East Midlands Gateway
Phase 2 (EMG2)

Document DCO 6.19B/MCO 6.19B

ENVIRONMENTAL STATEMENT

Volume 2 Technical Appendices

Appendix 19B

Greenhouse Gas Assessment

July 2025

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The East Midlands Gateway Phase 2 and Highway Order 202X and The East Midlands Gateway Rail Freight and Highway (Amendment) Order 202X

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EAST MIDLANDS GATEWAY PHASE 2 (EMG2)

Environmental Statement: Appendix 19B - Greenhouse Gas Assessment

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1.1 Overview

1.1.1 This appendix to **Chapter 19: Climate Change** (**Document DCO/MCO 6.19**) sets out the methodology and calculations of the greenhouse gas (GHG) emissions for the **EMG2 Project**. These calculations inform the assessment of the climate change impacts in **Chapter 19** (**Document DCO/MCO 6.19**). This appendix should be read in conjunction with the chapter as supporting information.

1.1.2 GHG emissions have been estimated by applying published emissions factors to activities in the baseline and to those required for the **EMG2 Project**. The emissions factors relate to a given level of activity, or amount of fuel, energy or materials used, to the mass of GHGs released as a consequence. This appendix presents the technical calculations which relate to the potential magnitude of impact as assessed within **Chapter 19: Climate Change** (**Document DCO/MCO 6.19**).

1.1.3 For ease of reading, the headings match those in **Chapter 19** (**Document DCO/MCO 6.19**), where sections are relevant to the GHG emissions assessment.

1.2 GHG Emissions Assessment Methodology

1.2.1 The GHGs considered in this assessment are those in the 'Kyoto basket' of global warming gases expressed as their CO_2-equivalent (CO_2e) global warming potential (GWP). This is denoted by CO_2e units in emissions factors and calculation results. GWPs used are typically the 100-year factors in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC, 2013) or as otherwise defined for national reporting under the United Nations Framework Convention on Climate Change (UNFCCC).

1.2.2 GHG emissions caused by an activity are often categorised into 'scope 1', 'scope 2' or 'scope 3' emissions, following the guidance of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol suite of guidance documents (WRI and WBCSD, 2004):

- Scope 1 emissions: direct GHG emissions from sources owned or controlled by the company, e.g. from combustion of fuel at an installation.
- Scope 2 emissions: caused indirectly by consumption of purchased energy, e.g. from generating electricity supplied through the national grid to an installation.
- Scope 3 emissions: all other indirect emissions occurring as a consequence of the activities of the company, e.g. in the upstream extraction, processing and transport of materials consumed or the use of sold products or services.

1.2.3 This appendix has sought to include emissions from all three scopes, where this is material and reasonably possible from the information and emissions factors available, to capture the impacts attributable most completely to the **EMG2 Project**. These emissions shall not be separated out by defined scopes (scopes 1, 2 or 3) in the assessment.

1.2.4 GHG emissions from all relevant life cycle stages of the **EMG2 Project** have been calculated in a life cycle assessment. A life cycle assessment comprises an evaluation of the inputs, outputs and potential environmental impacts that occur throughout the lifecycle of a particular project, encompassing either a cradle-to-gate (project site) or a cradle-to-grave (accounting for in use and decommissioning) approach. This can be further broken down into the following LCA phases of development, in line with RICS (2023):

- Materials and construction (A1-A5)[1].

[1] Carbon life-cycle stages A1-A3 refer to the 'product' stage embodied emissions (i.e. the emissions associated with the extraction, processing and manufacturing of building materials). Carbon life-cycle stages A4 and A5 refer to the 'construction' stage embodied

- Operations and maintenance (B1-B8)[2].
- Decommissioning (C1-C4).

1.2.5 Decommissioning of the **EMG2 Project** has not been assessed as the **EMG2 Project** is intended to be a permanent development, with no decommissioning timeline, and consideration for decommissioning at this stage would be hypothetical in nature. Nevertheless, it is considered good practice to consider the whole life GHG emissions impacts of a development, which includes emissions from end of life or decommissioning. This has been recognised qualitatively below.

1.2.6 There would be negligible end-of-life emissions associated with plant use on site, disassembly activities and material transport, given anticipated decarbonisation of the construction industry in line with UK net zero goals. Further, materials used to construct the **EMG2 Project** will be recycled at the end of their lifetime wherever possible, through the specification of recyclable and recycled materials for the buildings and infrastructure. As such, when disposing of materials, recycling is the preferred solution. This not only prevents materials from being sent to landfill, but also reduces the need for extraction of primary materials. Material which cannot be recycled might be incinerated or used to produce energy from waste. Emissions associated with the disposal of materials at the end of the lifetime is considered to be negligible and may even result in future avoided emissions. The impact of decommissioning is therefore not assessed further.

1.2.7 The sources of GHG emissions considered in this assessment, and an overview of the methodologies to calculate these emissions, are set out in Table 1.1, in accordance with the Design Manual for Roads and Bridges (DMRB) LA 114: Climate (Highways England, 2021).

Table 1.1: Sources of GHG Emissions and Overview of Calculation Methodology

Project Stage	Part of Project	Activity	Sources of GHG Emissions	Overview of Calculation Methodology
Construction	**DCO Scheme** and **MCO Scheme**	Manufacturing of the buildings (employment floorspace), associated infrastructure (including HGV loading areas, internal and external roads, landscaping, bus interchange terminal, active travel links and drainage) and Highways Works.	Embodied GHG emissions associated with the raw materials.	Application of published benchmark carbon intensities and LCA literature, analysis of example SEGRO developments' whole-life carbon (WLC) assessments, and the application of material emission intensities to material quantities.
		Construction processes, including earthworks and site preparation activities, transport of materials to site and construction activities on site.	Traffic movements to site and fuel and energy use on site.	Application of fuel emission intensities informed by construction traffic flows and plant schedules across the construction period.
		Land use change.	GHG emissions from disturbance of land.	Application of published literature carbon intensities to the type and area of land subject to change.

emissions (i.e. the emissions associated with the transport of building materials to the construction site and all construction processes on-site) (RICS, 2023).

[2] Carbon life-cycle stages B1-B5 refer to in-use embodied emissions (i.e. emissions associated with the maintenance, repair, replacement and refurbishment of a development, including the embodied emissions of the required materials). Carbon life-cycle stages B6-B7 refer to the 'operational carbon' arising from operational energy and water use. Carbon life-cycle stage B8 refers to other 'user carbon' not included in operational energy and water use, which includes road user emissions (RICS, 2023).

Project Stage	Part of Project	Activity	Sources of GHG Emissions	Overview of Calculation Methodology
Operation	**DCO Scheme** and **MCO Scheme**	Use of buildings and infrastructure by tenants and other users.	Operational energy use, including electricity and fuel use, and vehicle movements to/from the **EMG2 Works** and **EMG1 Works**.	Application of fuel and energy emission intensities to energy use and operational traffic flows.
	Highways Works	Use of roads by end users.	Vehicles using the highways infrastructure.	Application of fuel and energy emission intensities to operational traffic flows.
	DCO Scheme and **MCO Scheme**	Operation and maintenance activities.	Energy and material consumption for maintenance and refurbishment activities.	Application of published benchmark carbon intensities and LCA literature, and the application of material or fuel emission intensities to material or fuel quantities.
	DCO Scheme and **MCO Scheme**	Land use change	Net GHG flux changes as a result of proposed landscape planting	Application of published literature carbon intensities and modelled carbon sequestration rates to the type and area of land subject to change.

1.2.8 As the **EMG2 Project** is currently in the early stages of design, data relating to specific metrics for site specific design details, including specific warehouse design etc, are currently unavailable. Therefore, data has been extracted from industry benchmarks, previous SEGRO developments' WLC assessments, and indicative material quantities information provided by the design team to provide estimated figures for the construction and operation phases. Methodology specific to each item assessed is detailed in this report (see sections 1.4 and 1.5).

1.2.9 Key sources relied upon for the assessment are as follows:

- Carbon Heroes Benchmark (OneClick LCA, 2023);
- OneClick LCA Materials Database (OneClick LCA, 2025);
- Royal Institute for Chartered Surveyors (RICS) Professional Standard: Whole life carbon assessment for the built environment (2nd Edition) (RICS, 2023);
- RICS Information Paper: Methodology to calculate embodied carbon of materials (RICS, 2012);
- Woodland Carbon Code (WCC) Carbon Calculation Guidance version 2.4 (WCC, 2021) and
- UK Government GHG Conversion Factors for Company Reporting (Department for Energy Security and Net Zero (DESNZ) and Department for Environment, Food and Rural Affairs (DEFRA), 2024).

1.3 Assumptions and Limitations of the Assessment

1.3.1 Some of the construction-stage GHG emissions associated with the manufacturing of components may occur outside the territorial boundary of the UK and hence outside the scope of the UK's national carbon budget, policy and governance. However, in recognition of the climate change effect of GHG emissions (wherever occurring), and the need to avoid 'carbon leakage' overseas when reducing UK emissions, emissions associated with the construction stage have been presented within the assessment and quantification of GHG emissions as part of the **EMG2 Project**.

1.3.2 When considering the assessment of emissions resultant from the **EMG2 Project**, due to the early stage in the development design, the design of the **EMG2 Project** has not yet been fully specified.

Thus, there is a degree of uncertainty regarding the construction stage GHG emissions resulting from the manufacturing and construction of these elements of the **EMG2 Project**.

1.3.3 The assessment has sought to limit the impact this may have by assessing a maximum design scenario (which will result in a conservative or worst-case assessment). The maximum design scenario is based on the parameters plan set out in **Chapter 3: Proposed Development** (**Document DCO/MCO 6.3**). The following items comprise the main assumptions made for the maximum design scenario for the **EMG2 Project**:

- An estimated bill of materials for the buildings element (i.e. warehousing and office space) of the **EMG2 Works** and the **EMG1 Works** was developed based on WLC information collected from recently constructed comparable developments by SEGRO. The bill of materials was scaled by the maximum floorspace, listed in the Development Parameters in **Chapter 3**. Though exact material specifications may be subject to change (i.e. due to the availability of materials in proximity to the **EMG2 Project**), SEGRO are committed to a comparable level of low carbon design, as a minimum, for the **EMG2 Project**. The information provided is therefore deemed to suitably capture the material types and quantities to be used within the **EMG2 Project**. Any low carbon material specification in the bill of quantities have been set out in the mitigation measures in **Chapter 19: Climate Change** (**Document DCO/MCO 6.19**).
- The WLC assessments used to calculate the estimated bill of materials include the foundations, ground floor structure, frame, floors, roofs, stairs and ramps, external walls, internal walls and partitions, windows and doors, internal finishes and external works (including parking). The assessments did not include fittings and furnishings, services or mechanical and electrical plant (MEP), however these likely make up a proportion of total embodied carbon for a logistics development, and as such have not been considered further in this assessment.
- An estimated bill of materials for the internal road network was provided by the project team. The information provided was deemed to suitably capture the material types and quantities to be used for the **EMG2 Project**.
- Emissions associated with the construction plant during the construction-phase was calculated using a plant schedule provided by the project team, scaled by the construction programme listed in **Chapter 3: Project Description** (**Document DCO/MCO 6.3**). It is considered that this is representative of the construction work to be undertaken for the **EMG2 Project**.
- Emissions associated with operational traffic movements were informed by detailed traffic modelling. The assumptions underlying this modelling can be found in **Chapter 6: Traffic and Transport** (**Document DCO/MCO 6.6**).

1.4 Potential Impacts

Embedded Mitigation

1.4.1 As part of the **EMG2 Project** design process, a number of embedded mitigation design measures have been proposed to reduce the potential for impacts on climate change. They are considered at every stage of the **EMG2 Project** through design and best practice and, as there is a commitment to implementing these measures, these have been considered in the calculation of GHG emissions. The embedded mitigation is set out in **Chapter 19** (**Document DCO/MCO 6.19**) and summarised below.

Construction Phase

1.4.2 The **EMG2 Project** design will minimise the need for slope stabilisation by designing shallow (1 in 3 or shallower) slopes across the **EMG2 Project**. As such, no slope stabilisation measures have been specified in the design.

1.4.3 A cut/fill balance will be achieved across the EMG2 Project. On-site materials (i.e. excavated soils) will be used for bund creation to minimise the requirement for imported materials.

Operation Phase

1.4.4 Buildings will be designed such that they have the ability for occupiers to be net zero in operation. This will be achieved through wide ranging energy efficiency initiatives including targeting an EPC 'A' rating and a minimum of BREEAM 'Outstanding' as part of SEGRO base build specification and on-site installation of solar PV generating renewable energy for occupiers, and enabling decarbonisation in parallel with grid electricity. Additionally, 'be lean' and 'be clean' mitigation measures have been identified in the Energy Report (**Appendix 19D**, **DCO/CO Document 6.19D**). The buildings will be designed to meet the requirements of the Future Buildings Standard.

1.4.5 The above mitigation measures apply to both the **EMG2 Works** and **EMG1 Works** buildings.

Assessment of Construction Effects – GHG Assessment

1.4.6 The following paragraphs detail the construction stage emissions associated with the **EMG2 Project** to inform a 'do minimum' assessment prior to the implementation of further mitigation. This has included consideration of the DCO Application and the MCO Application separately and then in combination.

1.4.7 The construction stage emissions cover the LCA stages A1-A5. This includes embodied carbon emissions from materials, emissions associated with the transport of materials and workers to site, and the energy and fuel use on site during the construction process.

DCO Application

EMG2 Works Buildings

1.4.8 The buildings elements of the **EMG2 Works** include a maximum of 300,000 m^2 of employment floorspace, and 200,000 m^2 of internal mezzanine space, comprising predominantly logistics facilities with up to 20% of the floorspace capable of being used for advanced manufacturing.

1.4.9 Published benchmark data has been used to calculate emissions associated with the **EMG2 Project** in the absence of mitigation, in order to identify the potential impacts.

1.4.10 Two sources of benchmark data have been considered for the assessment of construction effects: examples published in the RICS Standard IP32/2012 information paper (RICS, 2012); and UK-specific benchmarks contained within the Carbon Heroes Benchmarking Database, produced by OneClick LCA (OneClick LCA, 2023).

1.4.11 Examples provided in the RICS Standard IP32/2012 information paper are a collection of information based on life cycle analyses (LCAs) of buildings in design or construction. This paper provides benchmark carbon intensities that include life-cycle stages A1-A3 and are given for UK warehousing/logistics and office uses. The RICS guide suggests a 'single point' estimate of 410 $kgCO_2e/m^2$ for warehousing/logistics and 435 $kgCO_2e/m^2$ for light industrial use.

1.4.12 The Carbon Heroes Database is developed using data input into the LCA software OneClick LCA. Data input from projects is anonymised and included into the benchmarks based on mechanical and manual screening that considers consistency, completeness and plausibility. Projects that display aberrant values or inconsistency have been excluded from the samples. The database includes lifecycle stages A1-A3, A4, B4-B5 and C1-C4 and are given for UK warehouses, industrial buildings and offices. The most recent benchmarks available are those published in Q3 of 2023. Average Carbon Heroes database values for each building type have been used to inform the calculations of embodied carbon, and are 660 $kgCO_2e/m^2$ for UK warehouses and 471 $kgCO_2e/m^2$ for UK industrial buildings.

1.4.13 The RICS guide to calculation of embodied carbon (RICS, 2012) provides an estimation of the sources (in terms of lifecycle stages) of the GHG emissions involved in the construction and use of buildings. Figure 1.1 highlights that emissions from distribution (A4), refurbishment (B4-B5) and end of life (C1-C4) account for 8.3% of total A1-A4, B4-B5 and C1-C4 emissions (i.e. those covered by

the Carbon Heroes benchmark)[3]. As such, a reduction of 8.3% has been applied to the OneClick (2023) benchmarks, to produce an A1-A3 (materials) figure. This corresponds to adjusted benchmarks of 605 $kgCO_2e/m^2$ for UK warehouses and 432 $kgCO_2e/m^2$ for UK industrial buildings.

Figure 1.1: Examples of building GHG emissions by life cycle stage

1.4.14 As the RICS (2012) benchmarks account for LCA stages A1-A3, no uplifts or reductions have been made to the published benchmarks.

1.4.15 It should be noted that life-cycle analyses of different buildings may not be directly comparable (differing in scope, assumptions and energy mix for example). Furthermore, there is substantial variation in building design, materials choice, year of development[4] and hence embodied carbon between benchmarks. As such, the most conservative of the available benchmarks have been used to ensure a robust assessment.

1.4.16 These benchmarks have been scaled by the Gross Internal Area (GIA) for the **EMG2 Works** buildings, as set out in the parameters plan; resultant emissions are summarised within Table 1.2 below.

Table 1.2: EMG2 Works Construction Emissions - Buildings

Total Floorspace (m^2 GIA)	RICS Benchmark ($kgCO_2e/m^2$)	Carbon Heroes Benchmark ($kgCO_2e/m^2$)	Total Embodied Carbon (tCO_2e) (worst case)
300,000	410 – 435	432 – 605	181,598

1.4.17 Embodied emissions associated with the PV proposed to be installed on the building roofs have been calculated by scaling the proposed roof area PV coverage (20% of the total GIA, or 60,000 m^2), by an EPD for monocrystalline solar panels (148 $kgCO_2e/m^2$) (OneClick, 2025). Embodied emissions are calculated to be 8,880 tCO_2e.

1.4.18 The total pre-mitigation A1-A3 (material cradle to gate) emissions have been calculated to be 190,478 tCO_2e.

EMG2 Works Infrastructure

1.4.19 The infrastructure elements of the **EMG2 Works** include:

- a series of Development Zones including supporting infrastructure to the buildings (parking and HGV turning/loading areas);
- vehicular access from the A453 (DCO Works No. 6);
- provision of a new estate road serving the Development Zones;
- HGV parking area;
- bus interchange terminal;
- strategic drainage infrastructure, including attenuation basins; and

[3] The total design to construction, and refurbishment and demolition (A1-A4, B4-B5 and C1-C4) lifecycle stages, covered by the Carbon Heroes benchmark, account for 16.9% of a building's lifecycle carbon emissions, and the distribution, refurbishment and demolition stages account for 1.4%. Therefore the distribution, refurbishment and demolition stages (A4, B4-B5 and C1-C4) stages account for 8.3% of the design to construction, and refurbishment and demolition stages.

[4] The Carbon Heroes database provides benchmarks based on published data up to 2023, while the RICS benchmarks were published in 2012.

- substation building, housing switchgear and transformers.

1.4.20 To enable the **EMG2 Project**, substantial earthworks will be required to be undertaken, particularly on the **EMG2 Works**, given the site slopes towards the south with a significant fall. This will result in the creation of three main development plateaus to the north of Hyam's Lane and a further four development plateaus to the south. Surplus soil will be used to create the mounding required as part of the landscaping strategy. The cut and fill exercise will be designed to enable a balance across the **EMG2 Project** to avoid any off site removal or import of material. As such, there will be negligible emissions associated with the structural earthworks embodied carbon, given no material will be imported to site for this purpose. Emissions associated with the earthworks activities (i.e. plant use on site) and emissions from land use change are discussed in paragraphs 1.4.27 and 1.4.31 below.

1.4.21 The A1-A3 emissions from the parking, HGV turning/loading areas, vehicular access from the A453, HGV parking area, bus interchange terminal and estate road have been calculated based on an indicative road profile provided by the project team, which has been applied to all paved infrastructure elements. The profile has been scaled by the development area, calculated from the indicative masterplan (see Figure 3.2) for each infrastructure element, and subsequently scaled by relevant materials emissions factors for stone mastic asphalt (0.0653 $kgCO_2e/kg$), asphalt concrete (0.0511 $kgCO_2e/kg$) and aggregates (0.00671 $kgCO_2e/kg$) (OneClick LCA, 2025). Development areas and resultant emissions are summarised within Table 1.3 below.

1.4.22 Emissions associated with drainage infrastructure have been calculated based on an indicative bill of quantities provided by the project team, scaled by relevant materials emissions factors for polyvinyl chloride (PVC) pipework (3.23 $kgCO_2e/kg$) and precast concrete pipework (0.138 $kgCO_2e/kg$) (OneClick LCA, 2025). Resultant emissions are summarised within Table 1.3 below.

1.4.23 The embodied carbon emissions of the substation electrical equipment were calculated using an average of a series of Environmental Product Declarations (EPDs) for switchgear (Schneider Electric, 2011;2014;2023a;2023b;2024) of 2,466 $kgCO_2e$ per switchgear unit, scaled by the number of units (two) as informed by the project team. For the substation building and housing, the total building area (provided by the project team) was scaled by the building embodied carbon benchmark for "Other Industrial/Utilities/Specialist Uses" (RICS, 2012), of 545 $kgCO_2e/m^2$.

1.4.24 The embodied carbon emissions of the additional floorspace for the bus terminal office and HGV amenity building was calculated by scaling the total building area (as set out in the Parameters Plan) by the building embodied carbon benchmark for UK Offices (OneClick, 2023), of 722 $kgCO_2e/m^2$.

Table 1.3: EMG2 Works Construction Emissions - Infrastructure

Infrastructure Component	Total Development Area (m^2)	Total Embodied Carbon (tCO_2e)
HGV loading/turning areas	129,717	6,028
Car parking areas	65,307	3,035
Estate road and EMG2 Access Works	21,470	998
HGV parking (Plot 7)	11,606	539
Bus interchange terminal	2,540	118
Drainage	N/A	TBC
Substation	58	36
Bus terminal office	500	361
HGV amenity building	500	361
Total	**231,698**	**11,477**

1.4.25 The total A1-A3 (material cradle to gate) emissions for the **EMG2 Works** infrastructure have been calculated to be 11,477 tCO_2e.

EMG2 Works Construction Activities

1.4.26 Construction site activities for the **EMG2 Works** include:

- plant use on site to undertake construction of the **EMG2 Works** buildings and infrastructure; and
- transport of materials and personnel to site.

1.4.27 The emissions associated with the use of construction plant, alongside the transport of materials and construction personnel to site, have been calculated following the methodologies detailed below.

1.4.28 An indicative plant schedule and construction programme was provided by the project team for each of the primary activities listed in paragraph 1.4.26, and was scaled by plant working hours and relevant emissions factors sourced from the OneClick LCA database (OneClick LCA, 2025). Resultant emissions associated with site construction activities are set out in Table 1.5 and total 9,005 tCO_2e.

Table 1.4: EMG2 Works Construction Emissions – Plant and Equipment

Plant / Equipment	Total Working Hours	Emission Factor ($kgCO_2e/hr$)	Construction Emissions (tCO_2e)
Dump truck	96,180	38.1	3664
Excavator (tracked)	63,670	30.8	1960
Excavator (wheeled)	2,760	26.8	74
Bulldozer	28,000	42.3	1183
Telehandler	27,750	20.8	577
Asphalt compactor	27,430	17.4	477
Forklift	11,100	22.2	247
Crane	9,250	24.2	224
Compressor	2,400	41.1	99
Tractor	5,875	14.6	86
Multipurpose plant	2,000	10.8	22
Asphalt paver	4,250	0.1	16
Other[5]	18,325	NA	376
Total	**298,990**		**9,005**

1.4.29 Two-way HGV movements associated with the construction of the **EMG2 Works** have been scaled by an assumed average distance of travel (120km, in line with RICS (2023) whole life carbon guidance for nationally manufactured construction materials such as structural steelwork, reinforcement and precast concrete), and an emissions factor for fully laden diesel HGVs ($0.985kgCO_2e/km$) (DESNZ and Defra, 2024). Emissions from two-way personnel movements have been calculated using the same methodology, with an average commuting distance of 11.7km (Department for Transport, 2024a) and emissions factor for average petrol cars ($0.178kgCO_2e/km$) (DESNZ and Defra, 2024).

1.4.30 Emissions associated with the EMG2 Works construction activities are set out in Table 1.5.

Table 1.5: EMG2 Works Construction Emissions – Construction Activities

Construction activity	Plant / Equipment	Construction Emissions (tCO_2e)
Construction plant use	Dumpers, fork lifts, concrete pump, mobile cranes, loaders, mobile elevating work platforms	9,005
Transport of materials to site	HGVs	TBC
Personnel transport to site	Cars	TBC

[5] Other plant includes hand operated machinery, compactors, concrete pumps, vibrators and loaders.

Construction activity	Plant / Equipment	Construction Emissions (tCO_2e)
Total		**9,005**

Land Use Change

1.4.31 The current land use for the **EMG2 Works** and **Highways Works** is arable land. Desk study and field study data (see **Chapter 15: Agriculture and Soils** (**Document DCO/MCO 6.15**) and **Chapter 14: Ground Conditions** (**Document DCO/MCO 6.14**)) demonstrate the absence of any significant carbon stores across the Order Limits, such as peat or woodland. Good practice soil management construction practices are set out in the site-specific Soil Management Plan (SMP) (**Appendix 15C** (**Document DCO/MCO 6.15C**)). Adherence to the SMP will protect soil resources ensuring their availability for use in landscaping, and minimise soil disturbance. As such any emissions resulting from the change in land use would be negligible.

Highways Works Infrastructure

1.4.32 Infrastructure elements proposed as part of the **Highways Works** include:

- A50 Eastbound to J24 interchange link upgrades (DCO Works No. 11);
- M1 Northbound and J24 to A50 Westbound upgrades, including bridge construction (DCO Works No. 8, 9 and 10);
- Amendments to EMG1 entry (DCO Works No. 3B, 5B and 5C);
- EMG1 Access Junction capacity improvements (DCO Works No. 13);
- EMG2 A452 access junction (DCO Works No. 6);
- EMG2 principal access alternative location;
- Finger farm roundabout improvements (DCO Works No. 18); and
- active travel works, including provision of shared footpath/cycleway along the A453 (the Active Travel Link), Hyam's Lane Works and new footpaths.

1.4.33 Embodied emissions associated with the materials used in the construction of the above elements have been calculated based on an indicative road profile, new road development areas and road resurfacing areas provided by the project team. Material quantities based on development areas and road profiles were subsequently scaled by relevant materials emissions factors for stone mastic asphalt (0.0653 $kgCO_2e/kg$), asphalt concrete (0.0522 $kgCO_2e/kg$), ready mix concrete (178 $kgCO_2e/m^3$) and aggregates (0.00671 $kgCO_2e/kg$) (OneClick LCA, 2025). Development areas and resultant emissions are summarised within Table 1.6 below.

1.4.34 Embodied emissions associated with the bridge construction have been calculated using an estimated bill of quantities provided by the project team, scaled by relevant emissions factors for aggregates (0.0067 $kgCO_2e/kg$), asphalt concrete (0.052 $kgCO_2e/kg$), thin surface course system asphalt (0.073 $kgCO_2e/kg$), steel rebar (0.76 $kgCO_2e/kg$), ready mix concrete (205 $kgCO_2e/m^3$), and precast reinforced concrete (763 $kgCO_2e/m^3$) (OneClick LCA, 2025). Total A1-A3 (material cradle to gate) emissions are shown in Table 1.6.

Table 1.6: Highways Works Construction Emissions – Infrastructure

Infrastructure Component	New Road Development Area (m^2)	Road Resurfacing Area (m^2)	Total Embodied Carbon (tCO_2e)
Active travel works	1,375	0	64
A50EB to J24 interchange link	1,518	1,150	154
M1 NB & J24 to A50WB	11,772	4,033	1,165
Amendments to EMG1 entry	30	260	4
EMG1 access junction capacity improvement	205	73	20

Infrastructure Component	New Road Development Area (m^2)	Road Resurfacing Area (m^2)	Total Embodied Carbon (tCO_2e)
A452 EMG2 access junction	790	633	80
EMG2 Principal access alternative location	2,871	1,067	285
Finger farm roundabout improvements	150	370	17
M1 J24 Works – bridge construction	N/A	N/A	3,745
Total			**2,412**

Highways Works Construction Activities

1.4.35 The construction activities at the **Highways Works** include:

- plant use on site to undertake construction of the **EMG1 Works** buildings and infrastructure; and
- transport of materials and personnel to site.

1.4.36 Emissions associated with the plant use (A5) have been calculated using the methodology in paragraphs 1.4.26 to 1.4.29 above. Emissions associated with construction traffic movements (A4) have been calculated using the methodology in paragraph 1.4.29 above.

1.4.37 Site plant specifications, working hours, emissions factors and resultant emissions are shown in Table 1.7.

Table 1.7: Highways Works Construction Emissions – Plant and Equipment

Plant / Equipment	Total Working Hours	Emission Factor ($kgCO_2e/hr$)	Construction Emissions (tCO_2e)
Excavator (tracked)	33,220	30.8	1,023
Dump truck	19,945	38.1	760
Bulldozer	10,150	42.3	429
Asphalt compactor	6,560	17.4	114
Multipurpose plant	8,400	10.8	91
Other[6]	1,475	NA	31
Total	**78,675**		**2,444**

1.4.38 Emissions associated with the **Highways Works** plant construction activities are set out in Table 1.8.

Table 1.8: Highways Works Construction Emissions - Plant Construction Activities

Construction activity	Plant / Equipment	Construction Emissions (tCO_2e)
Construction plant use	Excavators, dumpers. bulldozers, compactors, multipurpose plant, pumps, mixers and compressors	2,444
Transport of materials to site	HGVs	TBC
Personnel transport to site	Cars	TBC
Total		**2,444**

[6] Other plant includes concrete pumps, vibrators, mixers, compressors and excavators.

MCO Application

EMG1 Works Buildings

1.4.39 The buildings elements of the **EMG1 Works** include provision of a maximum of 26,500 m^2 of additional warehousing, and 3,500 m^2 of internal mezzanine space.

1.4.40 Associated pre-mitigation emissions have been calculated using the methodology detailed from paragraphs 1.4.8 to 1.4.18 above. The total A1-A3 (material cradle to gate) emissions are shown in Table 1.9 below, and have been calculated to be 16,826 tCO_2e.

Table 1.9: EMG1 Works Construction Emissions - Buildings

Element	Total Floorspace (m^2 GIA)	RICS Benchmark ($kgCO_2e/m^2$)	Carbon Heroes Benchmark ($kgCO_2e/m^2$)	Total Embodied Carbon (tCO_2e) (worst case)
Building structure	26,500	410 – 435	432 – 605	16,041
PV	NA	NA	NA	784
Total				16,826

EMG1 Works Infrastructure

1.4.41 The infrastructure elements of the **EMG1 Works** include:

- supporting infrastructure to the building(s) at Plot 16 (HGV loading areas and parking);
- increase to the maximum permitted height of gantry cranes at the rail freight interchange to 24 m;
- expansion of the EMG1 Management Suite;
- enhancements to the Public Transport Interchange, through installation of EV charging infrastructure and a drop-off layby;
- upgrade of the EMG1 substation, including a new switch room and switchgear; and
- drainage infrastructure, including attenuation and Sustainable Drainage (SuDS) features.

1.4.42 Improvements to the existing rail freight terminal are to increase crane heights, with no substantial construction works taking place. Public Transport Interchange enhancements include EV charging infrastructure installation and provision of a drop-off layby, and also do not have substantial construction works. As such, construction emissions from rail freight terminal improvements and Public Transport Interchange enhancements are likely to be negligible and immaterial, and have not been quantitatively assessed further.

1.4.43 For the parking and HGV turning/loading areas, embodied emissions have been calculated using the methodology in paragraph 1.4.20 above. Embodied emissions from drainage infrastructure have been calculated using the methodology in paragraph 1.4.22 above. Embodied emissions associated with the substation upgrade have been calculated using the methodology in paragraph 1.4.23 above. Embodied emissions associated with the Management Suite have been calculated in accordance with the methodology in paragraph 1.4.24 above, using benchmark data for office space, with an emissions intensity of 722 $kgCO_2e/m^2$ (OneClick, 2023), scaled by the area of the Management Suite expansion (as provided in the Parameters Plan). Development areas and resultant emissions are summarised within Table 1.10 below.

Table 1.10: EMG1 Works Construction Emissions – Infrastructure

Infrastructure Component	Total Development Area (m^2)	Total Embodied Carbon (tCO_2e)
HGV loading/turning areas	17,273	803
Car parking areas	6,865	319
Drainage	N/A	TBC
Management Suite expansion	500	361

Infrastructure Component	Total Development Area (m^2)	Total Embodied Carbon (tCO_2e)
Substation upgrade	58	34
Total	**24,691**	**1,517**

Construction Activities

1.4.44 The construction activities at **EMG1 Works** include:

- plant use on site to undertake construction of the **EMG1 Works** buildings and infrastructure; and
- transport of materials and personnel to site.

1.4.45 Emissions associated with the plant use (A5) have been calculated using the methodology in paragraphs 1.4.26 to 1.4.28 above. Emissions associated with construction traffic movements (A4) have been calculated using the methodology in paragraph 1.4.29 above.

1.4.46 Site plant specifications, working hours, emissions factors and resultant emissions are shown in Table 1.11.

Table 1.11: EMG1 Works Construction Emissions – Plant and Equipment

Plant / Equipment	Total Working Hours	Emission Factor ($kgCO_2e/hr$)	Construction Emissions (tCO_2e)
Telehandler	2,775	20.8	58
Forklift	1,110	22.2	25
Crane	925	24.2	22
Dump truck	900	38.1	34
Loader	740	29.9	22
Other[7]	1,475	NA	31
Total	**7,925**		**193**

1.4.47 Emissions associated with the EMG1 Works plant construction activities are set out in Table 1.12.

Table 1.12: EMG1 Works Construction Emissions – Plant Construction Activities

Construction activity	Plant / Equipment	Construction Emissions (tCO_2e)
Construction plant use	Dumpers, fork lifts, concrete pump, mobile cranes, loaders, mobile elevating work platforms	193
Transport of materials to site	HGVs	TBC
Personnel transport to site	Cars	TBC
Total		**193**

EMG1 Works Land Use Change

1.4.48 As per paragraph 1.4.31 above, minimal carbon emissions are anticipated from land use change.

[7] Other plant includes concrete pumps, vibrators, mixers, compressors and excavators.

Summary and Magnitude of Impact

1.4.49 The estimated GHG emissions arising from the construction stage of the **EMG2 Project**, split by the DCO Application and the MCO Application are presented in Table 1.13.

Table 1.13: Summary of Pre-Mitigation Construction Stage GHG Emissions

Project Elements	Emissions (tCO_2e)
DCO Application	218,920
MCO Application	18,535
EMG2 Project	237,455

Assessment of Operational Effects – GHG Assessment

1.4.50 The following paragraphs detail the operational emissions associated with the **EMG2 Project** to inform a 'do minimum' assessment prior to the implementation of further mitigation.

1.4.51 The operation stage emissions cover the LCA stages B1-B8. This includes operational energy emissions from the use of the **EMG2 Project**, emissions from traffic (HGV movements, worker commuting and other road user emissions), and emissions from the maintenance and refurbishment of the **EMG2 Project**.

DCO Application

EMG2 Buildings Energy Use

1.4.52 Energy demand associated with the **EMG2 Works** buildings was calculated within **Appendix 19D**: Energy Statement (**Document DCO/MCO 6.19D**). Energy modelling was undertaken using the Government approved Integrated Environmental Solutions (IES) thermal modelling methodology. Embedded mitigation measures were considered in the modelling.

1.4.53 With regards to the 'be lean' measures, energy modelling incorporated improvements beyond building regulation requirements, including improvements in U values for all building fabric elements and openings, specification of high efficiency building services, in order to exceed current Part L requirements and meet the indicative Future Building Standard requirements.

1.4.54 With regards to the 'be green' measures, solar PV will be installed to cover 20% of building roofs. Warehouses will have the structural capacity to support 100% PV coverage, and as such, should tenants require greater unregulated energy demand from more energy intense activities than anticipated, greater coverage of PV can be accommodated.

1.4.55 Overall, total energy demand was calculated to be 39,328 MWh per year (comprising 2,209 MWh per year of regulated energy[8] and 37,119 MWh per year of unregulated energy[9]). This corresponds to a saving of 1,384 MWh compared to a 'business as usual' scenario (modelled on 2021 Part L building regulations), as set out in **Appendix 19D**: Energy Statement (**Document DCO/MCO 6.19D**).

1.4.56 The total energy consumption has been scaled by the current UK electricity emissions factor ($0.207kgCO_2e/kWh$) (DESNZ and Defra, 2024) and associated upstream 'scope 3' transmission and distribution and well-to-tank losses ($0.0682kgCO_2e/kWh$) (DESNZ and Defra, 2024). Total operational emissions from the **EMG2 Works** buildings total 10,824 tCO_2e in the first year of operation, of which 608 tCO_2e is regulated energy and 10,216 tCO_2e is unregulated energy.

1.4.57 It should be noted that figures from the DESNZ and Defra (2024) GHG conversion factors have been used, and as such, the operational GHG emissions form a fixed current year estimate. Due to this, the 11,205 tCO_2e per annum figure provided for operational GHG use does not account for the

[8] Energy consumption from controlled fixed building services and fittings, such as space heating and cooling, lighting, hot water and ventilation.

[9] Energy consumption from other tenant installations and non-fixed appliances.

steady decarbonisation of electricity that is expected in line with policy and legislation as the UK moves towards its net zero 2050 target. This therefore provides a conservative assumption for the magnitude of impact.

EMG2 Works Road Users

1.4.58 The transport emissions associated with the **EMG2 Works** during operation include commuters driving to/from the **EMG2 Works**, and HGV movements to/from the **EMG2 Works**.

1.4.59 Development traffic flows for HGVs, and light vehicles have been modelled to generate 24-hour two-way Annual Average Daily Traffic (AADT) movements for the **EMG2 Works** (see **Chapter 6: Traffic and Transport** (**Document DCO/MCO 6.6**) for more information). Light vehicle movements have been assumed to be predominantly car movements for commuting.

1.4.60 The two-way commuter traffic movements were scaled by the 2023 average commuting distance in the East Midlands (7.3 miles) (Department for Transport, 2024a), and relevant emissions factors for petrol, diesel, hybrid and electric vehicles (DESNZ and Defra, 2024), based on current UK fleet mix statistics (DVLA, 2024). The two-way HGV traffic movements were scaled by the 2023 average HGV haulage distance (107 km) (Department for Transport, 2024b) and relevant emissions factor for average laden HGVs (0.873 $kgCO_2e/km$) (DESNZ and Defra, 2024). Resultant emissions have been calculated to total 111,841 tCO_2e in the first year of operation.

1.4.61 It should be noted that, similarly to paragraph 1.4.57 above, the 111,841 tCO_2e per annum figure provided for traffic GHG emissions does not account for the steady decarbonisation of the transport sector that is in line with policy and legislation as the UK moves towards its net zero 2050 target. As such, it can be anticipated that associated emissions reduce throughout the **EMG2 Project's** lifetime.

Refurbishment and Maintenance

1.4.62 In addition to the emissions set out in paragraphs 1.4.52 to 1.4.61 above, operational emissions arise from maintenance and refurbishment of the **EMG2 Works**. Maintenance can be divided into preventative maintenance and corrective maintenance:

- Preventative maintenance: proactive repair to, or replacement of, known wear components based on routine inspections or monitoring systems
- Corrective maintenance includes the reactive repair or replacement of failed or damaged components.

1.4.63 Maintenance activities related to the **EMG2 Works** largely involve inspection, monitoring, repainting, repair of internal road surfaces and building repair and refurbishment.

1.4.64 Maintenance (module B2) emissions have been calculated by applying a benchmark of 10 $kgCO_2e/m^2$ GIA to the total area of the **EMG2 Works** as per best industry practice (RICS, 2023). Repair (module B3) emissions have been calculated as 25% of B2 emissions, in line with RICS (2023). Maintenance and repair emissions total 3,750 tCO_2e over the lifetime of the **EMG2 Works**.

1.4.65 Refurbishment and material replacement (module B4) emissions have been calculated for the **EMG2 Works** infrastructure by applying material design lifetimes from RICS (2023) and OneClick (2025), to estimated material quantities. In line with National Highways (2021) and RICS (2023) guidance, the design life for the **EMG2 Works** has been assumed to be 60 years. In the absence of bill of quantity information to inform pre-mitigation emissions, refurbishment (module B4) emissions for the **EMG2 Works** buildings have been calculated based on the ratio of post-mitigation refurbishment emissions to construction (A1-A5) emissions. Refurbishment emissions total 53,991 tCO_2e for the buildings and 16,429 tCO_2e for infrastructure.

1.4.66 Overall, total refurbishment and maintenance emissions are 74,170 tCO_2e over the lifetime of **EMG2 Works.** This equates to 1,236 tCO_2e per year of operation, on average, though individual years of operation may be more or less than this total (owing to the intermittent nature of material replacement programmes).

1.4.67 It should be noted that, similarly to paragraph 1.4.57 above, the 1,236 tCO_2e per annum figure provided for refurbishment and maintenance GHG emissions does not account for the steady

decarbonisation of the construction sector that is in line with policy and legislation as the UK moves towards its net zero 2050 target.

Highways Works Operational Emissions

1.4.68 The transport emissions associated with the Highways Works include modified traffic flows from users of the road network as a result of the Highways Works. Emissions have not yet been calculated at this consultation stage, but will be considered in further detail at the ES stage following the completion of operational traffic modelling. Emissions will be calculated using air quality modelling, informed by projected traffic flows with and without the proposed **Highways Works**.

1.4.69 Emissions associated with maintenance and refurbishment activities have been calculated in line with paragraphs 1.4.62 to 1.4.65 above. Refurbishment emissions total 2,999 tCO_2e over the lifetime of the **Highways Works**, and 50 tCO_2e per year of operation.

Land Use Change

1.4.70 There will be substantial landscape planting at the **EMG2 Works**, including woodland (see **Figure 3.2**). When managed sustainably, woodland acts as a "carbon sink", sequestering or removing CO_2 from the atmosphere over time. As such, the landscape planting will reduce total lifetime emissions associated with the **EMG2 Project**. The landscape plan (**Figure 10.11**) includes an area of 10 ha for mixed broadleaf woodland planting.

1.4.71 The emissions removals from woodland planting have been calculated using WCC modelling, an internationally recognised standard for calculating carbon credits from woodland restoration and planting projects (WCC, 2021). The total woodland area, alongside indicative species mixes and planting densities were input into the WCC modelling, which calculated emissions removals of 45 tCO_2e over the first five years following woodland establishment, 164 tCO_2e between 5-10 years, 1,112 tCO_2e between 10-20 years, 2,241 tCO_2e between 20-40 years, and 917 tCO_2e tCO_2 between 40-60 years, reaching a total of 4,479 tCO_2 sequestered. Average yearly removals during the operation of **EMG2** are therefore calculated to be 75 tCO_2e.

MCO Application

EMG1 Works Buildings

1.4.72 The operational energy use of the **EMG1 Works** buildings has been calculated using the methodology in paragraphs 1.4.52 to 1.4.56 above. Total energy consumption has been assessed to be 1,487 MWh per year (comprising 241 MWh of regulated energy demand, and 1,245 MWh of unregulated energy demand per annum). This corresponds to a saving of 150 MWh per year compared to a 'business as usual' scenario. Emissions total 409 tCO_2e per annum in the first year of operation, of which 66 tCO_2e is regulated energy and 343 tCO_2e is unregulated energy.

EMG1 Works Road Users

1.4.73 The transport emissions associated with the **EMG1 Works** include commuter travel and HGV movements to/from the **EMG1 Works**. Transport emissions have been calculated using the methodology in paragraphs 1.4.58 to 1.4.61 above. Resultant emissions total 9,021 tCO_2e in the first year of operation.

1.4.74 As set out in **Chapter 3: Proposed Development** (**Document DCO/MCO 6.3**), no additional capacity for train movements is proposed at the rail freight interchange beyond the 16 trains per day approved through the EMG1 DCO. As such, emissions associated with train movements have not been assessed as part of the **EMG2 Project** in isolation, but are considered qualitatively as part of cumulative effects with the wider EMG1 development.

EMG1 Works Refurbishment and Maintenance

1.4.75 Emissions associated with maintenance and refurbishment activities have been calculated in line with paragraphs 1.4.62 to 1.4.65 above. Refurbishment emissions total 6,726 tCO_2e over the lifetime of the **EMG1 Works**, and 112 tCO_2e per year of operation.

Summary and Magnitude of Impact

1.4.76 The estimated pre-mitigation GHG emissions arising from the first year of operation of the **EMG2 Project**, split by the **EMG2** (the DCO Application, including the **EMG2 Works** and **Highways Works**), and the **EMG1 Works** (the Material Change Application) are presented in Table 1.14.

Table 1.14: Summary of Pre-mitigation Operational GHG Emissions

Project Element	Emissions per year of operation (tCO_2e)
DCO Application	123,877
MCO Application	9,542
EMG2 Project	133,419

1.5 Mitigation Measures

1.5.1 Full mitigation measures for the **EMG2 Project** are provided in **Chapter 19: Climate Change** (**Document DCO/MCO 6.19**) and the Carbon Management Plan (**Document DCO/MCO 6.19E**). A summary of those relevant for the GHG assessment are presented below.

Construction Phase

1.5.2 The Applicant is committed to reducing embodied emissions in its buildings, given their commitment to achieving Net Zero across all business operations by 2050 at the latest. As such, all new construction projects aim to have an embodied emissions intensity of less than 320 $kgCO_2e/m^2$ lettable floor area. This limit covers emissions from LCA stages A1-A5. The limit applies to the **EMG2 Project**, and will be achieved through the selection of low carbon building materials (e.g. recycled steel, concrete with cement replacement) and reducing site activity emissions (e.g. optimising site activity efficiency, and use of electric plant) where feasible.

1.5.3 The Applicant is also committed to reducing embodied emissions in the infrastructure elements of the **EMG2 Project**. This will be achieved through material reduction ("no build") and the selection of low carbon building materials (e.g. warm mix asphalt, recycled aggregates and use of permeable paving/eco grids).

1.5.4 As part of the landscaping design, areas of woodland planting with the **EMG2 Works** are proposed, which would sequester carbon over the **EMG2 Project's** lifetime.

Operation

1.5.5 The Energy Strategy (**Appendix 19D, Document DCO/MCO 6.19D**) details the means by which the emissions associated with the operational energy demand of the **EMG2 Project** buildings will be reduced. The strategy follows the energy hierarchy: be lean (reduce building energy consumption), be clean (supply the energy required in an efficient manner), and be green (supply remaining energy from low carbon and renewable energy sources). In addition, the Applicant is targeting BREEAM Outstanding and EPC A ratings for all buildings.

1.5.6 Additionally, SEGRO will engage with its future tenants to reduce unregulated building energy use, and maximise the use of renewable energy across the Project.

1.5.7 A Sustainable Travel Strategy (STS) has been prepared and will be submitted as part of the DCO Application. The STS sets out how sustainable travel will be enhanced and proposed at the **EMG2 Project**, to ensure that future employees have viable and attractive options to walk, cycle, use public transport, car share or use electric vehicles to reach the site.

1.5.8 Finally, SEGRO will engage with its future tenants to reduce emissions from HGV traffic where feasible. Measures could include use of electric HGVs by tenants, and the provision of electric HGV charging points.

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1.6 Residual Effects

Assessment of Construction Effects – GHG Assessment

1.6.1 The following paragraphs detail the construction stage emissions associated with the **EMG2 Project**, following the implementation of mitigation measures summarised above.

DCO Application

EMG2 Works Buildings

1.6.2 The post-mitigation A1-A3 construction emissions resultant from the **EMG2 Works** buildings have been calculated based on an estimated bill of quantities, incorporating good practice design measures common to SEGRO developments, and which would be applied to the **EMG2 Project** where feasible. This estimated bill of quantities has been informed by WLC assessments of nine recently completed developments by the Applicant:

- Smartparc SEGRO Derby
- Smartparc SEGRO Derby, Unit 2
- East Midlands Gateway, Unit 11
- East Midlands Gateway, Unit 5
- SEGRO Park Tottenham
- SEGRO Park Hayes
- Slough Trading Estate, Buckingham Avenue
- SEGRO Park Bracknell, Plot 4
- Slough Trading Estate, Ajax Avenue

1.6.3 The above developments are considered to represent current SEGRO standard design for buildings similar to those proposed for the **EMG2 Works** and **EMG1 Works**. As the specific design and associated bill of quantities (BoQ) for the buildings at the **EMG2 Works** and **EMG1 Works** has not yet been specified, it is considered that the resultant estimated BoQ will appropriately represent likely material use.

1.6.4 The WLC assessments for the sample developments include the foundations, ground floor structure, frame, floors, roofs, stairs and ramps, external walls, internal walls and partitions, windows and doors, internal finishes and external works (including parking). The assessments did not include fittings and furnishings, services or mechanical and electrical plant (MEP), however these likely make up a negligible proportion of total embodied carbon for a logistics development, and as such have not been considered further in this assessment.

1.6.5 Linear regression analysis was undertaken to establish a relationship between the materials used at the sample developments and lettable floor area. The analysis focused on materials that made up greater than 95% of total embodied emissions across the sample developments: structural steel and steel rebar, concrete, insulation, aluminium and glazing. For each of these materials, a scaling factor was calculated based on the relationship between the material quantity and the lettable floor area. For the remaining materials, as the regression analysis did not find a strong relationship between material quantities and floor area, an average scaling factor was calculated. This was informed by the total material quantities and lettable floor area.

1.6.6 A variety of grades of concrete and steel are used in building construction. Different grades of steel and concrete require different manufacturing processes and/or material composition, which results in a range of emissions intensities. Given that emissions from steel and concrete make up greater than 75% of embodied emissions across the sample developments, and a wide range of concrete and steel grades were used in these developments, more detailed regression analysis was undertaken for these materials to calculate scaling factors for each grade of concrete and steel.

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1.6.7 Based on these scaling factors, an estimated bill of quantities for the **EMG2 Works** buildings was calculated, using the maximum floor areas as set out in **Chapter 3: Project Description** (**Document DCO/MCO 6.3**). The estimated bill of quantities is shown in Table 1.15.

1.6.8 This bill of quantities was subsequently scaled by relevant emission intensity factors. These factors were sourced from the OneClick LCA database (OneClick LCA, 2025), using a blended average of the intensity factors used in the sample developments. The emissions factors used in this assessment are shown in Table 1.15.

1.6.9 Embodied emissions associated with the PV proposed to be installed on the building roofs have been calculated by scaling the proposed roof area PV coverage (20% of the total GIA, or 60,000 m^2), by an EPD for monocrystalline solar panels (148 $kgCO_2e/m^2$) (OneClick, 2025). Embodied emissions are shown in Table 1.15.

Table 1.15: Post-mitigation EMG2 Works Construction Emissions - Buildings

Material	Estimated Bill of Quantities (tonnes)	Emission Intensity Factor ($kgCO_2e/kg$)	Emissions (tCO_2e)
Steel	23,936	NA[1]	43,810
Concrete	291,966	NA[1]	24,206
Insulation	3,743	3.312	12,399
Aluminium	373	6.854	2,556
Glazing	216	4.851	3,986
Other[2]	2,799	NA[1]	6,057
PV	NA	NA	8,880
Total (excl. PV)	**323,033**		**90,073**
Total	**323,033**		**98,953**

1: A range of emissions intensities were use for steel, concrete and other materials. These ranged from 0.71 $kgCO_2e/kg$ (steel rebar) to 2.89 $kgCO_2e/kg$ (stainless steel sheets) for steel, 0.089 $kgCO_2e/kg$ (C28/C35 ready mix concrete) to 0.18 $kgCO_2e/kg$ (specialised precast concrete) for concrete, and from 0.15 $kgCO_2e/kg$ (screed) to 6.58 $kgCO_2e/kg$ (glass fibre reinforced polymer) for other materials.

2: Other materials include paints and coatings, membranes, plasterboard and timber, tiles, carpets, screed, vinyl, cladding and blockwork.

1.6.10 Overall, **EMG2 Works** building A1-A3 emissions total 98,953 tCO_2e, a 48% reduction compared to pre-mitigation emissions.

1.6.11 Excluding PV emissions (in line with SEGRO's LCA calculation methodology, and the Net Zero Carbon Building Standard guidance), total A1-A3 (material cradle to gate) emissions have been calculated to be 90,073 tCO_2e, with an intensity of 300 $kgCO_2e/m^2$.

EMG2 Works Infrastructure

1.6.12 The mitigation measures summarised above and included in **Chapter 19** (**Document DCO/MCO 6.19**) are anticipated to reduce the magnitude of emissions from infrastructure elements of the **EMG2 Works**. However, at this early design stage, the exact emission reduction measures to be used have not been specified in detail. As such, a selection of potential emission reduction measures have been used to calculate the likely magnitude of reductions. Post-mitigation emissions were calculated using the methodology in paragraph 1.4.20, substituting the industry standard emissions factors with lower carbon alternatives: warm mix asphalt (0.039 $kgCO_2e/kg$) and recycled aggregates (0.0061 $kgCO_2e/kg$) (OneClick LCA, 2025). Table 1.16 sets post-mitigation emissions for each infrastructure.

Table 1.16: Post-mitigation EMG2 Works Construction Emissions - Infrastructure

Infrastructure Component	Total Embodied Carbon (tCO_2e)	% Reduction compared to pre-mitigation
Estate road and EMG2 Access Works	893	11%
HGV loading/turning areas	5,394	11%
Car parking areas	2,716	11%

Infrastructure Component	Total Embodied Carbon (tCO_2e)	% Reduction compared to pre-mitigation
HGV parking (Plot 7)	483	10%
Bus interchange terminal	106	10%
Substation	36	0%
Bus terminal office	361	0%
HGV amenity building	361	0%
Drainage	TBC	TBC
Total	**10,348**	**10%**

EMG2 Works Construction Activities

1.6.13 The mitigation measures set out in above and in **Chapter 19** (**Document DCO/MCO 6.19**) are anticipated to reduce the magnitude of emissions from the **EMG2 Works** plant activities. However, as specific mitigation measures cannot be committed to (e.g. selection of electric site plant), it is not possible to quantitatively assess the proposed mitigation measures. As such, total post mitigation emissions for the **EMG2 Works** construction activities remain 9,005 tCO_2e.

1.6.14 Material transport emissions have not yet been calculated at this consultation stage. Further detail will be provided at the ES stage.

Land Use Change

1.6.15 As per paragraph 1.4.31 above, minimal carbon emissions are anticipated from land use change.

Highways Infrastructure

1.6.16 The post-mitigation emissions from the **Highways Works** infrastructure have been calculated using the methodology in paragraph 1.6.12 above. Resultant emissions are summarised within Table 1.17 below.

Table 1.17: Post-mitigation Highways Works Construction Emissions - Infrastructure

Infrastructure Component	Total Embodied Carbon (tCO_2e)	% Reduction compared to pre-mitigation
Active travel works	57	11%
A50EB to J24 interchange link	118	23%
M1 NB & J24 to A50WB	897	23%
Amendments to EMG1 entry	3	28%
EMG1 access junction capacity improvement	16	23%
A452 EMG2 access junction	61	23%
EMG2 Principal access alternative location	219	23%
Finger farm roundabout improvements	12	23%
M1 J24 Works – bridge construction	3,745	0%
Total	**5,116**	**7%**

1.6.17 For the reasons presented in paragraph 1.6.13 above, post-mitigation emissions are calculated to be 2,444 tCO_2e for the **Highways Works** plant activities, the same as pre-mitigation emissions.

1.6.18 Material transport emissions have not yet been calculated at this consultation stage. Further detail will be provided at the ES stage.

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MCO Application

EMG1 Works Buildings

1.6.19 The post-mitigation emissions from the **EMG1 Works** buildings have been calculated using the methodology in paragraphs 1.6.2 to 1.6.10 above. The estimated bill of quantities, alongside emissions factors and resultant emissions, are set out in Table 1.18.

1.6.20 Embodied emissions associated with the PV have been calculated in line with the methodology in paragraph 1.4.17. Resultant emissions are set out in Table 1.18.

1.6.21 Overall, **EMG1 Works** building A1-A3 emissions total 8,973 tCO_2e, a 47% reduction compared to pre-mitigation emissions.

1.6.22 Excluding PV emissions, the total A1-A3 (material cradle to gate) emissions have been calculated to be 8,188 tCO_2e, with an intensity of 309 $kgCO_2e/m^2$.

Table 1.18: Post-mitigation EMG1 Works Construction Emissions - Buildings

Material	Estimated Bill of Quantities (tonnes)	Emission Intensity Factor ($kgCO_2e/kg$)	Emissions (tCO_2e)
Steel	2,207	NA*	4,044
Concrete	26,617	NA*	2,207
Insulation	331	3.312	1,095
Aluminium	33	6.854	226
Glazing	17	4.851	83
Other[10]	247	NA*	534
PV	NA	NA	784
Total (excl. PV)	**29,452**		**8,188**
Total	**29,452**		**8,973**

* A range of emissions intensities were use for steel, concrete and other materials, discussed in detail at Table 1.15 above.

EMG1 Works Infrastructure

1.6.23 The post-mitigation emissions from the **EMG1 Works** infrastructure have been calculated using the methodology in paragraph 1.6.12 above. Resultant emissions are summarised within Table 1.19 below.

Table 1.19: Post-mitigation EMG1 Works Construction Emissions - Infrastructure

Infrastructure Component	Total Embodied Carbon (tCO_2e)	% Reduction compared to pre-mitigation
HGV loading/turning areas	718	11%
Car parking areas	285	11%
Management Suite expansion	361	0%
Substation upgrade	34	0%
Drainage	TBC	TBC
Total	**1,398**	**8%**

[10] Other materials include paints and coatings, membranes, plasterboard and timber, tiles, carpets, screed, vinyl, cladding and blockwork.

Construction Activities

1.6.24 For the reasons presented in paragraph 1.6.13 above, post-mitigation emissions are calculated to be 193 tCO_2e for the **EMG1 Works** plant activities, the same as pre-mitigation emissions.

1.6.25 Material transport emissions have not yet been calculated at this consultation stage. Further detail will be provided at the ES stage.

Land Use Change

1.6.26 As per paragraph 1.4.31 above, minimal carbon emissions are anticipated from land use change.

Summary and Magnitude of Impact

1.6.27 The estimated post-mitigation GHG emissions arising from the construction stage of the **EMG2 Project** are presented in Table 1.20. These emissions totals will be updated following receipt of final information (as detailed above) and the calculation of currently omitted emissions sources.

Table 1.20: Summary of Post-mitigation Construction GHG Emissions

Item	Emissions (tCO_2e)	% reduction compared to pre-mitigation emissions
DCO Application	125,867	43%
MCO Application	10,564	43%
EMG2 Project	136,431	43%

Assessment of Operation Effects – GHG Assessment

1.6.28 The following paragraphs detail the construction stage emissions associated with the **EMG2 Project**, following the implementation of mitigation measures summarised in section 1.5 above.

DCO Application

EMG2 Works Energy Use

1.6.29 The additional mitigation measures in section 1.5 are anticipated to further reduce the magnitude of emissions from the **EMG2 Works** building energy use. However, given quantification of mitigation measures would rely on measurement of future tenant occupancy activities, it is not possible to quantitatively assess the proposed mitigation. As such, total post mitigation emissions for the **EMG2 Works** building energy use have been reported as 10,824 tCO_2e per annum, consistent with the pre-mitigation assessment. This includes a 39% reduction in regulated energy emissions compared to a business-as-usual scenario.

EMG2 Works Road Users

1.6.30 The application the STS is anticipated to reduce operational transport movements, and hence reduce the magnitude of emissions from operational transport at the **EMG2 Works**. A similar STS has been implemented at **EMG1** with associated emissions savings assessed within [**Appendix XX**]: **EMG1** Commuter-Related Carbon Calculations. Emissions savings reported indicate the extent of emissions savings that could be achieved at the **EMG2 Works**: from 2019 to 2023 the implementation of sustainable transport initiatives at **EMG1** resulted in a cumulative saving of 4,431 tCO_2e. Potential emissions savings for EMG 2 at full occupation have been forecast, assuming that EMG2 achieves a similar level of sustainable commuting as EMG1, and totals emissions savings of 789 tCO_2e per year. Post-mitigation transport emissions are therefore 111,052 tCO_2e, a saving of 9.1% for commuter emissions and 0.7% for total **EMG2 Works** operational transport emissions. Refer to **Appendix [XX]** for further information on the STS and associated CO_2e savings.

EMG2 Works Refurbishment and Maintenance

1.6.31 Maintenance and repair (module B2-B3) emissions remain the same as pre-mitigation emissions, at 3,750 tCO_2e, in accordance with RICS (2023) guidance.

1.6.32 Refurbishment (module B4) emissions have been calculated by applying material lifetimes from RICS (2023) and OneClick (2025), to estimated material quantities for the EMG2 Works buildings and infrastructure. In line with National Highways (2021) and RICS (2023) guidance, the design life has been assumed to be 60 years. Refurbishment emissions total 30,278 tCO_2e for the buildings and 11,440 tCO_2e for infrastructure.

1.6.33 Overall, total refurbishment and maintenance emissions are 45,469 tCO_2e over the lifetime of the **EMG2 Works.** This equates to 758 tCO_2e per year of operation, on average, though individual years of operation may be more or less than this total (owing to the intermittent nature of material replacement programmes). This corresponds to a saving of 39% compared to pre-mitigation emissions.

Land Use Change

1.6.34 Average yearly GHG removals due to woodland planting are calculated to be 75 tCO_2e, in line with paragraph 1.4.71.

Highways Works

1.6.35 As per paragraphs 1.4.68 and 1.4.69, operational transport emissions associated with the Highways Works have not been quantified at this consultation stage but will be considered in further detail at the ES stage following the completion of operational traffic modelling. Emissions will be calculated using air quality modelling, informed by projected traffic flows with and without the proposed **Highways Works**.

1.6.36 Refurbishment and maintenance emissions associated with the **Highways Works** have been calculated using the methodology in paragraphs 1.6.31 and 1.6.32 above. Emissions total 2,233 tCO_2e over the lifetime of the **Highways Works.** This equates to 37 tCO_2e per year of operation, a saving of 26% compared to pre-mitigation emissions.

MCO Application

1.6.37 In line with paragraph 1.6.29, post-mitigation building energy emissions are unchanged from the pre-mitigation assessment, at 409 tCO_2e per year. This includes a 38% reduction in regulated energy compared to a business-as-usual scenario.

1.6.38 Operational transport emissions remain as per pre-mitigation emissions set out in Table 1.14, at 9,021 tCO_2e in the first year of operation.

1.6.39 Refurbishment and maintenance emissions associated with the **EMG1 Works** have been calculated using the methodology in paragraphs 1.6.31 and 1.6.32 above. Emissions total 4,193 tCO_2e over the lifetime of the **EMG1 Works.** This equates to 70 tCO_2e per year of operation, a saving of 38% compared to pre-mitigation emissions.

Summary and Magnitude of Impact

1.6.40 The estimated post-mitigation GHG emissions arising from the first year of operation of the **EMG2 Project** are presented in Table 1.21.

Table 1.21: Summary of Post-mitigation Operational GHG Emissions

Item	Emissions per year of operation (tCO_2e)	% reduction compared to pre-mitigation emissions
DCO Application	122,597	1.0%
MCO Application	9,500	0.4%
EMG2 Project	132,097	1.0%

1.7 Assessment of Whole Life Effects

1.7.1 The net GHG emissions for the **EMG2 Project** are presented in Table 1.22 below.

Table 1.22: Net Whole Life GHG Emissions

	DCO Application	MCO Application	EMG2 Project
Construction emissions (tCO_2e)	125,867	10,564	136,431
Operation emissions per year of operation (tCO_2e)	122,597	9,500	132,097
Total	**248,463**	**20,064**	**268,527**

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