M5 Junction 10 Improvements Scheme

Design Principles Report

TR010063 - APP 9.70

Rule 8 (k)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 9
September 2024

Gloucestershire COUNTY COUNCIL

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

M5 Junction 10 Improvements Scheme

Development Consent Order 202[x]

Design Principles Report

Rule Number:	Rule 8 (k)
Planning Inspectorate Scheme Reference	TR010063
Application Document Reference	TR010063/APP/9.70
Author:	M5 Junction 10 Improvements Scheme Project Team

Version	Date	Status of Version
Rev 0	September 2024	Deadline 4

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1. Summary

1.1.1. This document describes the Design Principles that are to be secured through Requirement 11 of the draft Development Consent Order [REP3-011][1].

1.1.2. The Project Design Report [REP3-047 and REP3-048] sets out the Design Principles for the Scheme. The Design Principles are consolidated within this document to establish that the Scheme is delivered to the high environmental standards as set out in the Application documents of the Development Consent Order.

[1] The references given in this document are correct to the most up to date version of documents at time of writing.

2. Introduction

2.1. The purpose of this document

2.1.1. The purpose of this document is to bring together the Design Vision and the Scheme Objectives, and to define the Design Principles that are to be incorporated into the detailed design of the Scheme.

2.1.2. This document captures the key principles that have shaped the preliminary design (DF3 design stage) as submitted, and makes a commitment that these will be maintained and developed in the future detailed design and delivery phase of the Scheme in accordance with National Policy Statement for National Networks (NPS NN) (Department for Transport, 2014) requirements for 'good design'.

2.1.3. It is noted that the NPS NN was withdrawn in May 2024, and a revised National Networks National Policy Statement (NNNPS) was designated in May 2024, subsequent to the submission of the Development Consent Order (DCO) application (December 2023). Therefore the NPS NN 2014 has effect for this Scheme.

2.2. The Design Principles

2.2.1. The Design Principles are commitments that will be secured through Requirement 11 of the draft Development Consent Order [REP3-011].

2.2.2. The Design Principles apply to the Scheme's permanent works; they exclude the temporary construction works associated with the Scheme. Design considerations that relate to the management of construction works are detailed within the 1st iteration Environmental Management Plan (EMP) [AS-025].

2.2.3. There is a suite of documents that capture the Scheme's Design Principles as embedded mitigation adopted in the preliminary design (DF3 design stage) for the Scheme. These documents comprise:

- The Environmental Statement (ES) including appendices and figures.
- The 1st iteration EMP [AS-025] and associated annexes [AS-031 – AS-043 and AS-052].
- The Register of Environmental Actions and Commitments (REAC) [REP3-031].
- The Project Design Report [REP3-047 and REP3-048].
- Environmental Masterplans part 1 and 2 [REP3-009 and REP3-010].

2.3. Scheme objectives

2.3.1. The Scheme has five objectives as outlined in ES Chapter 2 The Scheme [AS-010]. These are as follows:

1. Support economic growth and facilitate growth in jobs and housing by providing improved transport network connections in west and north-west Cheltenham.
2. Enhance the transport network in the west and north-west of Cheltenham area with the resilience to meet current and future needs.
3. Improve the connectivity between the SRN and the local transport network in west and north-west Cheltenham.
4. Deliver a package of measures which is in keeping with the local environment, establishes biodiversity net gain and meets climate change requirements.
5. Provide safe access to services for the local community and including for users of sustainable transport modes within and to west and north-west Cheltenham.

2.4. Design vision

2.4.1. Whilst achieving the Scheme objectives described above, the design vision for the Scheme as outlined in the Project Design Report [REP3-047 and REP3-048] aims to:

DV1 - Unlock the housing and employment opportunities within the west and north-west Cheltenham developments through the provision and future proofing of improved transport network connections.
DV2 - Integrate the Scheme into the distinct and varying landscape characters present and manage impacts on the flood zone locally.
DV3 - Provide enhancements for sustainable travel and for biodiversity, addressing requirements for Biodiversity Net Gain (BNG).
DV4 - Produce a landscape design that contributes to the landscape character of the area and provides visual amenity and screening, with the aim of embedding the Junction 10, the widened A4019 and the Link Road into the landscape.

2.5. The Scheme

2.5.1. As outlined in ES Chapter 2 The Scheme [AS-010], the improvements proposed as part of the Scheme seek to increase the capacity of the junction 10, and to upgrade the current restricted movements junction to an all-movements junction. To enable travel both south and north on the M5, the two existing Junction 10 sliproads will be removed, and four new slip roads will be constructed to provide access and egress to the M5 in all directions. The Scheme elements are:

- An all-movements junction at M5 Junction 10 (Scheme element)[2].
- A new West Cheltenham Link Road east of Junction 10 from the A4019 to the B4634 (Scheme element)[3].
- Widening of the A4019 to the east of Junction 10, including a bus lane on the A4019 eastbound carriageway from the West Cheltenham Fire Station to the Gallagher Junction (Scheme element)[4].

2.5.2. Mitigation measures incorporated in the design include:

- Embedded mitigation measures - project design principles adopted to avoid, prevent or reduce adverse environmental effects; for example, adjustments to the vertical and/or horizontal alignment of roads.
- Essential mitigation measures - measures required to reduce and if possible offset likely significant adverse environmental effects; for example, provision of crevice dwelling bat roost structures.

2.5.3. The mitigation measures included in the Scheme are broadly described in ES Chapter 2 The Scheme [AS-010] and in more detail in relevant topic ES chapters.

2.5.4. Enhancement measures, measures over and above normal mitigation, are also included within the design.

2.6. Good design

2.6.1. The NPS NN acknowledges that there may be a limit on the extent to which national network infrastructure development can contribute to the enhancement of the quality of the area. Nevertheless, good design should meet the principal objectives of the Scheme

[2] Work No. 2(a) to 2(i). This excludes the slip road and elements deemed to be motorway, plus drainage, which are covered under Work No. 1(a) to 1(o).
[3] Work No. 5(a) to 5(n).
[4] Work No. 3(a) to 3(d) for the A4019 to the west of J10, and Work No. 4(a) to 4(y) for the A4019 to the east of J10.

by eliminating or substantially mitigating the identified problems by improving operational conditions and simultaneously minimising adverse impacts.

2.6.2. The Project Design Report [REP3-047 and REP3-048] sets out how due regard for good design and the environment in which the Scheme is located, have been key components in the development of the preliminary design (DF3 design stage) for the Scheme.

2.7. Design process

2.7.1. Section 4 of the Project Design Report [REP3-047 and REP3-048] provides examples of how the multidisciplinary approach to the design process has developed a design that is aligned to each of the ten principles set out by National Highways (NH) in their 'The Road to Good Design' guidance.

2.7.2. The Scheme does not sit in a sensitive landscape and was not assessed as having a substantial effect on the surrounding landscape, so a National Highways Design Panel process was sought by the Applicant for this Scheme.

2.7.3. The Scheme development has followed the Project Control Framework (PCF) developed by Highways England (now National Highways). National Highways have provided external review at key stages through the project lifecycle under the PCF. In addition, non-statutory and statutory consultation have been undertaken with local stakeholders. Feedback from these processes has been considered in the development of the Scheme. Mitigation has been incorporated in the design iteratively throughout the development of the Scheme as a result of consultation, multi-disciplinary working and the review process.

2.7.4. Mitigation measures have been developed following the Mitigation hierarchy system as follows, defined in the Department for Transport's Design Manual for Roads and Bridges (DMRB) LA 104:

- avoidance and prevention: design and mitigation measures to prevent the effect (e.g. alternative design options or avoidance of environmentally sensitive sites).
- reduction: where avoidance is not possible, then mitigation is used to lessen the magnitude or significance of effects.
- remediation: where it is not possible to avoid or reduce a significant adverse effect, these are measures to offset the effect.

2.7.5. A summary of the process and the main alternatives considered is set out in ES Chapter 3 Assessment of Alternatives [APP-062] and in ES Chapter 4 Environmental Assessment Methodology [APP-063].

3. Design Principles

3.1. Introduction

3.1.1. The purpose of this section is to set out the Scheme specific Design Principles that have been followed in preliminary design (DF3 design stage) and are to be complied with during detailed design.

3.1.2. An overarching Design Principle is set out in Table 3-1. This overarching principle sets out the overall principle for design development, in order to deliver the design vision through the Design Principles.

Table 3-1 - Design Principles - Overarching

ID	Design Principle
DP0	Develop a sustainable design through a multidisciplinary team of engineers and environmental specialists, with the design developed through an iterative process of development, testing and refining the design and the consideration of feedback received through the consultation process.

3.1.3. All other Design Principles are directly associated with the four components of the Design Vision for the Scheme as detailed in Section 2.4 above (items DV1 – DV4). The Design Principles for each of these four components are set out in the following sections.

3.2. Transport network connection

3.2.1. Design Vision component:

DV1 - Unlock the housing and employment opportunities within the west and north-west Cheltenham developments through the provision and future proofing of improved transport network connections.

3.2.2. The Design Principles that deliver DV1 are:

Table 3-2 - Design Principles - Transport network connection

ID	Design Principle
DP1.1	Develop a sustainable design that considers future use including interaction with the potential development of the local allocated land areas.
DP1.2	Ensure that the Scheme design considers the experience of road users of the Scheme in operation, improving clarity and safety where possible.
DP1.3	Ensure Walkers, Cyclists and Horse Riders (WCH) accessibility through the incorporation of links to Public Rights of Ways (PRoWs), and footpaths to be reinstated and created (where severance or diversion has resulted from the Scheme construction).
DP1.4	Ensure that all properties continue to have access and where possible improved safety and access to the transport network.

3.3. Water environment

3.3.1. Design Vision component:

DV2 - Integrate the Scheme into the distinct and varying landscape characters present and manage impacts on the flood zone locally.

3.3.2. The Design Principles that deliver the water environment aspects of DV2 are presented in Table 3-3. The landscape aspects are presented in Table 3-6:

Table 3-3 - Design Principles - Water environment

ID	Design Principle
DP2.1	Ensure the Scheme is designed to provide greater resilience to flooding on the A4019 than the existing baseline.
DP2.2	Ensure the Scheme is designed to work with (rather than against) the natural flood cycle of the River Chelt, whilst avoiding increasing flood risk to downstream receptors.
DP2.3	Ensure the Scheme design for the management of floodwater has an allowance for climate change, so as to provide for longer term durability of the design.
DP2.4	Prepare drainage strategy to limit the peak rate and overall volume of discharge.
DP2.5	Construct compensatory floodplain to offset the volume of water displaced by the Scheme during the design flood, prior to the removal of any existing floodplain.
DP2.6	Highway drainage system for the Scheme to comply with all current standards and sustainable drainage system (SuDS) best practice techniques.
DP2.7	Ensure design minimises deterioration in surface water quality and surface water hydromorphology.
DP2.8	Minimise direct impacts to the floodplain of the River Chelt through the selection of the route corridor for the Link Road that avoids as much of the floodplain as possible.
DP2.9	Design to incorporate a series of culverts underneath sections of the Link Road so as to minimise impedance of floodwater from the River Chelt.

3.4. Biodiversity

3.4.1. Design Vision component:

DV3 - Provide enhancements for sustainable travel and for biodiversity, addressing requirements for BNG.

3.4.2. The Design Principles that deliver the biodiversity aspects of DV3 are presented in Table 3-4. The sustainable travel aspects are presented in Table 3-5:

Table 3-4 - Design Principles - Biodiversity

ID	Design Principle
DP3.1	Inclusion of underpasses to allow safe movement of bats, badgers and otters, as well as other mammal species, reptiles and amphibians across the Scheme.
DP3.2	Underpass underneath the A4019 designed to provide mitigation for bats, safe movement of other mammal species, reptiles and amphibians across the A4019, and traffic free access for pedestrians and equestrians.
DP3.3	Replace habitat losses and provide additional habitat to ensure the Scheme design achieves at least a 10% net gain in biodiversity within each of the habitat types relevant to the Scheme area.
DP3.4	Enable vegetation retention through the design, ensuring removal of vegetation is of minimal extent as necessary for the works.
DP3.5	Ensure impacts to protected species are minimised as far as possible, through incorporation of mitigation and enhancements where practical.

3.5. Sustainable travel

3.5.1. Design Vision component:

DV3 - Provide enhancements for sustainable travel and for biodiversity, addressing requirements for BNG.

3.5.2. The Design Principles that deliver the sustainable travel aspects of DV3 are presented in Table 3-5. The biodiversity aspects are presented in Table 3-4:

Table 3-5 - Design Principles - Sustainable travel

ID	Design Principle
DP3.6	Incorporate bus stop provision along the A4019.
DP3.7	Embed design requirements for climate vulnerability.
DP3.8	Include of an active travel corridor along the A4019 through the full length of the Scheme.
DP3.9	Embed sustainable travel infrastructure in the Scheme, including the provision of additional infrastructure for bus travel compared to what is present currently, with a new bus lane along a section of the A4019.
DP3.10	Ensure traffic management during construction retains local residents ease of access as far as practical.

NB: Transport Network design principles also relate to sustainable travel.

3.6. Landscape and visual impacts

3.6.1. Design Vision component:

DV4 - To produce a landscape design that contributes to the landscape character of the area and provides visual amenity and screening, with the aim of embedding the Junction 10, the widened A4019 and the Link Road into the landscape.

3.6.2. The Design Principles that deliver DV4 are:

Table 3-6 - Design Principles - Landscape and visual impacts

ID	Design Principle
DP4.1	Replacement of woodland and scrub along the M5 and around the new junction to reinstate screening effect and integrate back into the landscape.
DP4.2	Incorporate replacement planting along the realigned sections of the A4019 to help embed this route back into the landscape and provide some buffer to the proposed site allocations north of the A4019, as well as ensuring visual amenity for receptors.
DP4.3	Consider early planting of new vegetation to allow planting to establish and integrate the Scheme into the surrounding landscape sooner.
DP4.4	Retain existing vegetation for screening and habitat connectivity where practical.
DP4.5	Incorporate hedgerow along the Link Road with supplementary blocks of wood and individual trees particularly around the bridge to reflect local character of road infrastructure and provide some screening for visual receptors, whilst creating an attractive route for all users.
DP4.6	Design structures with consideration to the design of existing structures in the area.
DP4.7	Design attenuation basin to sit more naturally within the landscape through wetland grass and planting.

ID	Design Principle
DP4.8	Embed flood storage area into the landscape through naturalistic earth contouring and appropriate planting to the flood storage area.
DP4.9	Where in National Highways (NH) jurisdiction, planting is to be in accordance with NH requirements (NB. liaison with NH to be undertaken during detail design to agree planting proposals in NH jurisdiction).
DP4.10	Where in Gloucestershire County Council (GCC) jurisdiction, planting to be in accordance with GCC Highways and Biodiversity Guidance for Gloucestershire May 2022.
DP4.11	Where providing a screening function, replacement planting should include evergreen species to provide function during winter months.
DP4.12	Replace habitat losses and provide additional habitat to ensure a minimum 10% BNG.
DP4.13	Seek to include locally appropriate species selection in design: • Native or non-invasive species to be proposed. • Locally source grass seeding for replacement and proposed species rich grass areas.
DP4.14	Ensure the lighting design seeks to minimise obtrusive light pollution by using full cut off luminaires with louvres.
DP4.15	Noise barriers to be designed in consultation with those directly affected to ensure they provide visual as well as noise amenity.
DP4.16	Avoid excessive land take, whilst ensuring adequate visual and habitat mitigation.
DP4.17	Avoid impacts to buildings including listed buildings (for example at Uckington), and key environmental features such as existing hedgerows along the route of the Link Road, and the scheduled monument of Moat House at Uckington.
DP4.18	Minimise effects of the Scheme on the setting of designated heritage assets as far as possible.

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