A57 Link Roads

TR010034

9.56 Outline Carbon Management Plan

Rule 8(k)

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The Infrastructure Planning (Examination Procedure) Rules 2010

A57 Link Roads Scheme

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9.56 Outline Carbon Management Plan

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1. Introduction

1.1.1 This Outline Carbon Management Plan (CMP) has been prepared for the A57 Link Roads scheme (hereby referred to as the 'Scheme') to set out how whole life carbon emissions will be managed and reduced during the Detailed Design stage, to ensure that the objectives are met or exceeded.

1.1.2 The Scheme's carbon management approach is aligned with PAS 2080:2016[1] – *Carbon Management in Infrastructure* technical standard which ensures that carbon reduction is fully integrated into the project team's culture.

1.1.3 It is applicable to all design development, construction planning, procurement, and value chain engagement for the Scheme, and is specified for use by:

- the appointed Principal Designer and Contractor
- sub-contractors, sub-consultants and material suppliers working on the Scheme, to guide their carbon management activities
- the Scheme's National Highways management team

1.1.4 It is designed to inform all relevant parties of:

- how the appointed Principal Designer and Contractor will implement carbon reduction for the Scheme; and
- the requirements to support implementation of the CMP.

1.1.5 The Scheme is a Nationally Significant Infrastructure Project (NSIP) and this Outline CMP has been developed in support of National Highways' application for a Development Consent Order (DCO) to authorise construction, operation and maintenance of the Scheme. An Environmental Impact Assessment (EIA) has been carried out for the Scheme and is reported in the Environmental Statement (ES). The ES and other DCO documents prepared to support the application are available through the Planning Inspectorate project document library: TR010034-000603-A57 Link Road Examination Library Published.pdf (planninginspectorate.gov.uk).

1.1.6 This Outline CMP has been prepared to support the DCO application by the appointed Principal Designer and Contractor to detail the approach and methodology for carbon management at Scheme level for the Detailed Design and Construction stages. At Detailed Design stage it will be developed into a detailed CMP for the Scheme.

Background

1.1.7 As stated in paragraph 2.2.9 in Chapter 2 The Scheme of the ES (REP1-014), the appointed Principal Designer and Contractor has set Scheme specific targets. This includes the following target:

- Support reductions in carbon emission by adhering to the principles of the PAS 2080:2016 – *Carbon Management in Infrastructure Verification* certification. This will help the Scheme reduce its carbon emissions across the whole value chain through effective and innovative design, construction

[1] https://www.carbontrust.com/what-we-do/assurance-and-certification/pas-2080-carbon-management-in-infrastructure

and use. It would also ensure that carbon is consistently and transparently quantified at the key stages of the design process.

1.1.8 There are multiple technical requirements in the PAS 2080 standard, key of which are:

- implement a carbon management process to help an organisation meet PAS 2080 when delivering assets and/or programmes of work
- follow the carbon reduction hierarchy
- quantify, assess and report a Scheme's carbon emissions to inform scheme development and overall asset management
- engage with other value chain members, as early as possible, in a collaborative way of working to identify whole life low carbon solutions, including the selection of relevant low carbon materials and products, innovative design solutions and construction methods.

1.1.9 It defines the specific carbon management actions to be undertaken, and defines the key strategies and approaches to implement the culture and behaviour changes necessary for delivering carbon reduction, specifically:

- collaborative working across the value chain
- implementation of the carbon reduction hierarchy when identifying potential opportunities to reduce carbon
- raising major carbon challenges to design development and construction planning, where key carbon risks are identified.

1.1.10 This would follow a data collection and analysis methodology which adheres to the requirements of the PAS 2080. This would assess carbon use for the whole lifecycle of the project and promote embodied carbon management and commit to achieving carbon reductions.

2. Roles and responsibilities

2.1.1 Commitment from the whole project team and all stakeholders is a key aspect to successful implementation. All members of the project team and the value chain from National Highways to specific materials suppliers and fabricators have the potential to influence low-carbon outcomes.

2.1.2 However, some roles have key responsibilities in leading the efforts to implement low-carbon solutions during design and delivery. These are set out below in Table 2.1. Further details of roles and responsibilities will be integrated into the carbon management process in the detailed CMP.

Table 2.1 – Roles and responsibilities

Role	Main Responsibilities
Appointed Principal Contractor Project Director	• The Project Director has overall responsibility for carbon reduction. • The Project Director will hold responsibility for driving the carbon reduction agenda, leading by example by presenting progress internally and externally. • Empower the project staff to challenge design, specification, procurement, and construction processes. • Ensure early engagement with the supply chain, holding workshops and events to upskill, knowledge share and unlock innovation to whole life cost and carbon • They will attend the carbon reduction workshops, provide opening and closing statements to set their expectations and priorities for carbon reduction, and actively engage in the direction and decision making of the workshops. • They are to lead by example by pro-actively discussing carbon reduction at all relevant opportunities, as part of their day-to-day role, in accordance with the expectations and priorities that they set. • Ensure the project team has the skills and resource to deliver on the carbon objectives of the CMP, and the expectations and priorities that are set. • Participate in all review activities and/ or ensure through delegation that carbon is correctly considered, and decision-making progresses towards achieving the carbon reduction opportunities. • Provide a level of challenge to make sure that focus is given to low carbon opportunities. • Maintain an active relationship with National Highways management team for the Scheme, ensuring they are aware of their responsibilities to support low carbon decision making, carbon reduction progress, and are prepared to discuss challenges that arise.
Appointed Principal Designer Project Director	• Ensure the project team are clearly informed of the carbon objectives of this plan, and the expectations, priorities and challenge of the Project Director, and are empowered to undertake their roles. • Ensure the carbon performance of options are consider and recorded in the Design Decision Log (DDL).

Role	Main Responsibilities
	• Ensure their own knowledge of the carbon performance of options is correct to enable effective participation in design development discussions and reviews. • Ensure the design team has the skills and resource to deliver on the carbon objectives of this plan, and the expectations and priorities that are set.
Appointed Principal Designer Design Manager:	• Through day-to-day running, ensure compliance with and directly support the design team with implementation of objectives of this plan, in particular the carbon reduction hierarchy, and the expectations, priorities and challenge that are set. • Ensure knowledge of the carbon performance of options is correctly developed and recorded in the DDL. • Ensure the carbon assessment of options are carried out to the required level of detail. • Through on-going implicit monitoring, ensure the carbon knowledge or resource issues of the project team are sufficient to meet the objectives.
Appointed Principal Contractor Engineering Manager:	• To provide strategic engineering and design management, strong leadership and control of a multi-disciplinary team comprising engineering resources at all levels. • Ensure full design integration between all design disciplines is achieved and assessed for all build ability aspects during both the development stage and construction stage of a scheme. • To lead, support and implement digital design and carbon integrated method-led construction. • To support and advise the design manager throughout the hotspot review and carbon design optioneering stage.
Appointed Principal Contractor Construction Manager:	• To provide strategic operational management, strong leadership and control of a multi-disciplinary team comprising engineering and supervisory resources at all levels and facilitation of strong links with other teams within and external to the project. • To support and advise the engineering and design manager throughout the hotspot review and carbon design optioneering stage, to ensure carbon in construction is considered. • To implement the low carbon in construction plan in all works packages. • Ensure the on-site workforce complete the relevant carbon training.
Appointed Principal Contractor Supply Chain Manager:	• To provide strategic operational and supply chain management, strong leadership and control of our supply chain data and operational performance. • To collaborate with our vendors and suppliers to ensure all operations meet carbon, quality, and safety standards. • To support and advise the sustainable procurement manager throughout the carbon integrated procurement.

Role	Main Responsibilities
Appointed Principal Contractor Sustainable Procurement Manager:	• To provide strategic operational management, strong leadership and control of a multi-disciplinary team comprising engineering and supervisory resources at all levels and facilitation of strong links with other teams within and external to the project. • To lead, support and implement, carbon integrated procurement throughout the Scheme design and pre-construction.
Appointed Principal Contractor Programme Manager:	• Ensure carbon management actions are included in the programme to ensure that they are undertaken at the required time, to enable the required design decision making, and performance reporting.
Appointed Principal Designer Carbon Manager	• Develop and document the carbon management plan for the Scheme. • Support the Directors and Managers with implementation of this plan, through day-to-day working to assist them with understanding: - The actions required from the project team. - Pragmatic, but effective levels of options assessment. • Lead modelling the carbon performance of the completed designs.
All Project Team Staff	• As part of day-to-day activities and aligned with the objectives, expectations, priorities and challenges, minimise carbon through challenging design, buildability, planning and integration of activities, logistics and procurement. • Ensure that the potential carbon reduction benefits of all innovations are voiced to relevant project leads, and suitably recorded, along with the other parallel benefits.

3. Carbon reduction objectives

3.1 Plans, policies and requirements

3.1.1 This Outline CMP is underpinned by national policy as well as plans, policies and requirements of National Highways. These are detailed below.

The Government's Transport Decarbonisation Plan (TDP) 2021

3.1.2 In response to the UK's net zero emissions target by 2050, the Department for Transport (DfT) published "Decarbonising Transport: A Better, Greener Britain" – referred to as the Transport Decarbonisation Plan (TDP) on 14 July 2021. The TDP is framed by the Climate Change Act 2008, amended in June 2019 to commit to achieving Net Zero by 2050 for territorial (or "domestic") Greenhouse Gas (GHG) emissions.

3.1.3 The TDP outlines a number of commitments by the Government to remove all emissions from road transport to achieve net zero target by 2050. It sets out this vision for decarbonised transport emissions through three strategic priorities:

- Accelerating modal shift to public and active transport
- Decarbonisation of road vehicles
- Decarbonising how we get our goods

3.1.4 Commitments that will have a direct impact on road user emissions from the Scheme will include:

- An end to the sale of new petrol and diesel cars and vans by 2030
- All new cars and vans to zero emissions at the tailpipe by 2030
- All new L-category vehicles to be fully zero emissions at the tailpipe by 2035

3.1.5 The Scheme supports the TDP through managing whole life carbon in transport infrastructure and reducing associated embodied emissions. Alongside the TDP, the DfT has initiated a Carbon Management Programme to embed an integrated system for managing whole life carbon of infrastructure projects at a portfolio level. The framework will include capital carbon, i.e. emissions associated with the creation or major modification of an infrastructure asset and be guided by the principles of PAS 2080.

National Highways' Roads Investment Strategy 2

3.1.6 The Scheme design will be carried out in accordance with the National Highways Delivery Plan 2020-2025 (the second roads period)[2], which also sets out Key Performance Indicator targets, including:

- Reduce National Highways' carbon emissions as a result of electricity consumption, fuel use and other day to day operational activities during the second road period to levels defined by baselining and target setting activities in 2020-21.

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/951100/road-investment-strategy-2-2020-2025.pdf

3.1.7 This will be assessed against the following Performance Indicator:

- Supply Chain Carbon emissions: emissions from National Highways' contractors (including embodied carbon from construction) per million pounds spent.

National Highways' Net Zero Highways Plan

3.1.8 National Highways published its 'Net Zero Highways Plan' ('the Plan')[3] in July 2021. The Plan, which is aligned with the TDP, sets out new aspirational greenhouse gas reduction targets. The Plan sets out a roadmap with targets to cut corporate emissions (100% of corporate emissions to be net zero without purchased offsetting by 2030), maintenance and construction emissions (40-50% reduction in emissions compared to 2020 by 2030, and 100% of schemes net zero by 2040), and road users (100% of the network will be net zero by 2050).

3.1.9 The construction and maintenance emissions are of most relevance to the Scheme. Here, the Scheme can already show proactive actions that directly contribute to the commitments National Highways has set out. In particular, the commitment to implement PAS 2080 compliant carbon management system throughout detailed design and into construction is ahead of the commitment to certify a carbon management system by 2022 and could play a role in informing how that system is specified.

3.1.10 The Plan sets out a wide range of objectives covering all of its activities. For construction the key objectives are:

- 0-10% reduction in emissions by 2025 compared to 2020, and 40-50% by 2030 compared to 2020
- Tier 1 and Tier 2 suppliers have certified carbon management systems by 2025
- By 2022 carbon reduction is a key metric within National Highways innovation and research programs
- By 2022 National Highways have a continually improved database of low carbon solutions by asset type in place.

DMRB GG 103 Introduction and general requirements for sustainable development and design

3.1.11 The principles outlined in the Design Manual for Roads and Bridges (DMRB) GG103 *Introduction and general requirements for sustainable development and design*[4] discuss how different engineering and environmental constraints identified throughout design development and assessments have influenced the design.

3.1.11.1 The specific requirements specified in DMRB GG 103 are:

- Design shall aspire to minimise greenhouse gas emissions.

[3] https://nationalhighways.co.uk/media/eispcjem/net-zero-highways-our-2030-2040-2050-plan.pdf
[4] https://www.standardsforhighways.co.uk/prod/attachments/89d10ef2-7833-44df-9140-df85cd6382b9?inline=true

- Carbon emissions (greenhouse gases or carbon dioxide equivalents) associated with the whole life of a project shall be minimised.
- The minimisation of carbon emissions may be achieved by working in accordance with a recognised standard or specification agreed with National Highways, e.g. Carbon Management in Infrastructure PAS 2080

3.2 DMRB LA 114 Climate assessment and Register of Environmental Actions and Commitments

3.2.1 DMRB LA 114 Climate states that: '*Projects shall seek to minimise carbon emissions in all cases to contribute to the UK's target for net reduction in carbon emissions*'. This requirement applies whether or not the Scheme is anticipated to generate a significant effect on climate.

3.2.2 Chapter 14 Climate of the ES (REP1-019) included an assessment of GHG emissions during the construction phase, which was prepared in accordance with DMRB LA 114.

3.2.3 Tables 14.11 and 14.12 of Section 14.8 of Chapter 14 of the ES includes the mitigation measures that were included in the carbon assessment for the Scheme.

3.2.4 Emissions are mitigated by applying the carbon reduction hierarchy set out in DMRB LA 114: Avoid / Prevent, Reduce, Remediate. Items at the top of the hierarchy have a greater potential to reduce emissions and are prioritised.

- Avoid / prevent:
  - Maximise potential for re-using and / or refurbishing existing assets to reduce the extent of new construction required
  - Explore alternative lower carbon options to deliver the project objectives (i.e. shorter route options with smaller construction footprints).
- Reduce:
  - Apply low carbon solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, user's use of the project, and at end-of-life
  - It is recommended that as far as possible, materials are locally procured to minimise transportation emissions
  - Construct efficiently, using techniques (e.g. during construction and operation) that reduce resource consumption over the life cycle of the project
- Remediate:
  - After addressing avoid/prevent and reduce measures projects will identify, assess and integrate measures to further reduce carbon through on or off-site offsetting or sequestration.

3.2.5 Through the commitment to adhere to the principles of the PAS 2080, this hierarchy is now embedded in the project team's ways of working.

3.2.6 The Register of Environmental Actions and Commitments (REAC) (REP1-037), which forms part of the Environmental Management Plan (EMP) (REP3-010) identifies the environmental mitigation commitments (both embedded and essential), to address potential environmental effects of the Scheme which are identified in each topic chapter of the ES. In particular, actions C1.8, C2.6 and C3.4 of the REAC refers to implementing a comprehensive CMP from the Detailed Design stage and through construction.

3.2.7 The commitments within the REAC are secured by Requirement 4 in Schedule 2 of the draft Development Consent Order (dDCO) (REP3-013).

3.3 Carbon management objectives

3.3.1 The requirements of PAS 2080 and the plans, policies and requirements set out in section 3.1 and 3.2, a consistent requirement of carbon reduction for highways schemes.

3.3.2 In response to and aligned with these, the objectives of this plan are to:

- Reduce the whole life carbon footprint of the Scheme as low as reasonably practicable by applying the carbon reduction hierarchy, with unlimited thinking, to promote innovation and carbon reductions, through development of clever and collaborative design develop and construction planning proposals, with direct value chain engagement.
- The appointed Principal Designer and Contractor will actively identify and pursue carbon reduction opportunities and risks through all means as part of the integrated scheme development.
- A baseline carbon model will be produced, and the model will be used to:
    - identify carbon hotspots to inform design development and construction planning
    - as the basis for determining performance improvements achieved during the Detailed Design stage.
- An output carbon model and report will be produced to fully quantify and document the carbon reductions that have been achieved.

4. Carbon management principles

4.1 Carbon reduction hierarchy

4.1.1 Cost and carbon reductions have been widely shown to be comparatively closely linked, i.e. the carbon reduction hierarchy set out in PAS 2080, which specifies:

- **Build nothing**: evaluate the basic need for an asset and/or programme of works and explore alternative approaches to achieve outcomes set by the asset owner/manager
- **Build less**: evaluate the potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required
- **Build clever**: consider the use of low carbon solutions (including technologies materials and products) to minimise resource consumption during the construction, operation and user's use stages of the asset or programme of work
- **Build efficiently**: use techniques (e.g. construction, operational) that reduce resource consumption during the construction and operation phases of an asset or programme of work 'Build nothing' and 'build less' are the two primary carbon reduction mechanisms.

4.1.2 The carbon reduction hierarchy specifies 'build nothing' and 'build less' as the two primary carbon reduction mechanisms.

4.1.3 Secondary to build nothing and build less are 'build clever' and 'build efficiently'. These relate to clever use of technology, and alternative materials. These are emerging areas for which there is not extensive best practice, primarily because lower carbon materials and technology relevant to road schemes is only just maturing, or are in development, e.g. warm asphalt and low carbon concrete. However, where prices are not excessive, significant reductions can potentially be achieved, due to the extensive use of relevant materials, i.e. recycled sub-base, warm asphalt, lower carbon concrete through alternative ingredients, and lower carbon steel from energy efficient production.

4.2 Carbon management at the Preliminary Design stage

4.2.1 The starting point for the PAS 2080 assessment will consider carbon management opportunities that were undertaken during the Preliminary Design. It will be based on estimated construction data from the available design information based on the proposals that were available during the preliminary design stage. The assessment will therefore use the Preferred Route Announcement (PRA)[5] as a baseline to measure carbon savings against.

4.2.2 Construction processes are estimated based on previous project data for a similar scope of work and therefore are based on conventional materials and methods, as data on alternative low carbon methods are not currently available.

[5] The Preferred Route Announcement (PRA) was made by the Applicant on 2 November 2017. Option A was selected as the Preferred Route to be progressed to the next stage of development. This design was taken forward into Preliminary Design and was

4.2.3 Since the PRA was made in November 2017, the Scheme has been amended, based on consultation with stakeholders, and more detailed assessments of traffic, engineering, buildability and environmental factors.

4.2.4 A substantial quantity of emissions embodied within materials will be saved from the Scheme, compared with this baseline. These amendments are illustrated in Insert 4.1.

Insert 4.1: Examples of Scheme carbon reductions

Roe Cross Link	Mottram Underpass	Mottram Moor Junction	River Etherow Bridge
› Removal of Roe Cross Link › Significant reduction in earthworks, pavement, drainage & lighting › Avoided construction of Cricket Ground Roundabout	› Relocation of underpass › Reduced diameter of piles › Reduced reliance on specialist piling plant, which has limited availability	› Roundabout replaced with crossroads junction › Reduction in junction footprint and extent of earthworks, pavement and drainage › Operational performance improved	› Span of structure reduced › Removal of central pier › Resulted in reduced size of overall structure

4.2.5 The removal of Cricket Ground Roundabout and Roe Cross Road junction, as well as the conversion of Mottram Moor junction from a roundabout, has resulted in a reduced need for materials associated with such junctions. The design modifications from the PRA design have resulted in reduced number of compound areas and less land uptake. There is opportunity for further savings, if risks regarding use of recycled materials for pavements can be resolved. The use of Warm Mix Asphalt (WMA) as best practice also offers further savings.

4.2.6 During the Detailed Design stage, the PAS 2080 process will be used to identify opportunities for carbon savings, e.g. design and construction options for the Mottram Underpass will include consideration of carbon performance, and it is the intent that the lowest carbon solution will be progressed as the preferred choice for detailed design.

4.2.7 The assessment to be undertaken will include reviewing the Design Decision Log against the Carbon Management Hierarchy.

4.2.8 For the construction stage of the Scheme, calculations will be undertaken using Highways England's Carbon Tool (herein after referred to as 'The Carbon Tool'). This is reported in Chapter 14 of the ES, and used the Preliminary Design, as submitted with the DCO application, as the baseline.

4.3 Project team engagement

Incorporating Low-Carbon Ideas

4.3.1 Commitment to the CMP from all project stakeholders is vital. Workshops have been hosted by relevant leads to improve joined-up thinking and generate opportunities to make GHG emission savings during all stages of the design.

4.3.2 To initiate and embed the carbon management process into the project team's way of working the following were undertaken at an early stage of the Preliminary Design:

- carbon briefing – a value chain meeting was held to initiate the carbon management process and secure buy in from all project stakeholders
- engagement session – an initial workshop held with the whole project team followed soon after to capture ideas to reduce carbon within the design. These ideas will be carried forward in the Carbon Management Process (see section 5 of this Outline CMP).

4.3.3 Regular calls at the Preliminary Design stage, which included the design, construction, and environmental disciplines, as well as the supply chain, have been held. These have led to a more thorough understanding of the environmental and engineering constraints across the team, and identified opportunities to introduce more carbon efficient options, leading to a better considered design. The discipline leads attended weekly online design meetings where design developments were communicated to the team and discussions around constraints and opportunities could be held. This allowed the team to draw on experienced team members, whilst contributing to driving efficiencies that would lead to carbon emissions savings.

Whole life costing and low-carbon targets

4.3.4 Whole life costing has been thoroughly considered in the major disciplines that could drive cost in the project, and the principles have formed the basis of design thinking, e.g. pavements and structures. Carbon savings are not prioritised against cost and programme, rather cost, programme and carbon are three multiple project metrics that must be considered collectively. Each project development consideration is assessed in its own right and against the performance of the overall scheme, and the metrics are balanced accordingly.

4.3.5 Across all disciplines, a balance has had to be maintained between whole-life costing and other major considerations, such as construction cost and practical maintenance complications. In a small number of cases, such as with structures, the preferred option favours durability over total costs. The whole life cost savings are made through value engineering and optioneering. One example of the savings was scoping out a junction, thus reducing six months of earthworks and construction costs.

4.3.6 Value engineering at the Preliminary Design stage was therefore applied to the baseline scenario as options were explored to build minimum (the ‘build less’ principle) rather than use of low-cost materials (the ‘build clever’ principle). The ‘build clever’ and ‘build efficiently’ principles will be fully integrated into the design as the detailed CMP is developed.

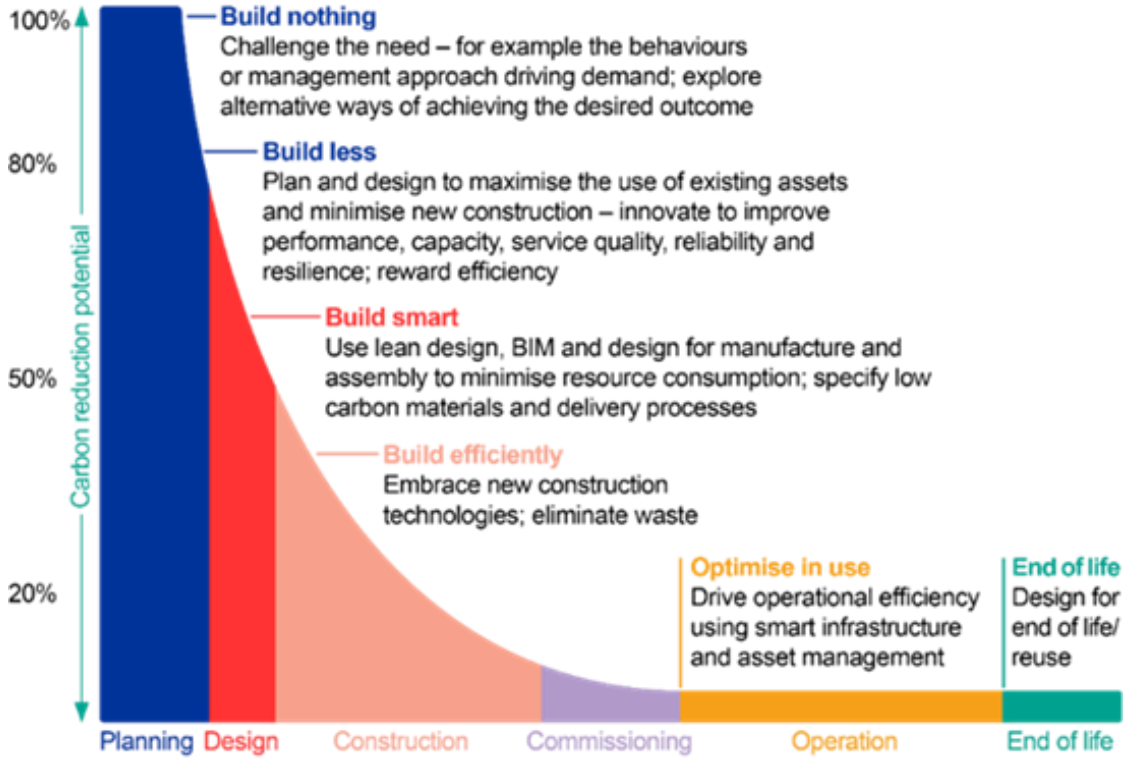
4.3.7 Furthermore, the Scheme will be planned around low-carbon construction principles and targets. Low-carbon target setting will consider the use of electric construction plant, carbon efficient power supplies, use of local materials to reduce road haulage, and using standardised products build off site to reduce construction durations. As part of the detailed CMP, a low carbon in construction plan will be developed setting low carbon construction principles, processes and targets. The plan will prioritise on the most carbon intensive aspects of construction include plant, compound, material logistics and construction method.

5. Carbon management process

5.1 Whole life carbon management approach

5.1.1 Taking a whole life carbon management approach to reducing GHG emissions identifies the best combination of opportunities across the project lifecycle using the PAS 2080 carbon reduction hierarchy (Insert 5.1) shows the greatest opportunity to reduce whole life carbon emissions is at the early stages of the project.

Insert 5.1 The PAS 2080 Carbon Reduction Hierarchy

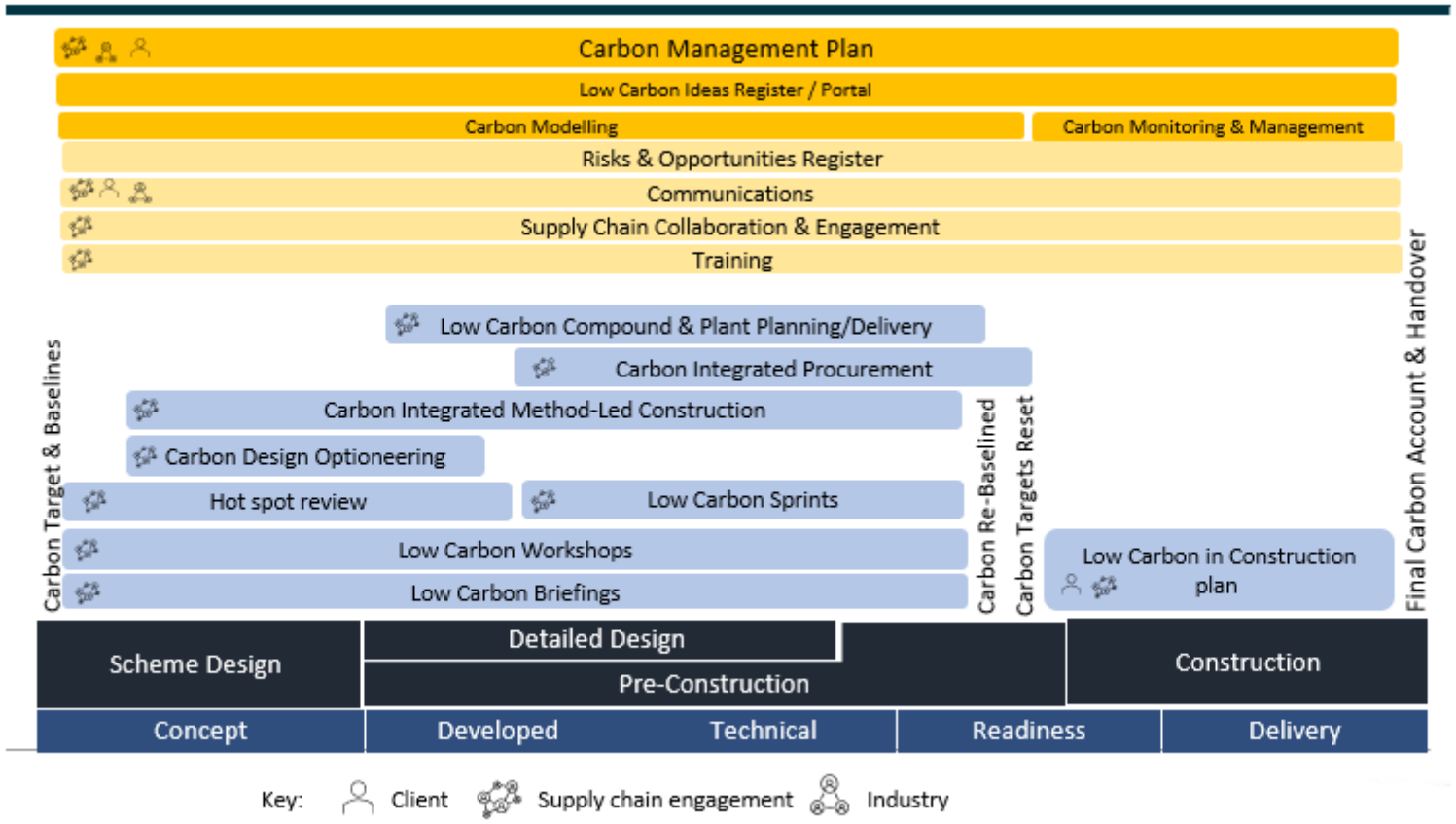


5.1.2 The CMP processes are shown in Insert 5.2. The greatest opportunities to reduce carbon are considered earlier in the project life cycle. The project team will work collaboratively to ensure:

- design options fully consider low carbon alternatives, utilising the strengthen of the supply chain. This will be undertaken through **low carbon workshops and sprints**[6]
- carbon in construction is considered as early as possible through our **method-led construction assessments** (see section 5.3), e.g. enabling the selection of low carbon plant or local materials
- carbon in construction is accurately **calculated to ensure low carbon design and construction methods are selected**.

[6] A short/accelerated multi-disciplinary process where design ideas for a key design features are validated, innovative ideas are explored and problems are solved to reduce risk.

Insert 5.2 Carbon management plan



5.2 Carbon Modelling

5.2.1 The CMP will use a number of ways to assess carbon within the Scheme.

Carbon calculation tool

5.2.2 Carbon is quantified throughout the Scheme using the appointed Principal Designer's in-house 'Carbon Knowledgebase' carbon calculation tool. Carbon models are produced for the whole Scheme covering all assets and operational activities within the Scheme boundary, over its design life. This data is used to identify:

- Carbon Hot Spots to allow low carbon sprints to focus on the areas of greatest carbon intensity
- Monitor and track carbon performance

Integrating carbon into cost estimates.

5.2.3 A robust cost estimate is produced by the appointed Principal Contractor using specialist in-house software. This software can also undertake an analysis of the carbon impact of the decisions that are made. The carbon functionality is built into the software with a column to input a unit carbon conversion for all resources. This enables the Scheme's commercial team to calculate the total carbon of the products chosen in the same way that cost is calculated.

Procurement

5.2.4 Carbon will be integrated into the procurement processes. It is the intention that all carbon questions will have a weighting of 10%.

Communications

5.2.5 The spotlight will be on carbon each and every day to drive real change. The detailed CMP will be developed in collaboration with the supply chain and key stakeholders. Requirements of the CMP will be integrated into all project plans and communicated with the project team through briefings, inductions, workshops and toolbox talks, so that low carbon is embedded throughout.

Carbon Management Process

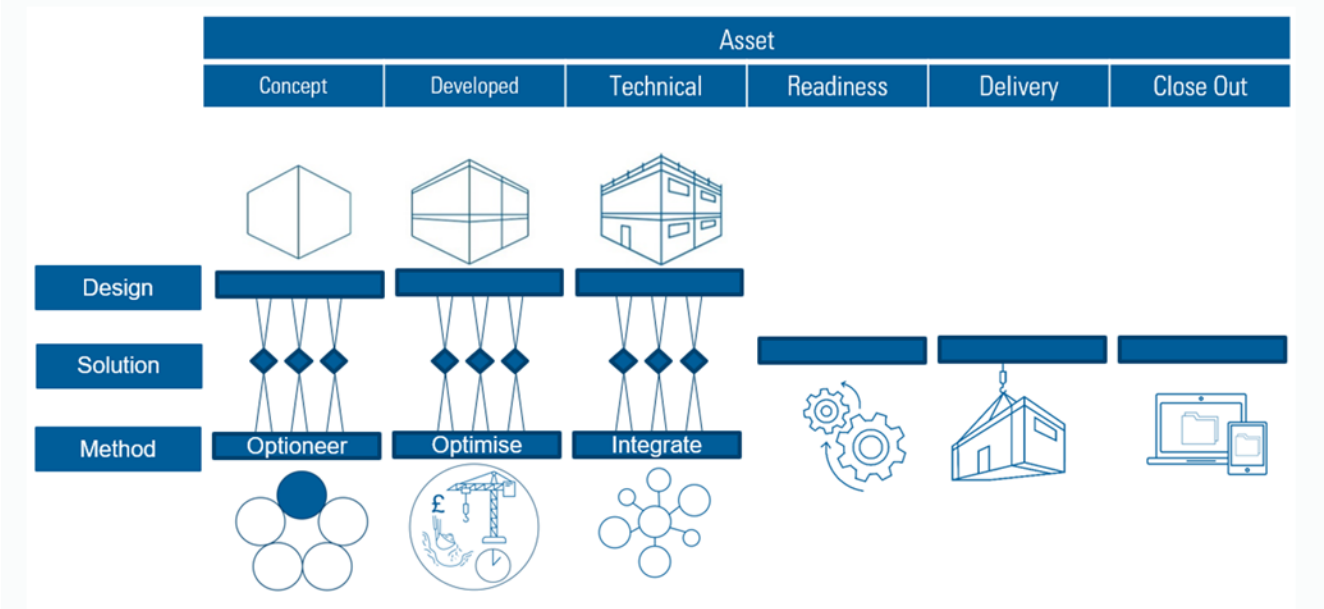
5.2.6 Method-led construction is a framework developed by the Principal Designer and Contractor which is being used on the Scheme to align method and design to ensure the optimal solution is developed and delivered on the project. By using method-led construction to structure the project in pre-construction we can ensure ideas for innovation and carbon reduction are considered as early as possible during the asset's lifecycle during solutions development. It also provides a platform to ensure constraints and constructability are considered in suitable detail before designs are finalised and construction begins

Method-led principles

5.2.7 The Scheme can be broken down into several key structures (for example Mottram Underpass) as well as the asset types that make up the fundamental

construction areas of the Scheme (drainage, earthworks, kerbing, etc.). Each of these key structures and asset types form a focus area. For each of these focus areas the design and method will follow a lifecycle to map the development of the design and method in parallel through pre-construction, construction, and close-out. This process will begin with a design sprint for each focus area during concept stage (see Insert 5.3).

Insert 5.3 Method-led principles process



5.2.8 Following this structure allows peer reviews to be completed for each focus area, as required, and scheduled into the pre-construction programme.

Incorporating low-carbon ideas

5.2.9 The ideas from the initial workshop held with the whole project team to capture ideas to reduce carbon within the Scheme design were reviewed and categorised to align with the focus areas for each design sprint.

5.2.10 During each design sprint these ideas are brought into discussion and agreed whether to be carried forward. All decisions are recorded within the DDL to allow tracking of the decision from idea through to agreement and close.

5.2.11 The sprints provide a platform where low carbon ideas can be considered in the early stages of solution development and built into the final solution.

Process actions

5.2.12 The following actions provide the specific details on how the low carbon design will be undertaken

- Identify and pursue carbon reduction opportunities and risks through all means as part of the integrated scheme development, specifically by ensuring carbon performance is:

    - Proactively considered by all project staff during Method Led Construction and detailed design development and construction planning, based on personal expertise and carbon reduction training
    - Logged in the DDL by all staff, as necessary
    - Consider during weekly DDL reviews
    - Raised as a metric for consideration with all value chain engagements, as part of design development and construction planning.
- Through an initial carbon reduction workshop:
    - All project staff will be trained on the carbon reduction hierarchy, their role-specific means for applying it, and the key strategies and approaches to implement the culture and behaviour changes necessary for delivering carbon reduction, as set out in the CMP
    - An initial set of carbon reduction opportunities will be identified
- Update training to all staff will be continuous through review of the carbon management progress that has been made during the design development
- Plans will be put in place to identify and manage any outstanding actions that remain
- A carbon model will be produced in the Carbon Knowledgebase tool using the baseline design, and the model will be used to:
    - Identify carbon hotspots to inform design development and construction planning
    - As the basis for determining performance improvements achieved during Detailed Design
- During design development, materials and construction options will largely be assessed on a working basis using mental arithmetic, indicative materials and construction quantities and carbon factors; and as necessary, more complex options will be assessed using quantified assessments in the Carbon Knowledgebase tool
- The detailed CMP will identify the stages of the project lifecycle that carbon modelling will be used.

5.3 Reporting

5.3.1 The output from the carbon model will be used to produce a Carbon Management Report to fully quantify the carbon reductions that have been achieved, and document how this had influenced decision making.

5.3.2 PAS 2080 has three tiers of conformity covering: independent third-party certification; other-party certification; and self-validation. The current proposal is for self-validation.

5.3.3 In addition, the appointed Principal Contractor has a contractual requirement to report on cost and carbon performance to National Highways, which includes reporting on carbon emissions. This will be via National Highways' Carbon Tool,

which will be populated on a quarterly return basis through the construction process and during maintenance activities through the life of the Scheme, as part of National Highways' existing reporting processes. This reporting is part of the Collaborative Performance Framework (CPF) which scores the contractor on 'tonnes of carbon per £m.

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