 42 | 917,949 | 917,949 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 917,949 |
| Water Use | | 11,246,724 | 11,246,724 | 11,246,724 |
| Water Use | 3,468 days | 2,550 | 8,843,400 | 8,843,400 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 2,550,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 2,550 m3 | | 2,550 | 2,550 | 8,843,400 |
| Waste Water Treatment | 3,468 days | 693 | 2,403,324 | 2,403,324 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 990 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 990 m3 | | 693 | 693 | 2,403,324 |
| Wylfa Newydd Development Area | | 135,733,928 | 135,733,928 | 135,733,928 |
| Site Campus | | 135,733,928 | 135,733,928 | 135,733,928 |
| Materials | | 48,202,173 | 48,202,173 | 48,202,173 |
| Concrete | 13,513 tonnes | 89 | 1,202,657 | 1,202,657 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 1,202,657 |
| Rubble & Hardcore | 3,266 tonnes | 5.2 | 16,983 | 16,983 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 16,983 |
| Brick & Blockwork | 6,006 tonnes | 240 | 1,441,440 | 1,441,440 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Bricks - General<br>Carbon Factor Value: 0.24 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 240 | 240 | 1,441,440 |
| Tiles & Ceramics | 120 tonnes | 590 | 70,800 | 70,800 |
| Ceramics - Tile<br>Carbon Factor Value: 0.59 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 590 | 590 | 70,800 |
| Glass | 38 tonnes | 1,350 | 51,300 | 51,300 |
| Glass - Toughened<br>Carbon Factor Value: 1.35 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 1,350 | 1,350 | 51,300 |
| Ferrous Metals | 22,521 tonnes | 1,950 | 43,915,950 | 43,915,950 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 43,915,950 |
| Non Ferrous Metals | 375 tonnes | 840 | 315,000 | 315,000 |
| Copper - EU Tube & Sheet - Recycled<br>Carbon Factor: Copper - EU Tube & Sheet - Recylced Value: 0.84 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 840 | 840 | 315,000 |
| Gypsum | 751 tonnes | 130 | 97,630 | 97,630 |
| Plaster (Gypsum) - General<br>Carbon Factor Value: 0.13 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 130 | 130 | 97,630 |
| Timber | 450 tonnes | 720 | 324,000 | 324,000 |
| Timber - General<br>Carbon Factor Value: 0.72 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 720 | 720 | 324,000 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Binder | 268 tonnes | 76 | 20,368 | 20,368 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 20,368 |
| Chippings | 393 tonnes | 17 | 6,681 | 6,681 |
| Stone - Gravel/Chippings<br>Carbon Factor Value: 0.017 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 17 | 17 | 6,681 |
| Thin Surface Course Systems (TSCS)<br>Mass: 1,000 kg | 3,923 tonnes | 41 | 159,274 | 159,274 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 2.6 | 2.6 | 10,200 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 38 | 38 | 149,074 |
| Binder Course | 5,908 tonnes | 76 | 449,008 | 449,008 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 449,008 |
| Type 1 Granular Fill | 23,505 tonnes | 5.2 | 122,226 | 122,226 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 122,226 |
| Drainage Granular Fill | 1,703 tonnes | 5.2 | 8,856 | 8,856 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 8,856 |
| Transport | | 6,676,842 | 6,676,842 | 6,676,842 |
| Concrete | 13,513 tonnes | 35 | 470,874 | 470,874 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 470,874 |
| Rubble & Hardcore | 3,266 tonnes | 35 | 113,807 | 113,807 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 113,807 |
| Brick & Blockwork | 6,006 tonnes | 35 | 209,285 | 209,285 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 209,285 |
| Tiles & Ceramics | 120 tonnes | 35 | 4,182 | 4,182 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 4,182 |
| Glass | 38 tonnes | 35 | 1,324 | 1,324 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,324 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Ferrous Metals | 22,521 tonnes | 35 | 784,767 | 784,767 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 784,767 |
| Non Ferrous Metals | 375 tonnes | 35 | 13,067 | 13,067 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 13,067 |
| Gypsum | 751 tonnes | 35 | 26,169 | 26,169 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 26,169 |
| Timber | 450 tonnes | 35 | 15,681 | 15,681 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 15,681 |
| Binder | 268 tonnes | 35 | 9,339 | 9,339 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 9,339 |
| Chippings | 393 tonnes | 35 | 13,694 | 13,694 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 13,694 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Thin Surface Course System (TSCS) | 3,923 tonnes | 35 | 136,701 | 136,701 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 136,701 |
| Binder Course | 5,908 tonnes | 35 | 205,870 | 205,870 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 205,870 |
| Type 1 Granular Fill | 23,505 tonnes | 35 | 819,055 | 819,055 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 819,055 |
| Drainage Granular Fill | 1,703 tonnes | 35 | 59,343 | 59,343 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 59,343 |
| Off-site Waste Construction | 96,390 tonnes | 35 | 3,358,806 | 3,358,806 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 3,358,806 |
| Off-site Waste Building Use | 12,480 tonnes | 35 | 434,878 | 434,878 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 434,878 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Waste | | 7,484,418 | 7,484,418 | 7,484,418 |
| Disposal Waste Construction | 96,390 tonnes | 1.4 | 134,946 | 134,946 |
| Landfill Inert<br>Carbon Factor Value: 1.4 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 1.4 | 1.4 | 134,946 |
| Disposal Waste Building Use | 12,480 tonnes | 589 | 7,349,472 | 7,349,472 |
| Landfill<br>Carbon Factor Value: 588.9 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 589 | 589 | 7,349,472 |
| Energy / Fuel Use | | 71,092,415 | 71,092,415 | 71,092,415 |
| Crawler Crane 300t | 7,227 hours | 279 | 2,015,610 | 2,015,610 |
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 2,015,610 |
| Excavators 35t (5) | 17,895 hours | 179 | 3,208,574 | 3,208,574 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 3,208,574 |
| Compactors 32t (3) | 19,769 hours | 199 | 3,937,985 | 3,937,985 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 3,937,985 |
| Grader 26t:222kW (3) | 7,915 hours | 199 | 1,576,668 | 1,576,668 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 1,576,668 |
| Compressors (2) | 18,718 hours | 42 | 778,107 | 778,107 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 778,107 |
| Concrete Pump Trucks (2) | 10,095 hours | 179 | 1,810,034 | 1,810,034 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 1,810,034 |
| Crane All Terrain 30t | 2,409 hours | 239 | 575,992 | 575,992 |
| Diesel Engine - 300kW / 405hp<br>Carbon Factor Value: 239.1 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 239 | 239 | 575,992 |
| Crane All Terrain 50t | 7,361 hours | 239 | 1,760,015 | 1,760,015 |
| Diesel Engine - 300kW / 405hp<br>Carbon Factor Value: 239.1 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 239 | 239 | 1,760,015 |
| Articulated Dump Trucks (4) | 17,723 hours | 199 | 3,530,422 | 3,530,422 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 3,530,422 |
| Road Sweeper/ Bowser Water Trucks Mounted (2) | 17,379 hours | 120 | 2,076,791 | 2,076,791 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 2,076,791 |
| Vans (2) | 15,486 hours | 65 | 1,010,616 | 1,010,616 |
| Diesel Engine - 80kW / 108hp<br>Carbon Factor Value: 65.26 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 65 | 65 | 1,010,616 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Telehandlers (2) | 15,142 hours | 65 | 988,167 | 988,167 |
| Diesel Engine - 80kW / 108hp<br>Carbon Factor Value: 65.26 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 65 | 65 | 988,167 |
| Access Platform | 34,070 hours | 1.7 | 57,585 | 57,585 |
| Electricity 2018 - 2025<br>Carbon Factor Value: 0.313 kgCO2e/kW<br>Property Calculation: 5.4 kW<br>Source: A New Source Region: UK | 5.4 kW | 0.31 | 1.7 | 57,585 |
| Flat Trucks (4) | 28,908 hours | 42 | 1,201,706 | 1,201,706 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 1,201,706 |
| Generators (3) | 25,868 hours | 359 | 9,276,265 | 9,276,265 |
| Diesel Engine - 450kW / 607.5hp<br>Carbon Factor Value: 358.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 359 | 359 | 9,276,265 |
| Truck Mixers (6) | 49,633 hours | 159 | 7,911,500 | 7,911,500 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 7,911,500 |
| Tracked Excavators (2) | 13,250 hours | 279 | 3,695,425 | 3,695,425 |
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 3,695,425 |
| Artic Dump Trucks 39.5t (2) | 68,140 hours | 279 | 19,004,246 | 19,004,246 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Diesel Engine - 350kW / 472.5hp<br>Carbon Factor Value: 278.9 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 279 | 279 | 19,004,246 |
| Tractor Track 228kW (2) | 15,984 hours | 199 | 3,184,013 | 3,184,013 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 3,184,013 |
| Roller Steel/ Rubber (2) | 14,091 hours | 102 | 1,437,282 | 1,437,282 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 1,437,282 |
| Tractor Tracks 123kW (2) | 8,833 hours | 140 | 1,232,204 | 1,232,204 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 1,232,204 |
| Energy Building Use | 5.25 years | 156,802 | 823,211 | 823,211 |
| Electricity 2018 - 2027<br>Carbon Factor Value: 0.256 kgCO2e/kW<br>Property Calculation: 612,508 kW<br>Source: A New Source Region: UK | 612,508 kW | 0.26 | 156,802 | 823,211 |
| Water Use | | 2,278,080 | 2,278,080 | 2,278,080 |
| Water Use | 2,373 days | 400 | 949,200 | 949,200 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 400,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 400 m3 | | 400 | 400 | 949,200 |
| Waste Water Treatment | 2,373 days | 560 | 1,328,880 | 1,328,880 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 800 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 800 m3 | | 560 | 560 | 1,328,880 |
| Offsite Power Station Facilities | | 46,456,676 | 46,456,676 | 46,456,676 |
| AECC / ESL / MEEG | | 46,456,676 | 46,456,676 | 46,456,676 |
| Materials | | 40,899,722 | 40,899,722 | 40,899,722 |
| Concrete | 11,651 tonnes | 89 | 1,036,939 | 1,036,939 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 1,036,939 |
| Rubble & Hardcore | 2,816 tonnes | 5.2 | 14,643 | 14,643 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 14,643 |
| Brick & Blockwork | 5,178 tonnes | 240 | 1,242,720 | 1,242,720 |
| Bricks - General<br>Carbon Factor Value: 0.24 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 240 | 240 | 1,242,720 |
| Tiles & Ceramics | 104 tonnes | 590 | 61,360 | 61,360 |
| Ceramics - Tile<br>Carbon Factor Value: 0.59 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 590 | 590 | 61,360 |
| Glass | 32 tonnes | 1,350 | 43,200 | 43,200 |
| Glass - Toughened<br>Carbon Factor Value: 1.35 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 1,350 | 1,350 | 43,200 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Ferrous Metals | 19,418 tonnes | 1,950 | 37,865,100 | 37,865,100 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 37,865,100 |
| Non Ferrous Metals | 324 tonnes | 840 | 272,160 | 272,160 |
| Copper - EU Tube & Sheet - Recycled<br>Carbon Factor: Copper - EU Tube & Sheet - Recylced Value: 0.84 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 840 | 840 | 272,160 |
| Gypsum | 648 tonnes | 130 | 84,240 | 84,240 |
| Plaster (Gypsum) - General<br>Carbon Factor Value: 0.13 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 130 | 130 | 84,240 |
| Timber | 388 tonnes | 720 | 279,360 | 279,360 |
| Timber - General<br>Carbon Factor Value: 0.72 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 720 | 720 | 279,360 |
| Transport | | 1,425,167 | 1,425,167 | 1,425,167 |
| Concrete | 11,651 tonnes | 35 | 405,991 | 405,991 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 405,991 |
| Rubble & Hardcore | 2,816 tonnes | 35 | 98,126 | 98,126 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 98,126 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Brick & Blockwork | 5,178 tonnes | 35 | 180,433 | 180,433 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 180,433 |
| Tiles & Ceramics | 104 tonnes | 35 | 3,624 | 3,624 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 3,624 |
| Glass | 32 tonnes | 35 | 1,115 | 1,115 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,115 |
| Ferrous Metals | 19,418 tonnes | 35 | 676,640 | 676,640 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 676,640 |
| Non Ferrous Metals | 324 tonnes | 35 | 11,290 | 11,290 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 11,290 |
| Gypsum | 648 tonnes | 35 | 22,580 | 22,580 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 22,580 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Timber | 388 tonnes | 35 | 13,520 | 13,520 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 13,520 |
| Off-site Waste Construction | 340 tonnes | 35 | 11,848 | 11,848 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 11,848 |
| Waste | | 476 | 476 | 476 |
| Disposal Waste Construction | 340 tonnes | 1.4 | 476 | 476 |
| Landfill Inert<br>Carbon Factor Value: 1.4 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 1.4 | 1.4 | 476 |
| Energy / Fuel Use | | 4,121,445 | 4,121,445 | 4,121,445 |
| Tracked Excavators (3) | 2,734 hours | 82 | 223,040 | 223,040 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 223,040 |
| Articulated Dump Trucks (8) | 11,501 hours | 159 | 1,833,259 | 1,833,259 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 1,833,259 |
| Tipper Lorries (3) | 1,709 hours | 159 | 272,415 | 272,415 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 272,415 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Wheel Washers (4) | 1,183 hours | 8.5 | 10,059 | 10,059 |
| Diesel Engine - 10kW / 13.5hp<br>Carbon Factor Value: 8.503 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 8.5 | 8.5 | 10,059 |
| Dozer | 841 hours | 120 | 100,500 | 100,500 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 100,500 |
| Tracked Mobile Crane 55t (2) | 591 hours | 102 | 60,282 | 60,282 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 60,282 |
| Cement Mixer Truck (Discharging) (2) | 1,788 hours | 179 | 320,588 | 320,588 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 320,588 |
| Vibratory Rollers (2) | 2,103 hours | 82 | 171,563 | 171,563 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 171,563 |
| Lorry with Lifting Boom | 526 hours | 159 | 83,844 | 83,844 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 83,844 |
| Concrete Pumps (2) | 2,103 hours | 50 | 104,919 | 104,919 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Diesel Engine - 60kW / 81hp<br>Carbon Factor Value: 49.89 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 50 | 50 | 104,919 |
| Site Fork Lifts (2) | 1,314 hours | 42 | 54,623 | 54,623 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 54,623 |
| Large Rotary Bored Piling Rig | 1,262 hours | 319 | 402,326 | 402,326 |
| Diesel Engine - 400kW / 540hp<br>Carbon Factor Value: 318.8 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 319 | 319 | 402,326 |
| Tracked Mobile Crane 105t | 1,262 hours | 199 | 251,390 | 251,390 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 251,390 |
| Road Planer | 1,262 hours | 140 | 176,049 | 176,049 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 176,049 |
| Wheeled Backhoe Loader | 1,052 hours | 50 | 52,484 | 52,484 |
| Diesel Engine - 60kW / 81hp<br>Carbon Factor Value: 49.89 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 50 | 50 | 52,484 |
| Vibratory Plate | 657 hours | 4.5 | 2,987 | 2,987 |
| Petrol Engine - 2 Stroke - 3kW / 4.05hp<br>Carbon Factor Value: 4.546 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Petrol Engine 2 Stroke (T8-6) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 4.5 | 4.5 | 2,987 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Hand-Held Circular Saw | 657 hours | 1.7 | 1,118 | 1,118 |
| Diesel Engine - 2kW / 2.7hp<br>Carbon Factor Value: 1.701 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 1.7 | 1.7 | 1,118 |
| Water Use | | 9,866 | 9,866 | 9,866 |
| Water Use Construction | 58,035 man days | 0.10 | 5,804 | 5,804 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 100 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.1 m3 | | 0.10 | 0.10 | 5,804 |
| Waste Water Treatment Construction | 58,035 man days | 0.07 | 4,062 | 4,062 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 0.1 m3 | | 0.07 | 0.07 | 4,062 |
| Associated Development | | 42,583,201 | 42,583,201 | 42,583,201 |
| A5025 Off-line Highways Improvements | | 15,354,647 | 15,354,647 | 15,354,647 |
| Materials | | 2,976,843 | 2,976,843 | 2,976,843 |
| Binder | 1,040 tonnes | 76 | 79,040 | 79,040 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 79,040 |
| Chippings | 1,525 tonnes | 17 | 25,925 | 25,925 |
| Stone - Gravel/Chippings<br>Carbon Factor Value: 0.017 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 17 | 17 | 25,925 |
| Thin Surface Course Systems (TSCS)<br>Mass: 1,000 kg | 15,239 tonnes | 41 | 618,703 | 618,703 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 2.6 | 2.6 | 39,621 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 38 | 38 | 579,082 |
| Binder Course | 22,948 tonnes | 76 | 1,744,048 | 1,744,048 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 1,744,048 |
| Type 1 Granular Fill | 91,295 tonnes | 5.2 | 474,734 | 474,734 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 474,734 |
| Drainage Granular Fill | 6,614 tonnes | 5.2 | 34,393 | 34,393 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 34,393 |
| Transport | | 5,145,395 | 5,145,395 | 5,145,395 |
| Binder | 1,040 tonnes | 35 | 36,240 | 36,240 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 36,240 |
| Chippings | 1,525 tonnes | 35 | 53,140 | 53,140 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 53,140 |
| Thin Service Course Systems (TSCS) | 15,239 tonnes | 35 | 531,018 | 531,018 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 531,018 |
| Binder Course | 22,948 tonnes | 35 | 799,646 | 799,646 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 799,646 |
| Type 1 Granular Fill | 91,295 tonnes | 35 | 3,181,266 | 3,181,266 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 3,181,266 |
| Drainage Granular Fill | 6,614 tonnes | 35 | 230,471 | 230,471 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 230,471 |
| Off-site Waste Construction | 9,000 tonnes | 35 | 313,614 | 313,614 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 313,614 |
| Waste | | 12,600 | 12,600 | 12,600 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Disposal Waste Construction | 9,000 tonnes | 1.4 | 12,600 | 12,600 |
| Landfill Inert<br>Carbon Factor Value: 1.4 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 1.4 | 1.4 | 12,600 |
| Energy / Fuel Use | | 7,205,056 | 7,205,056 | 7,205,056 |
| Tracked Excavator 22t (22) | 7,227 hours | 82 | 589,579 | 589,579 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 589,579 |
| Articulated Dump Truck 23t (24) | 6,524 hours | 159 | 1,039,926 | 1,039,926 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 1,039,926 |
| Dozer 20t (15) | 6,023 hours | 120 | 719,749 | 719,749 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 719,749 |
| Road Lorry 39t (28) | 2,543 hours | 199 | 506,566 | 506,566 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 506,566 |
| Grader 25t (10) | 4,015 hours | 159 | 639,991 | 639,991 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 639,991 |
| Roller (Rolling Fill) 18t (10) | 6,692 hours | 120 | 799,694 | 799,694 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 799,694 |
| Tipper Lorry (5) | 1,606 hours | 159 | 255,996 | 255,996 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 255,996 |
| Road Sweeper (5) | 4,015 hours | 58 | 233,673 | 233,673 |
| Diesel Engine - 70kW / 94.5hp<br>Carbon Factor Value: 58.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 58 | 58 | 233,673 |
| Asphalt Paver (+ Tipper Lorry) 12t Hopper (5) | 4,684 hours | 82 | 382,121 | 382,121 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 382,121 |
| Vibratory Roller 12t (5) | 4,684 hours | 82 | 382,121 | 382,121 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 382,121 |
| Vibratory Roller 3t (5) | 4,684 hours | 17 | 79,675 | 79,675 |
| Diesel Engine - 20kW / 27hp<br>Carbon Factor Value: 17.01 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 17 | 17 | 79,675 |
| Compressor for Hand-Held Pneumatic Breaker 1t (5) | 7,963 hours | 25 | 201,623 | 201,623 |
| Diesel Engine - 30kW / 40.5hp<br>Carbon Factor Value: 25.32 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 25 | 25 | 201,623 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Road Planer 17t (5) | 4,684 hours | 159 | 746,630 | 746,630 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 746,630 |
| Backhoe Mounted Hydraulic Breaker (5) | 1,405 hours | 58 | 81,771 | 81,771 |
| Diesel Engine - 70kW / 94.5hp<br>Carbon Factor Value: 58.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 58 | 58 | 81,771 |
| Tractor (Towing Equipment) (5) | 937 hours | 82 | 76,440 | 76,440 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 76,440 |
| Tracked Excavator 8t (5) | 937 hours | 33 | 31,165 | 31,165 |
| Diesel Engine - 40kW / 54hp<br>Carbon Factor Value: 33.26 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 33 | 33 | 31,165 |
| Crawler Mounted Rig 33t (2) | 335 hours | 102 | 34,170 | 34,170 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 34,170 |
| Tracked Mobile Crane 110t (3) | 502 hours | 140 | 70,029 | 70,029 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 70,029 |
| Concrete Pump + Cement Mixer Truck 8t/350 Bar (2) | 335 hours | 179 | 60,066 | 60,066 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 60,066 |
| Diesel Generator (2) | 669 hours | 359 | 239,903 | 239,903 |
| Diesel Engine - 450kW / 607.5hp<br>Carbon Factor Value: 358.6 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 359 | 359 | 239,903 |
| Tracked Mobile Crane 55t (2) | 335 hours | 102 | 34,170 | 34,170 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 34,170 |
| Water Use | | 14,752 | 14,752 | 14,752 |
| Water Use | 86,779 man days | 0.10 | 8,678 | 8,678 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 100 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.1 m3 | | 0.10 | 0.10 | 8,678 |
| Waste Water Treatment | 86,779 man days | 0.07 | 6,075 | 6,075 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 0.1 m3 | | 0.07 | 0.07 | 6,075 |
| Park and Ride Facility | | 18,913,633 | 18,913,633 | 18,913,633 |
| Materials | | 7,779,643 | 7,779,643 | 7,779,643 |
| Concrete | 1,769 tonnes | 89 | 157,441 | 157,441 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 157,441 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Rubble & Hardcore | 427 tonnes | 5.2 | 2,220 | 2,220 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 2,220 |
| Brick & Blockwork | 786 tonnes | 240 | 188,640 | 188,640 |
| Bricks - General<br>Carbon Factor Value: 0.24 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 240 | 240 | 188,640 |
| Tiles & Ceramics | 16 tonnes | 590 | 9,440 | 9,440 |
| Ceramics - Tile<br>Carbon Factor Value: 0.59 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 590 | 590 | 9,440 |
| Glass | 5 tonnes | 1,350 | 6,750 | 6,750 |
| Glass - Toughened<br>Carbon Factor Value: 1.35 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 1,350 | 1,350 | 6,750 |
| Ferrous Metals | 2,948 tonnes | 1,950 | 5,748,600 | 5,748,600 |
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 5,748,600 |
| Non Ferrous Metals | 49 tonnes | 840 | 41,160 | 41,160 |
| Copper - EU Tube & Sheet - Recycled<br>Carbon Factor: Copper - EU Tube & Sheet - Recylced Value: 0.84 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 840 | 840 | 41,160 |
| Gypsum | 98 tonnes | 130 | 12,740 | 12,740 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Plaster (Gypsum) - General<br>Carbon Factor Value: 0.13 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 130 | 130 | 12,740 |
| Timber | 59 tonnes | 720 | 42,480 | 42,480 |
| Timber - General<br>Carbon Factor Value: 0.72 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 720 | 720 | 42,480 |
| Binder | 549 tonnes | 76 | 41,724 | 41,724 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 41,724 |
| Chippings | 804 tonnes | 17 | 13,668 | 13,668 |
| Stone - Gravel/Chippings<br>Carbon Factor Value: 0.017 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 17 | 17 | 13,668 |
| Thin Surface Course Systems (TSCS)<br>Mass: 1,000 kg | 8,038 tonnes | 41 | 326,343 | 326,343 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 2.6 | 2.6 | 20,899 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 38 | 38 | 305,444 |
| Binder Course | 12,104 tonnes | 76 | 919,904 | 919,904 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 919,904 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Type 1 Granular Fill | 48,152 tonnes | 5.2 | 250,390 | 250,390 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 250,390 |
| Drainage Granular Fill | 3,489 tonnes | 5.2 | 18,143 | 18,143 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 18,143 |
| Transport | | 5,530,478 | 5,530,478 | 5,530,478 |
| Concrete | 1,769 tonnes | 35 | 61,643 | 61,643 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 61,643 |
| Rubble & Hardcore | 427 tonnes | 35 | 14,879 | 14,879 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 14,879 |
| Brick & Blockwork | 786 tonnes | 35 | 27,389 | 27,389 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 27,389 |
| Tiles & Ceramics | 16 tonnes | 35 | 558 | 558 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 558 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Glass | 5 tonnes | 35 | 174 | 174 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 174 |
| Ferrous Metals | 2,948 tonnes | 35 | 102,726 | 102,726 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 102,726 |
| Non Ferrous Metals | 49 tonnes | 35 | 1,707 | 1,707 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,707 |
| Gypsum | 98 tonnes | 35 | 3,415 | 3,415 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 3,415 |
| Timber | 59 tonnes | 35 | 2,056 | 2,056 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 2,056 |
| Binder | 549 tonnes | 35 | 19,130 | 19,130 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 19,130 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Chippings | 804 tonnes | 35 | 28,016 | 28,016 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 28,016 |
| Thin Service Course Systems (TSCS) | 8,038 tonnes | 35 | 280,092 | 280,092 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 280,092 |
| Binder Course | 12,104 tonnes | 35 | 421,776 | 421,776 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 421,776 |
| Type 1 Granular Fill | 48,152 tonnes | 35 | 1,677,905 | 1,677,905 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,677,905 |
| Drainage Granular Fill | 3,489 tonnes | 35 | 121,578 | 121,578 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 121,578 |
| Off-site Waste Construction | 79,370 tonnes | 35 | 2,765,727 | 2,765,727 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 2,765,727 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Off-site Waste Building Use | 49 tonnes | 35 | 1,707 | 1,707 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,707 |
| Waste | | 139,974 | 139,974 | 139,974 |
| Disposal Waste Construction | 79,370 tonnes | 1.4 | 111,118 | 111,118 |
| Landfill Inert<br>Carbon Factor Value: 1.4 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 1.4 | 1.4 | 111,118 |
| Disposal Waste Building Use | 49 tonnes | 589 | 28,856 | 28,856 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 589 | 589 | 28,856 |
| Energy / Fuel Use | | 5,451,409 | 5,451,409 | 5,451,409 |
| Breaker | 421 hours | 102 | 42,942 | 42,942 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 42,942 |
| Tracked Excavators (3) | 3,575 hours | 82 | 291,649 | 291,649 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 291,649 |
| Articulated Dump Trucks (8) | 8,057 hours | 159 | 1,284,286 | 1,284,286 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 1,284,286 |
| Tipper Lorries (2) | 1,052 hours | 159 | 167,689 | 167,689 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 167,689 |
| Wheel Washers (4) | 1,314 hours | 8.5 | 11,173 | 11,173 |
| Diesel Engine - 10kW / 13.5hp<br>Carbon Factor Value: 8.503 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 8.5 | 8.5 | 11,173 |
| Dozer | 1,893 hours | 120 | 226,214 | 226,214 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 226,214 |
| Tracked Mobile Cranes 55t (2) | 329 hours | 102 | 33,558 | 33,558 |
| Diesel Engine - 125kW / 168.75hp<br>Carbon Factor Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 33,558 |
| Cement Mixer Trucks (Discharging) (2) | 1,222 hours | 179 | 219,105 | 219,105 |
| Diesel Engine - 225kW / 303.75hp<br>Carbon Factor Value: 179.3 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 179 | 179 | 219,105 |
| Vibratory Rollers (2) | 3,575 hours | 82 | 291,649 | 291,649 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 291,649 |
| Lorry with Lifting Boom | 1,446 hours | 159 | 230,492 | 230,492 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 230,492 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Site Fork Lifts (2) | 1,840 hours | 42 | 76,489 | 76,489 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 76,489 |
| Large Rotary Bored Piling Rig | 631 hours | 319 | 201,163 | 201,163 |
| Diesel Engine - 400kW / 540hp<br>Carbon Factor Value: 318.8 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 319 | 319 | 201,163 |
| Concrete Pump | 631 hours | 50 | 31,481 | 31,481 |
| Diesel Engine - 60kW / 81hp<br>Carbon Factor Value: 49.89 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 50 | 50 | 31,481 |
| Tracked Mobile Crane 105t | 1,262 hours | 199 | 251,390 | 251,390 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 251,390 |
| Road Planer | 1,262 hours | 140 | 176,049 | 176,049 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 176,049 |
| Wheeled Backhoe Loader | 841 hours | 50 | 41,957 | 41,957 |
| Diesel Engine - 60kW / 81hp<br>Carbon Factor Value: 49.89 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 50 | 50 | 41,957 |
| Vibratory Plate (Petrol) | 526 hours | 4.5 | 2,391 | 2,391 |

| Name | Quantity | Single ($kgCO_2e$) | Total ($kgCO_2e$) | Project ($kgCO_2e$) |
|---|---|---|---|---|
| Petrol Engine - 2 Stroke - 3kW / 4.05hp<br>Carbon Factor Value: 4.546 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Petrol Engine 2 Stroke (T8-6) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 4.5 | 4.5 | 2,391 |
| Hand-Held Circular Saw | 526 hours | 1.7 | 895 | 895 |
| Diesel Engine - 2kW / 2.7hp<br>Carbon Factor Value: 1.701 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 1.7 | 1.7 | 895 |
| Energy Building Use | 7 years | 267,263 | 1,870,839 | 1,870,839 |
| Electricity 2018 - 2027<br>Carbon Factor Value: 0.256 kgCO2e/kW<br>Property Calculation: 1,043,995 kW<br>Source: A New Source Region: UK | 1,043,995 kW | 0.26 | 267,263 | 1,870,839 |
| Water Use | | 12,128 | 12,128 | 12,128 |
| Water Construction Use | 32,759 man days | 0.10 | 3,276 | 3,276 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 100 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.1 m3 | | 0.10 | 0.10 | 3,276 |
| Waste Water Treatment Construction | 32,759 man days | 0.07 | 2,293 | 2,293 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 0.1 m3 | | 0.07 | 0.07 | 2,293 |
| Water Building Use | 38,599 man days | 0.10 | 3,860 | 3,860 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 100 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.1 m3 | | 0.10 | 0.10 | 3,860 |
| Waste Water Treatment Building Use | 38,559 man days | 0.07 | 2,699 | 2,699 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 0.1 m3 | | 0.07 | 0.07 | 2,699 |
| Logistics Centre | | 8,314,921 | 8,314,921 | 8,314,921 |
| Materials | | 2,559,640 | 2,559,640 | 2,559,640 |
| Concrete | 344 tonnes | 89 | 30,616 | 30,616 |
| Concrete - GEN3 - C16/20 MPa - Cement Replacement - Fly Ash - 25%<br>Carbon Factor Value: 0.089 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 89 | 89 | 30,616 |
| Rubble & Hardcore | 83 tonnes | 5.2 | 432 | 432 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 432 |
| Brick & Blockwork | 153 tonnes | 240 | 36,720 | 36,720 |
| Bricks - General<br>Carbon Factor Value: 0.24 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 240 | 240 | 36,720 |
| Tiles & Ceramics | 3 tonnes | 590 | 1,770 | 1,770 |
| Ceramics - Tile<br>Carbon Factor Value: 0.59 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 590 | 590 | 1,770 |
| Glass | 1 tonnes | 1,350 | 1,350 | 1,350 |
| Glass - Toughened<br>Carbon Factor Value: 1.35 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 1,350 | 1,350 | 1,350 |
| Ferrous Metals | 573 tonnes | 1,950 | 1,117,350 | 1,117,350 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Steel - General - World Average Recycled Content<br>Carbon Factor Value: 1.95 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 1,950 | 1,950 | 1,117,350 |
| Non Ferrous Metals | 10 tonnes | 840 | 8,400 | 8,400 |
| Copper - EU Tube & Sheet - Recycled<br>Carbon Factor: Copper - EU Tube & Sheet - Recylced Value: 0.84 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 840 | 840 | 8,400 |
| Gypsum | 19 tonnes | 130 | 2,470 | 2,470 |
| Plaster (Gypsum) - General<br>Carbon Factor Value: 0.13 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 130 | 130 | 2,470 |
| Timber | 11 tonnes | 720 | 7,920 | 7,920 |
| Timber - General<br>Carbon Factor Value: 0.72 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 720 | 720 | 7,920 |
| Binder | 473 tonnes | 76 | 35,948 | 35,948 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 35,948 |
| Chippings | 693 tonnes | 17 | 11,781 | 11,781 |
| Stone - Gravel/Chippings<br>Carbon Factor Value: 0.017 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 17 | 17 | 11,781 |
| Thin Surface Course Systems (TSCS)<br>Mass: 1,000 kg | 6,924 tonnes | 41 | 281,114 | 281,114 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 2.6 | 2.6 | 18,002 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 500 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 50 % Mass: Inherited ( 1,000 kg) | | 38 | 38 | 263,112 |
| Binder Course | 10,427 tonnes | 76 | 792,452 | 792,452 |
| Asphalt - 6% Bitumen Binder<br>Carbon Factor Value: 0.076 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 76 | 76 | 792,452 |
| Type 1 Granular Fill | 41,479 tonnes | 5.2 | 215,691 | 215,691 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 215,691 |
| Drainage Granular Fill | 3,005 tonnes | 5.2 | 15,626 | 15,626 |
| Aggregate - General<br>Carbon Factor Value: 0.0052 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 5.2 | 5.2 | 15,626 |
| Transport | | 2,286,978 | 2,286,978 | 2,286,978 |
| Concrete | 344 tonnes | 35 | 11,987 | 11,987 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 11,987 |
| Rubble & Hardcore | 83 tonnes | 35 | 2,892 | 2,892 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 2,892 |
| Brick & Blockwork | 153 tonnes | 35 | 5,331 | 5,331 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 5,331 |
| Tiles & Ceramics | 3 tonnes | 35 | 105 | 105 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 105 |
| Glass | 1 tonnes | 35 | 35 | 35 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 35 |
| Ferrous Metals | 573 tonnes | 35 | 19,967 | 19,967 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 19,967 |
| Non Ferrous Metals | 10 tonnes | 35 | 348 | 348 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 348 |
| Gypsum | 19 tonnes | 35 | 662 | 662 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 662 |
| Timber | 11 tonnes | 35 | 383 | 383 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 383 |
| Binder | 473 tonnes | 35 | 16,482 | 16,482 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 16,482 |
| Chippings | 693 tonnes | 35 | 24,148 | 24,148 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 24,148 |
| Thin Service Course Systems (TSCS) | 6,924 tonnes | 35 | 241,274 | 241,274 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 241,274 |
| Binder Course | 10,427 tonnes | 35 | 363,339 | 363,339 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 363,339 |
| Type 1 Granular Fill | 41,479 tonnes | 35 | 1,445,377 | 1,445,377 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 1,445,377 |
| Drainage Granular Fill | 3,005 tonnes | 35 | 104,712 | 104,712 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 104,712 |
| Off-site Waste Construction | 1,300 tonnes | 35 | 45,300 | 45,300 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 45,300 |
| Off-site Waste Building Use | 133 tonnes | 35 | 4,635 | 4,635 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 4,635 |
| Waste | | 80,144 | 80,144 | 80,144 |
| Disposal Waste Construction | 1,300 tonnes | 1.4 | 1,820 | 1,820 |
| Landfill<br>Carbon Factor Value: 1.4 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 1.4 | 1.4 | 1,820 |
| Disposal Waste Building Use | 133 tonnes | 589 | 78,324 | 78,324 |
| Landfill<br>Carbon Factor Value: 588.9 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 589 | 589 | 78,324 |
| Energy / Fuel Use | | 3,371,701 | 3,371,701 | 3,371,701 |
| Tracked Excavators (2) | 1,893 hours | 82 | 154,431 | 154,431 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 154,431 |
| Dozer | 421 hours | 120 | 50,310 | 50,310 |
| Diesel Engine - 150kW / 202.5hp<br>Carbon Factor Value: 119.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 120 | 120 | 50,310 |
| Articulated Dump Trucks (7) | 7,637 hours | 159 | 1,217,338 | 1,217,338 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 1,217,338 |
| Tracked Mobile Cranes 55t (2) | 460 hours | 102 | 46,920 | 46,920 |
| Diesel Engine - 125 kW / 168.75hp<br>Carbon Factor: Diesel Engine - 125kW / 168.75hp Value: 102 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 102 | 102 | 46,920 |
| Vibratory Rollers (2) | 1,682 hours | 82 | 137,218 | 137,218 |
| Diesel Engine - 100kW / 135hp<br>Carbon Factor Value: 81.58 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 82 | 82 | 137,218 |
| Lorry with Lifting Boom | 526 hours | 159 | 83,844 | 83,844 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 83,844 |
| Site Fork Lifts (2) | 1,052 hours | 42 | 43,732 | 43,732 |
| Diesel Engine - 50kW / 67.5hp<br>Carbon Factor Value: 41.57 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 42 | 42 | 43,732 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Tipper Lorries (2) | 1,052 hours | 159 | 167,689 | 167,689 |
| Diesel Engine - 200kW / 270hp<br>Carbon Factor Value: 159.4 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 159 | 159 | 167,689 |
| Water Jet Pumps (3) | 854 hours | 8.5 | 7,262 | 7,262 |
| Diesel Engine - 10kW / 13.5hp<br>Carbon Factor Value: 8.503 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 8.5 | 8.5 | 7,262 |
| Large Rotary Bored Piling Rig | 1,052 hours | 319 | 335,378 | 335,378 |
| Diesel Engine - 400kW / 540hp<br>Carbon Factor Value: 318.8 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 319 | 319 | 335,378 |
| Concrete Pump | 1,052 hours | 50 | 52,484 | 52,484 |
| Diesel Engine - 60kW / 81hp<br>Carbon Factor Value: 49.89 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 50 | 50 | 52,484 |
| Tracked Mobile Crane 105t | 1,682 hours | 199 | 335,054 | 335,054 |
| Diesel Engine - 250kW / 337.5hp<br>Carbon Factor Value: 199.2 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 199 | 199 | 335,054 |
| Road Planer | 841 hours | 140 | 117,320 | 117,320 |
| Diesel Engine - 175kW / 236.25hp<br>Carbon Factor Value: 139.5 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 140 | 140 | 117,320 |
| Wheeled Backhoe Loader | 631 hours | 50 | 31,481 | 31,481 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Diesel Engine - 60kW / 81hp<br>Carbon Factor Value: 49.89 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 50 | 50 | 31,481 |
| Vibratory Plate | 394 hours | 4.5 | 1,791 | 1,791 |
| Petrol Engine - 2 Stroke - 3kW / 4.05hp<br>Carbon Factor Value: 4.546 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Petrol Engine 2 Stroke (T8-6) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 4.5 | 4.5 | 1,791 |
| Hand-Held Circular Saw (Cutting Paving Slabs) | 394 hours | 1.7 | 670 | 670 |
| Diesel Engine - 2kW / 2.7hp<br>Carbon Factor Value: 1.701 kgCO2e/hr Lifecycle: Partial process<br>Calculation: Hours of Combustion Engine Operation (Hours_of_Operation_hr * CF)<br>Property Calculation: 1 hr<br>Source: CORINAIR - Diesel Engine (T8-5) (2006) Region: Europe<br>Hours of Operation: 1 hr | | 1.7 | 1.7 | 670 |
| Energy Building Use | 7 years | 84,112 | 588,781 | 588,781 |
| Electricity 2018 - 2027<br>Carbon Factor Value: 0.256 kgCO2e/kW<br>Property Calculation: 328,561 kW<br>Source: A New Source Region: UK | 328,561 kW | 0.26 | 84,112 | 588,781 |
| Water Use | | 16,459 | 16,459 | 16,459 |
| Water Construction Use | 20,075 man days | 0.10 | 2,008 | 2,008 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 100 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.1 m3 | | 0.10 | 0.10 | 2,008 |
| Waste Water Treatment Construction | 20,075 man days | 0.07 | 1,405 | 1,405 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 0.1 m3 | | 0.07 | 0.07 | 1,405 |
| Water Building Use | 76,741 man days | 0.10 | 7,674 | 7,674 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 100 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.1 m3 | | 0.10 | 0.10 | 7,674 |
| Waste Water Treatment Building Use | 76,741 man days | 0.07 | 5,372 | 5,372 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 0.1 m3 | | 0.07 | 0.07 | 5,372 |
| Operation | | 3,874,057,023 | 3,874,057,023 | 3,874,057,023 |
| Power Station | | 3,872,545,301 | 3,872,545,301 | 3,872,545,301 |
| Materials | | 899,867,342 | 899,867,342 | 899,867,342 |
| Uranium | 60 years | 10,409,050 | 624,543,000 | 624,543,000 |
| Uranium<br>Carbon Factor Value: 0.025 kgCO2e/kWh<br>Property Calculation: 416,362,000 kWh<br>Source: A New Source | 416,362,000 kWh | 0.03 | 10,409,050 | 624,543,000 |
| Fuel Assembly | 60 years | 4,588,739 | 275,324,342 | 275,324,342 |
| Zirconium - General<br>Carbon Factor Value: 103.03 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 44,304 kg<br>Source: Bath ICE (2.0) Region: UK<br>% Composition: 92.3 % Mass: 48,000 kg | | 4,564,641 | 4,564,641 | 273,878,467 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 3,696 kg<br>Source: Bath ICE (2.0) Region: Global<br>% Composition: 7.7 % Mass: 48,000 kg | | 24,098 | 24,098 | 1,445,875 |
| Transport | | 2,643,361 | 2,643,361 | 2,643,361 |
| Uranium | 3,917 tonnes | 11 | 42,570 | 42,570 |
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 2,600 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 5,200 km Weight: 0.5 tonne | | 11 | 11 | 42,570 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Fuel Assembly | 5,760 tonnes | 38 | 221,507 | 221,507 |
| Sea Freight: Bulk Carrier. Average dwt.<br>Carbon Factor Value: 0.00418 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 9,200 tkm<br>Source: Defra: Cargo Ship. All Scope. (2017) Region: UK<br>Distance: 18,400 km Weight: 0.5 tonne | | 38 | 38 | 221,507 |
| Off-site Waste | 65,400 tonnes | 35 | 2,278,928 | 2,278,928 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 2,278,928 |
| Off-site Spent Fuel Assembly | 2,880 tonnes | 35 | 100,356 | 100,356 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 100,356 |
| Waste | | 268,345,884 | 268,345,884 | 268,345,884 |
| Disposal Waste | 65,400 tonnes | 589 | 38,514,060 | 38,514,060 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonnes<br>Property Calculation: 1 tonnes<br>Source: A New Source | 1 tonnes | 589 | 589 | 38,514,060 |
| Disposal Spent Fuel Assembly | 60 years | 3,830,530 | 229,831,824 | 229,831,824 |
| Disposal Facility<br>Carbon Factor Value: 0.0092 kgCO2e/kWh<br>Property Calculation: 416,362,000 kWh<br>Region: Italy | 416,362,000 kWh | 0.01 | 3,830,530 | 229,831,824 |
| Energy / Fuel Use | | 2,694,448,864 | 2,694,448,864 | 2,694,448,864 |
| Boilers, Generators & Fire Pumps | 60 years | 44,016,700 | 2,641,002,019 | 2,641,002,019 |
| Fuel Oil<br>Carbon Factor Value: 3,838.21942 kgCO2e/tonne Lifecycle: Cradle to Gate<br>Calculation: Fuel Burnt - Tonnes (Fuel_tonne * CF)<br>Property Calculation: 11,468 tonne<br>Source: Defra: Fuels. Mass. All Scope. (2017) Region: UK<br>Fuel: 11,468 Tonnes | | 44,016,700 | 44,016,700 | 2,641,002,019 |
| Auxiliary Power Consumption | 60 years | 856,520 | 51,391,199 | 51,391,199 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Electricity 2027 to 2087<br>Carbon Factor Value: 0.069 kgCO2e/kW<br>Property Calculation: 12,413,333 kW<br>Source: A New Source Region: UK | 12,413,333 kW | 0.07 | 856,520 | 51,391,199 |
| Station Command Load | 60 years | 34,261 | 2,055,647 | 2,055,647 |
| Electricity 2027 to 2087<br>Carbon Factor Value: 0.069 kgCO2e/kW<br>Property Calculation: 496,533 kW<br>Source: A New Source Region: UK | 496,533 kW | 0.07 | 34,261 | 2,055,647 |
| Water Use | | 7,239,849 | 7,239,849 | 7,239,849 |
| Operational (Full) | | 6,305,316 | 6,305,316 | 6,305,316 |
| Water Use Operation | 21,590 days | 118 | 2,547,620 | 2,547,620 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 118,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 118 m3 | | 118 | 118 | 2,547,620 |
| Waste Water Treatment Operation | 21,590 days | 174 | 3,757,696 | 3,757,696 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 248.64 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 248.64 m3 | | 174 | 174 | 3,757,696 |
| Operational (Outage) | | 934,533 | 934,533 | 934,533 |
| Water Use Operation | 1,480 days | 512 | 757,760 | 757,760 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 512,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 512 m3 | | 512 | 512 | 757,760 |
| Waste Water Treatment Operation | 1,480 days | 119 | 176,773 | 176,773 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 170.63 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 170.63 m3 | | 119 | 119 | 176,773 |
| Offsite Power Station Facilities | | 1,511,723 | 1,511,723 | 1,511,723 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| AECC / ESL / MEEG | | 1,511,723 | 1,511,723 | 1,511,723 |
| Transport | | 31,361 | 31,361 | 31,361 |
| Off-site Waste | 900 tonnes | 35 | 31,361 | 31,361 |
| Road Freight: Articulated HGV. 3.5 - 33t. Average Load<br>Carbon Factor Value: 0.17423 kgCO2e/tkm Lifecycle: Cradle to Gate<br>Calculation: Freight - Tonne Kilometre (Weight_tonne * Distance_km * CF)<br>Property Calculation: 200 tkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km Weight: 0.5 tonne | | 35 | 35 | 31,361 |
| Waste | | 530,010 | 530,010 | 530,010 |
| Disposal Waste | 900 tonnes | 589 | 530,010 | 530,010 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonne<br>Property Calculation: 1 tonne<br>Source: A New Source | 1 tonne | 589 | 589 | 530,010 |
| Energy / Fuel Use | | 927,795 | 927,795 | 927,795 |
| Building Energy Use | 60 years | 15,463 | 927,795 | 927,795 |
| Electricity 2027 to 2087<br>Carbon Factor Value: 0.069 kgCO2e/kW<br>Property Calculation: 224,105 kW<br>Source: A New Source Region: UK | 224,105 kW | 0.07 | 15,463 | 927,795 |
| Water Use | | 22,557 | 22,557 | 22,557 |
| Operational (Normal) | | 21,148 | 21,148 | 21,148 |
| Water Use Operation | 21,780 days | 0.53 | 11,543 | 11,543 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 530 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 0.53 m3 | | 0.53 | 0.53 | 11,543 |
| Waste Water Treatment Operation | 21,780 days | 0.44 | 9,605 | 9,605 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 0.63 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope<br>(2011 (v1)) Region: UK<br>Volume: 0.63 m3 | | 0.44 | 0.44 | 9,605 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Operational (Incident) | | 1,408 | 1,408 | 1,408 |
| Water Use Operation | 120 days | 6.4 | 766 | 766 |
| Water Supply<br>Carbon Factor Value: 0.001 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 6,380 kg<br>Source: Bath ICE (2.0) Region: UK<br>Density: Water - 1,000 kg/m3 Volume: 6.38 m3 | | 6.4 | 6.4 | 766 |
| Waste Water Treatment Operation | 120 days | 5.4 | 643 | 643 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 7.65 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 7.65 m3 | | 5.4 | 5.4 | 643 |
| Generated Electricity (as off-set UK general equivalent) | | (94,292,372,160) | (94,292,372,160) | (94,292,372,160) |
| Electricity (Gross Generated Output) | 60 years | (1,571,539,536) | (94,292,372,160) | (94,292,372,160) |
| Electricity 2027 to 2087<br>Carbon Factor Value: -0.063 kgCO2e/kWh<br>Property Calculation: 24,945,072,000 kWh<br>Source: A New Source Region: UK | 24,945,072,000 kWh | (0.06) | (1,571,539,536) | (94,292,372,160) |
| Decommissioning | | 2,675,177,287 | 2,675,177,287 | 2,675,177,287 |
| Materials | | 1,131,257,100 | 1,131,257,100 | 1,131,257,100 |
| Cementitious Grout | 8,250 tonnes | 740 | 6,105,000 | 6,105,000 |
| Cement - General (UK weighted average)<br>Carbon Factor Value: 0.74 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 740 | 740 | 6,105,000 |
| IX Resin | 345 tonnes | 1,930 | 665,850 | 665,850 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 1,930 | 1,930 | 665,850 |
| Sodium Hydroxide Solution | 125 tonnes | 1,100 | 137,500 | 137,500 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Sodium Hydroxide<br>Carbon Factor Value: 1.1 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 1,000 kg<br>Source: European Plastics - Sodium Hydroxide (2005) Region: Europe<br>Density: 1,000 kg/m3 Volume: 1 m3 | | 1,100 | 1,100 | 137,500 |
| Granular Active Carbon | 115 tonnes | 480 | 55,200 | 55,200 |
| Bitumen - General<br>Carbon Factor Value: 0.48 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (1.6a) Region: Global<br>Mass: 1,000 kg | | 480 | 480 | 55,200 |
| Diamond Wire Rope | 15 tonnes | 3,020 | 45,300 | 45,300 |
| Steel - Wire - Virgin<br>Carbon Factor Value: 3.02 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 3,020 | 3,020 | 45,300 |
| General Fill Materials | 1,602,000 tonnes | 224 | 358,848,000 | 358,848,000 |
| Cement - Soil Cement<br>Carbon Factor Value: 0.14 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Volume (Volume_cu_m * Density_kg_cu_m * CF)<br>Property Calculation: 1,600 kg<br>Source: Bath ICE (1.6a) Region: UK<br>Density: 1,600 kg/m3 Volume: 1 m3 | | 224 | 224 | 358,848,000 |
| Imported Topsoil | 430,000 tonnes | 1.1 | 473,000 | 473,000 |
| Waste - Construction - Soils<br>Carbon Factor Value: 1.1 kgCO2e/tonne Lifecycle: Partial process<br>Calculation: Waste Disposal - Tonnes (Weight_tonne * CF)<br>Property Calculation: 1 tonne<br>Source: Defra: Waste. Closed-loop recycling. (2017) Region: UK<br>Weight: 1 tonne | | 1.1 | 1.1 | 473,000 |
| Foamed Concrete Grout | 792,200 tonnes | 740 | 586,228,000 | 586,228,000 |
| Cement - General (UK weighted average)<br>Carbon Factor Value: 0.74 kgCO2e/kg Lifecycle: Partial process<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: UK<br>Mass: 1,000 kg | | 740 | 740 | 586,228,000 |
| KBS-3 Copper Spent Fuel Disposal Canister | 34,000 tonnes | 2,582 | 87,788,000 | 87,788,000 |
| Iron - General<br>Carbon Factor Value: 1.91 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 650 kg<br>Source: Bath ICE (1.6a) Region: Global<br>% Composition: 65 % Mass: 1,000 kg | | 1,242 | 1,242 | 42,211,000 |

| Name | Quantity | kgCO2e Single | kgCO2e Total | kgCO2e Project |
|---|---|---|---|---|
| Copper - General - Virgin<br>Carbon Factor Value: 3.83 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass with percentage composition (Mass_kg * (Percentage_Composition / 100) * CF)<br>Property Calculation: 350 kg<br>Source: Bath ICE (1.6a) Region: Global<br>% Composition: 35 % Mass: 1,000 kg | | 1,341 | 1,341 | 45,577,000 |
| Spent Fuel MPC | 2,300 tonnes | 6,520 | 14,996,000 | 14,996,000 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 14,996,000 |
| 3m3 Box | 4,700 tonnes | 6,520 | 30,644,000 | 30,644,000 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 30,644,000 |
| 3m3 Drum | 4,200 tonnes | 6,520 | 27,384,000 | 27,384,000 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 27,384,000 |
| 2m Box | 625 tonnes | 6,520 | 4,075,000 | 4,075,000 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 4,075,000 |
| 4m Box | 410 tonnes | 6,520 | 2,673,200 | 2,673,200 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 2,673,200 |
| Dolav 800mm Box | 265 tonnes | 1,930 | 511,450 | 511,450 |
| HDPE - General<br>Carbon Factor Value: 1.93 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Europe<br>Mass: 1,000 kg | | 1,930 | 1,930 | 511,450 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Half Height ISO HHISO (TC01) | 525 tonnes | 6,520 | 3,423,000 | 3,423,000 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 3,423,000 |
| Third Height ISO THISO (TC03) | 465 tonnes | 6,520 | 3,031,800 | 3,031,800 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 3,031,800 |
| WB1 Waste Box | 95 tonnes | 6,520 | 619,400 | 619,400 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 619,400 |
| TC19 210 Litre Drum | 545 tonnes | 6,520 | 3,553,400 | 3,553,400 |
| Stainless Steel - General<br>Carbon Factor Value: 6.52 kgCO2e/kg Lifecycle: Cradle to Gate<br>Calculation: Mass (Mass_kg * CF)<br>Property Calculation: 1,000 kg<br>Source: Bath ICE (2.0) Region: Global<br>Mass: 1,000 kg | | 6,520 | 6,520 | 3,553,400 |
| Transport | | 1,233,483,625 | 1,233,483,625 | 1,233,483,625 |
| Cementitious Grout | 8,250 tonnes | 425 | 3,509,583 | 3,509,583 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 3,509,583 |
| IX Resin | 345 tonnes | 425 | 146,764 | 146,764 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 146,764 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Sodium Hydroxide Solution | 125 tonnes | 425 | 53,176 | 53,176 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 53,176 |
| Granular Active Carbon | 115 tonnes | 425 | 48,921 | 48,921 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 48,921 |
| Diamond Wire Rope | 15 tonnes | 425 | 6,381 | 6,381 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 6,381 |
| General Fill Materials | 1,602,000 tonnes | 425 | 681,497,208 | 681,497,208 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 681,497,208 |
| Imported Topsoil | 430,000 tonnes | 425 | 182,923,720 | 182,923,720 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 182,923,720 |
| Foamed Concrete Grout | 792,200 tonnes | 425 | 337,005,049 | 337,005,049 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 337,005,049 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| KBS-3 Copper Spent Fuel Disposal Canister | 34,000 tonnes | 425 | 14,463,736 | 14,463,736 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 14,463,736 |
| Spent Fuel MPC | 2,300 tonnes | 425 | 978,429 | 978,429 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 978,429 |
| 3m3 Box | 4,700 tonnes | 425 | 1,999,399 | 1,999,399 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 1,999,399 |
| 3m3 Drum | 4,200 tonnes | 425 | 1,786,697 | 1,786,697 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 1,786,697 |
| 2m Box | 625 tonnes | 425 | 265,878 | 265,878 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 265,878 |
| 4m Box | 410 tonnes | 425 | 174,416 | 174,416 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 174,416 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Dolav 800mm Box | 265 tonnes | 425 | 112,732 | 112,732 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 112,732 |
| Half Height ISO HHISO (TC01) | 525 tonnes | 425 | 223,337 | 223,337 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 223,337 |
| Third Height ISO THISO (TC03) | 465 tonnes | 425 | 197,813 | 197,813 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 197,813 |
| WB1 Waste Box | 95 tonnes | 425 | 40,413 | 40,413 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 40,413 |
| TC19 210 Litre Drum | 545 tonnes | 425 | 231,845 | 231,845 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 400 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 400 km | | 425 | 425 | 231,845 |
| Non-radioactive Waste Transport (Skips) | 10,250 no. | 346 | 3,542,818 | 3,542,818 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 325 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 325 km | | 346 | 346 | 3,542,818 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| LLW Transport for Direct Disposal | 330 no. | 851 | 280,767 | 280,767 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 800 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 800 km | | 851 | 851 | 280,767 |
| LLW Transport for Incineration | 825 no. | 851 | 701,917 | 701,917 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 800 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 800 km | | 851 | 851 | 701,917 |
| LLW Transport trips for Metal Melt | 860 no. | 851 | 731,695 | 731,695 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 800 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 800 km | | 851 | 851 | 731,695 |
| ILW to Geological Disposal Facility (GDF) | 1,410 no. | 851 | 1,199,639 | 1,199,639 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 800 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 800 km | | 851 | 851 | 1,199,639 |
| Spent Fuel to Geological Disposal Facility (GDF) | 1,600 no. | 851 | 1,361,293 | 1,361,293 |
| Road Freight: Articulated HGV. 3.5 - 33t. 50% Load<br>Carbon Factor Value: 1.06351 kgCO2e/vkm Lifecycle: Cradle to Gate<br>Calculation: Vehicle Use - Vehicle Kilometre (Distance_km * CF)<br>Property Calculation: 800 vkm<br>Source: Defra: HGV. All Scope.<br>(2017) Region: UK<br>Distance: 800 km | | 851 | 851 | 1,361,293 |
| Waste | | 157,472,800 | 157,472,800 | 157,472,800 |
| Radioactive Waste | | 17,727,400 | 17,727,400 | 17,727,400 |
| Primary Decommissioning LLW/VLLW | 18,000 tonnes | 587 | 10,566,000 | 10,566,000 |

| Name | Quantity | kgCO2e Single | Total | Project |
|---|---|---|---|---|
| Waste Disposal Service - Hazardous Waste<br>Carbon Factor Value: 0.587 kgCO2e/kg<br>Property Calculation: 1,000 kg<br>Source: EPD: Hazardous Waste (26/11/2008) Region: Italy | 1,000 kg | 0.59 | 587 | 10,566,000 |
| Secondary Decommissioning LLW/VLLW | 8,600 tonnes | 587 | 5,048,200 | 5,048,200 |
| Waste Disposal Service - Hazardous Waste<br>Carbon Factor Value: 0.587 kgCO2e/kg<br>Property Calculation: 1,000 kg<br>Source: EPD: Hazardous Waste (26/11/2008) Region: Italy | 1,000 kg | 0.59 | 587 | 5,048,200 |
| Primary Decommissioning ILW | 3,400 tonnes | 587 | 1,995,800 | 1,995,800 |
| Waste Disposal Service - Hazardous Waste<br>Carbon Factor Value: 0.587 kgCO2e/kg<br>Property Calculation: 1,000 kg<br>Source: EPD: Hazardous Waste (26/11/2008) Region: Italy | 1,000 kg | 0.59 | 587 | 1,995,800 |
| Secondary Decommissioning ILW | 200 tonnes | 587 | 117,400 | 117,400 |
| Waste Disposal Service - Hazardous Waste<br>Carbon Factor Value: 0.587 kgCO2e/kg<br>Property Calculation: 1,000 kg<br>Source: EPD: Hazardous Waste (26/11/2008) Region: Italy | 1,000 kg | 0.59 | 587 | 117,400 |
| Conventional Waste | | 139,745,400 | 139,745,400 | 139,745,400 |
| Mixed Metals | 180,000 tonnes | 589 | 106,002,000 | 106,002,000 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonnes<br>Property Calculation: 1 tonnes<br>Source: A New Source | 1 tonnes | 589 | 589 | 106,002,000 |
| Timber | 1,000 tonnes | 589 | 588,900 | 588,900 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonnes<br>Property Calculation: 1 tonnes<br>Source: A New Source | 1 tonnes | 589 | 589 | 588,900 |
| Mixed Materials | 22,500 tonnes | 589 | 13,250,250 | 13,250,250 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonnes<br>Property Calculation: 1 tonnes<br>Source: A New Source | 1 tonnes | 589 | 589 | 13,250,250 |
| Gypsum | 2,500 tonnes | 589 | 1,472,250 | 1,472,250 |
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonnes<br>Property Calculation: 1 tonnes<br>Source: A New Source | 1 tonnes | 589 | 589 | 1,472,250 |
| Waste Electricals | 31,000 tonnes | 589 | 18,255,900 | 18,255,900 |

| Name | Quantity | Single (kgCO2e) | Total (kgCO2e) | Project (kgCO2e) |
|---|---|---|---|---|
| Landfill Municipal<br>Carbon Factor Value: 588.9 kgCO2e/tonnes<br>Property Calculation: 1 tonnes<br>Source: A New Source | 1 tonnes | 589 | 589 | 18,255,900 |
| Hazardous (Various) | 300 tonnes | 587 | 176,100 | 176,100 |
| Waste Disposal Service - Hazardous Waste<br>Carbon Factor Value: 0.587 kgCO2e/kg<br>Property Calculation: 1,000 kg<br>Source: EPD: Hazardous Waste (26/11/2008) Region: Italy | 1,000 kg | 0.59 | 587 | 176,100 |
| Energy/ Fuel Use | | 148,158,963 | 148,158,963 | 148,158,963 |
| Electricity<br>Carbon Factor Value: 0.069 kgCO2e/kW<br>Property Calculation: 1,200,000,000 kW<br>Source: A New Source Region: UK | 1,200,000,000 kW | 0.07 | 82,800,000 | 82,800,000 |
| Diesel | 16,600 tonnes | 3,937 | 65,358,963 | 65,358,963 |
| Diesel<br>Carbon Factor Value: 3,937.2869 kgCO2e/tonne Lifecycle: Cradle to Gate<br>Calculation: Fuel Burnt - Tonnes (Fuel_tonne * CF)<br>Property Calculation: 1 tonne<br>Source: Defra: Fuels. Mass. All Scope. (2017) Region: UK<br>Fuel: 1 Tonnes | | 3,937 | 3,937 | 65,358,963 |
| Water Use | | 4,804,800 | 4,804,800 | 4,804,800 |
| Water Use | 4,620,000 m3 | 0.34 | 1,570,800 | 1,570,800 |
| Water Supply<br>Carbon Factor Value: 0.34 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 1 m3 | | 0.34 | 0.34 | 1,570,800 |
| Water Treatment | 4,620,000 m3 | 0.70 | 3,234,000 | 3,234,000 |
| Water Treatment<br>Carbon Factor Value: 0.7 kgCO2e/m3 Lifecycle: Partial process<br>Calculation: Water - Cubic Metre (Volume_cu_m * CF)<br>Property Calculation: 1 m3<br>Source: Defra - Life-Cycle Conversion Factors (Water); All Scope (2011 (v1)) Region: UK<br>Volume: 1 m3 | | 0.70 | 0.70 | 3,234,000 |

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