

# A12 Chelmsford to A120 widening scheme

TR010060

## 7.10 DESIGN PRINCIPLES

Rule 8(1)(k)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

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## Infrastructure Planning

### Planning Act 2008

### The Infrastructure (Examination Procedure) Rules 2010

## **A12 Chelmsford to A120 widening scheme**

### Development Consent Order 202[ ]

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## **7.10 Design Principles**

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## Executive summary

This Design Principles are one of the supporting documents submitted as part of the application for development consent for the A12 to A120 Widening Scheme ('the proposed scheme').

The document summarises the design policy context and design principles of the proposed scheme, developed in response to 4.48 of National Policy Statement for National Networks (NNNPS) criteria for 'good design' for national networks and National Highways 'The Road to Good Design', among other key design guidance.

The design principles have been developed to meet the following the proposed scheme objectives:

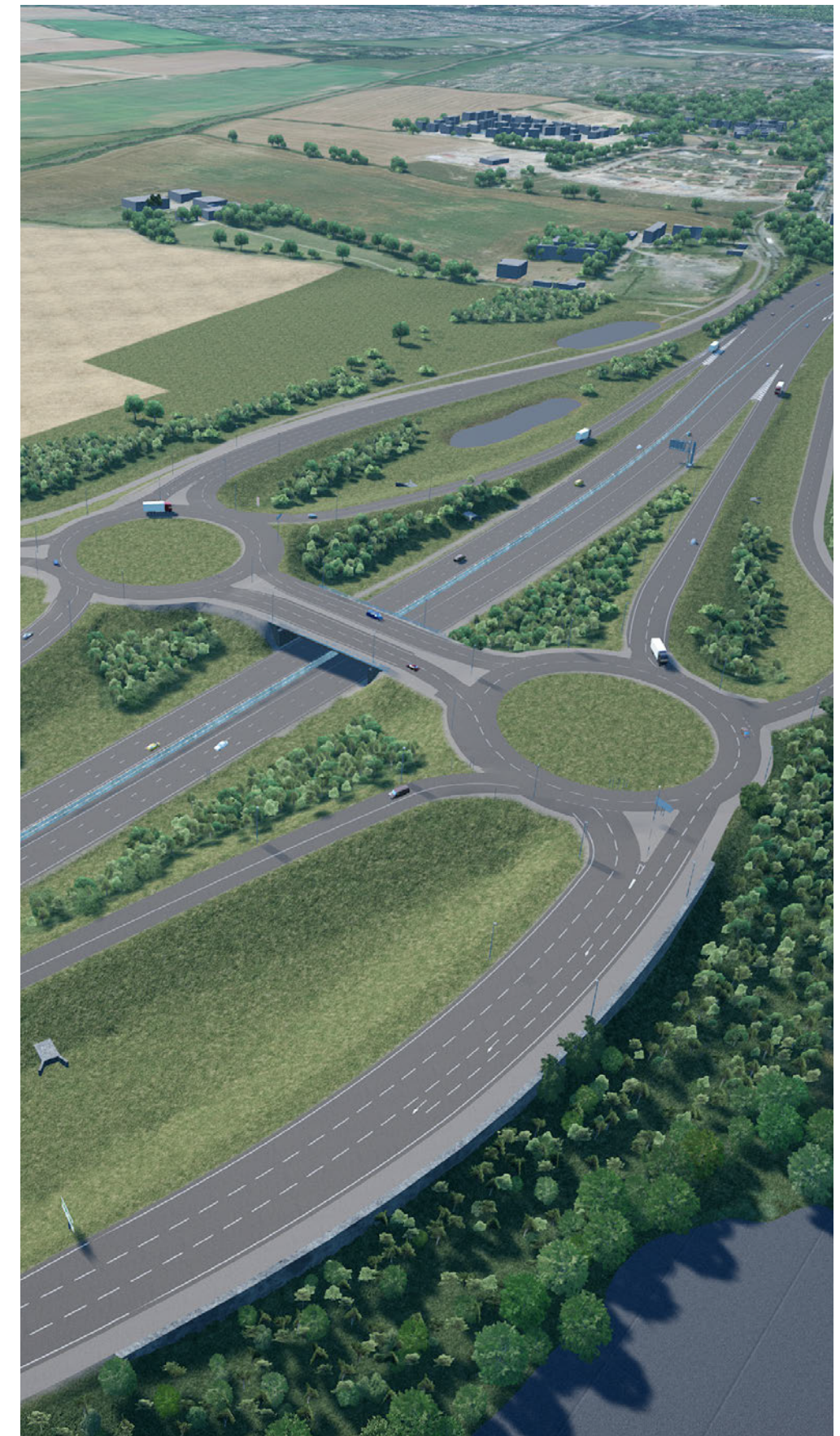
- Support the growth identified in Local Plans by reducing congestion related delay, improving journey time reliability and increasing the overall transport capacity of the A12
- Private accesses to the strategic road network closed off and alternative access to local roads provided by the proposed scheme
- Improve road user safety
- Improve road worker safety during maintenance and operational use
- Reduce current and forecast congestion-related delays and therefore improves journey time reliability
- Understand the impacts of other schemes and recognises other RIS schemes
- Reduce the visual, air and noise quality impacts of the proposed scheme on affected communities on the route
- Reduce the impact of severance of communities along the route
- Improve accessibility for walkers, cyclists, horse riders, and public transport users
- Improve customer satisfaction, and reduce customer impact during construction

The Case for the Scheme [APP-249] details the development of these objectives and contains an appraisal of all potential scheme options against these objectives.

The proposed scheme proposals incorporate the following key elements:

- Widening to three lanes in both directions between Hatfield Peverel and Marks Tey
- A new three-lane bypass at Rivenhall End (junctions 22 to 23)
- A bypass between junctions 24 to 25
- Improvements made to junctions 19 and 25
- Three new junctions constructed to replace existing junctions 20a, 20b and 23
- New and improved walking, cycling and horse riding routes

The design principles should be read alongside the Design and Access Statement (DAS) [APP-268], Works Plans [APP-006], General Arrangement Plans [APP-020/024], Structures engineering drawings and sections [APP-031/032] and Highway engineering sections drawings [APP-027/030].





## 1.1 Introduction

- 1.1.1 This document is intended to identify and summarise the factors that have shaped the preliminary scheme design and ultimately secure principles for detailed design and construction.
- 1.1.2 The design principles are one of a suite of documents that capture the proposed scheme's design and environmental commitments. These documents include:
- Design and Access Statement (DAS) [APP-268]
  - Environmental Statement (ES) Chapter 2 [APP-069] which describes the Scheme.
  - The ES Figure 2.1 Environmental Masterplan [APP-086 - APP-088] which defines the spatial layout of physical mitigation proposals.
  - The Register of Environmental Actions and Commitments (REAC) [APP-185] which defines commitments on the processes that need to be used in the delivery, management, monitoring and maintenance of the works.
- 1.1.3 The design principles are a result of the proposed scheme objectives, vision, policies, consultation and engagement. They set out a unified approach to design and create an overarching, shared resource for stakeholders over the required design outcomes. They provide detail on design commitment and objectives to be achieved through outline detailed design principles which leave some flexibility for the detailed designs to be developed.
- 1.1.4 The design principles have informed the preliminary scheme design shown on the works plans [APP-006], engineering section drawings [APP-027 - APP-030] and structures engineering drawings and sections [APP-031 - APP-031] which are secured through the draft DCO [APP-039] and that are certified in Schedule 2 Requirements, Part 1 Requirements '10. Detailed Design' of the draft DCO.
- 1.1.5 Temporary construction elements of the proposed scheme are addressed in the Temporary Works [APP-009] and are not included in the proposed design principles.
- 1.1.6 Access and the parameters for access works are addressed in the Outline Construction Traffic Management Plan [APP-272] with the parameters for their ongoing use during operation addressed in the first iteration Environmental Management Plan [APP-184] and therefore not included in the proposed design principles.
- 1.1.7 **Revision 2 of this document details, for each design principle, how it is controlled through the DCO documentation. Where a design principle is related to detailed design and therefore is not controlled by an existing certified document/plan, the Applicant has detailed the relevant technical design standard or legislation the Applicant will comply with to ensure compliance.**
- 1.1.8 The design principles are limited by the proposed scheme's limits of deviation.
- 1.1.9 Where appropriate, the design principle has been related to a specific character area as presented in map 1.1.



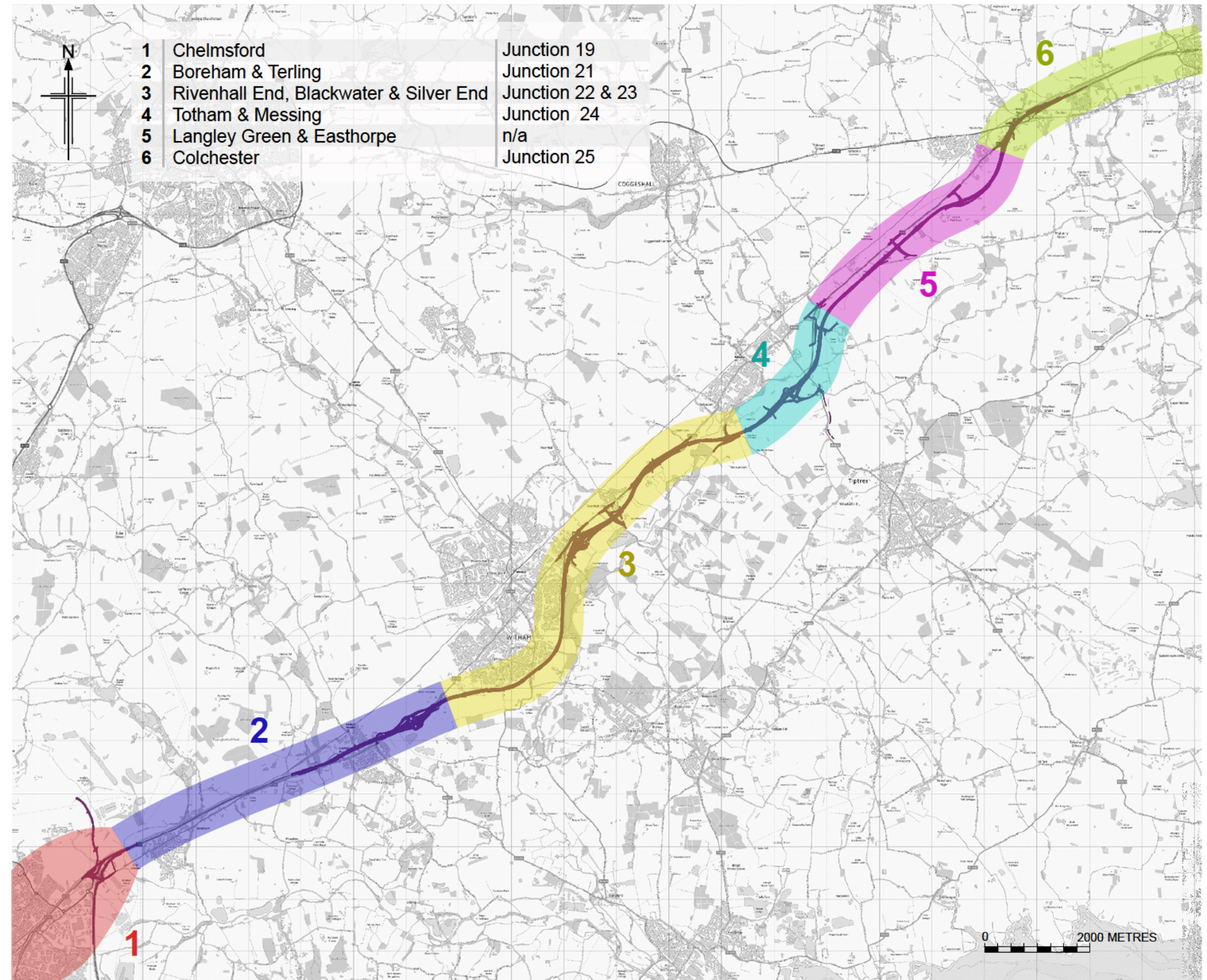
## 1.2 Character areas (CA)

1.2.1 A design narrative was produced within the Preliminary Environmental Impact Report (PEIR), which described the proposed schemes context and broke the proposed scheme down into 18 CAs. Each CA described the local context and a summary of the design constraints and opportunities.

1.2.2 PEIR CA's were then grouped and aligned to the junctions, to present the design development and proposed designs at Statutory Consultation. The areas presented are reflected in map 1.1.

1.2.3 More details on the CA and associated analysis can be found in the DAS [APP-268].

Map 1.1: Character Areas





### 1.3 Design policy and standard context

1.3.1 Design principles are written to capture the key policies and principles that have shaped the design thus far, and to make a commitment that these will be maintained and developed in the future detailed design and delivery phases of the proposed scheme in accordance with NNNPS (Department for Transport, 2014) requirements for 'good design'.

1.3.2 The overarching design principles respond to the design objectives set out in the following:

- NNNPS
- The Road to Good Design
- Design principles for National Infrastructure
- Essex Green Infrastructure Strategy (EGIS)
- Technical Design Standards
- **Technical Design Standards (Gas Pipeline)**
- Place Services: Essex Tree Palette
- **Police, Fire & Crime Commissioner (PFCC) for Essex Guiding Principles**

1.3.3 Paragraph 4.34 of the NNNPS recognises that applicants may only have limited choice in the physical appearance of some national networks infrastructure. Whilst the development both of and on the strategic road network needs to adhere to standards set out in the Design Manual for Roads and Bridges, every effort has been made to ensure that good design principles are embedded into the design development of the proposed scheme.

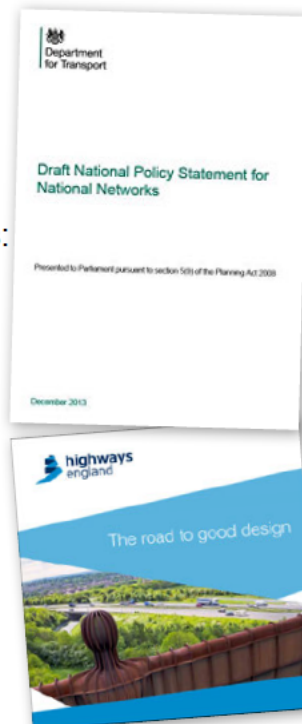
#### National Networks National Policy Statement (NNNPS)

1.3.4 The NNNPS provides guidance and imposes requirements on matters such as good scheme design, as well as the treatment of environmental impacts.

1.3.5 Paragraphs 4.28-4.35 of the NNNPS set out the criteria for 'good design' for national networks noting that design shall be an integral consideration from the outset. Paragraph 4.29 states:

- *“Visual appearance should be a key factor in considering the design of new infrastructure, as well as functionality, fitness for purpose, sustainability and cost. Applying “good design” to national network projects should therefore produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction, matched by an appearance that demonstrates good aesthetics as far as possible.”*

1.3.6 Achieving compliance with the NNNPS requires a high level of coordination across design, engineering, and environmental specialisms as well as consultation with external stakeholders. The design principles apply to the proposed scheme's permanent physical structures (including highways, tunnels and buildings) and landscape works; they do not apply to the temporary works, utilities



diversions and/or methods of construction, nor do they describe in detail how the works will be operated and maintained.

1.3.7 For more information on how the proposed scheme has been developed to comply with the NNNPS criteria for good design please see the Accordance Table within the Case for the proposed scheme [Document Reference: TR010060/APP/7.2].

#### The Road to Good Design

1.3.8 The RIS 1 includes the government's vision to ‘...see the strategic road network working more harmoniously with its surroundings, impacting less on local communities and the environment’

1.3.9 The Road to Good Design (Highways England, 2018), sets out the Applicant's vision for delivering roads that, as well as being safe, efficient and affordable, are also beautiful and examples of excellence. It aims to place good design at the heart of everything the organisation does, and ensure our roads better serve the people who use them and the environments through which they pass. It sets out design principles under the following three themes:

- **Connecting People:** People are at the heart of our design work, making good roads safe and useful, inclusive and understandable. Good road design reflects users' needs, engages with communities and works intuitively for all.
- **Connecting Places:** Good road design demands a deep understanding and response to place, to create a quality aesthetic experience for the user and wider community. This is restrained and environmentally sustainable design, in fitting with the context.
- **Connecting Processes:** A successful outcome focused on people and places requires good design processes. These are collaborative, thorough and innovative, generating long-lasting outcomes that are of benefit to users and the wider community.

#### Design Principles for national infrastructure

1.3.10 National Infrastructure Commission (NIC) published design principles for national infrastructure based on advice received from the independent National Infrastructure Design Group, made up of experts and leaders in design, architecture, engineering and landscape.

1.3.11 NIC developed four principles to guide planning and delivery of major schemes:

- **Climate:** Mitigate greenhouse gas emissions and adapt to climate change.
- **People:** Reflect what society wants and share benefits widely.
- **Places:** Provide a sense of identity and improve our environment.
- **Value:** Achieve multiple benefits and solve problems well.





- Essex Green Infrastructure Strategy (EGIS) (2020 )**
- 1.3.12 Essex County Council (ECC) have produced a green infrastructure strategy (Essex Green Infrastructure Strategy: A strategy that champions for high quality green space and green infrastructure in Essex, 2020). The EGIS outlines the vision and objectives for the county as follows: *'We will protect, develop and enhance a high quality connected green infrastructure network that extends from our city and town centres, and urban areas to the countryside and coast and which is self-sustaining and is designed for people and wildlife.'*
- 1.3.13 The vision and objectives set out what this strategy aim to achieve, recognising that good infrastructure is not an end, but an enabler of better social, economic and environmental outcomes.
- 1.3.14 EGIS objectives include:
1. Place
    - Protect existing green infrastructure, especially designated sites
    - Improve existing green infrastructure so it is better functioning for people and wildlife
    - Create more high-quality multi-functional green infrastructure, especially in areas of deficiency
    - Improve the connectivity of green infrastructure for people and wildlife
  - 1.3.15 2. People
    - Increase use and inclusivity of green infrastructure across all user groups, social groups and abilities
    - Provide green infrastructure facilities to promote health and wellbeing
  3. Funding
    - Working with partners to build and secure funding, effective governance and stewardship for new and existing green infrastructure to ensure their long-term sustainability
- Technical Design Standards**
- 1.3.16 The proposed scheme proposes to upgrade the existing A12 to a high-performing three-lane carriageway. It would benefit from modern safety measures and construction standards. This is achieved by designing the route to standards as defined in the Design Manual for Roads and Bridges ('DMRB'). The DMRB requirements and advice relating to works on motorways and all-purpose trunk roads for which National Highways is responsible.
- 1.3.17 The DMRB was prepared jointly by the Overseeing Organisations, which include National Highways. The DMRB embodies the collective experience of the Overseeing Organisations, their agents and designers. It provides requirements and advice resulting from research, practical experience of constructing and operating motorway and all-purpose trunk roads, and from delivering compliance to legislative requirements.
- 1.3.18 With regard to engineering components of the proposed scheme, including structures, walking, cycling and horse-riding (WCH) routes, and highways drainage, DMRB standards and guidance have been applied during the design development process.

These include, but are not limited to:

- CD 109 Highway link design
- CD 116 Geometric design of roundabouts
- CD 122 Geometric design of grade separated junctions
- CD 127 Cross-sections and headrooms
- CD 143 Designing for walking, cycling and horse-riding
- CD 350 The design of highway structures
- CD 351 The design and appearance of highway structures
- CD 529 Design of outfall and culvert details
- CG 501 Design of highway drainage systems
- TD 501 Road lighting design

**Technical Design Standards (Gas Pipeline)**

- 1.3.19 The pipeline, including special crossings at bridge and rivers, will be designed, constructed and tested to comply with the Institution of Gas Engineers and Managers publication, IGEM/TD/1 Edition 5, 2008 - 'Steel pipelines and associated installations for high pressure gas transmission'.
- 1.3.20 The construction of all gas pipelines must adhere to industry standards and comply with the following legislation:
- Gas Act 1986 (as amended 1995)
  - The Pipelines Safety Regulations 1996
  - The Construction (Design and Management) Regulations 2015
  - Health and Safety at Work etc. Act 1974
  - The Pressure Systems Safety Regulations (PSSR) 2000
  - The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
  - The Public Gas Transporter Pipe-line Works (Environmental Impact Assessment) Regulations 1999
  - Control of Substances Hazardous to Health Regulations 2002
- 1.3.21 The pipeline, including special crossings, will be designed, constructed and tested to comply with following specifications:
- IGEM/TD/3 Steel and polyethylene (PE) pipelines for gas distribution
  - GD/SP/TR/18 Specification for Engineering of Pipelines and installations Operating at above 7barg
  - GD/SP/TR/24 Specification for Detailed Designs of Pipelines and Installations Operating at above 7 bar
  - GD/SP/PW/11 Specification for Pipework Systems Operating at Pressures Exceeding 7 bar
  - GD/SP/GM/1 Specification for The Protection of Pipelines From Ground Movement and External Loading. External Loading on Steel Pipelines and Buried Piping at Installations
  - GDN/PM/P/18 Management Procedure for working on pipelines containing defective girth welds or girth welds of unknown quality
  - CAD/SP/PIP/1 Specification for steel line pipe for natural gas pipelines operating at pressures greater than 7 Bar Implementation



- GD/PM/G/17 Management Procedure For The Management Of New Works, Modifications and Repairs.
- GIS/L2 Specification for Steel pipes 21.3mm to 1219mm outside diameters for operating pressures up to 7Bar (supplementary to BSENISO3183PSL2)
- CAD/PM/MSL Main laying & service laying on systems operating at pressures up to and including 7Bar
- Cadent specifications for works (Above 7 bar Projects)
- Cadent specifications for works (Below 7 bar Projects)

**Place Services: Essex Tree Palette (2018)**

- 1.3.22 ECC have produced a guide to inform tree species (Place Services: Essex Tree Palette. A guide to choosing the most appropriate tree species for Essex sites according to landscape character and soil type, 2018).
- 1.3.23 The guide is based on landscape character type and has been used to inform typical species mixes within the indicative species lists presented within the first iteration Landscape and Ecological Management Plan, appended to the first iteration ES Figure 2.1 Environmental Masterplan [APP-086 / APP-087].
- Police, Fire & Crime Commissioner (PFCC) for Essex Guiding Principles**
- 1.3.24 The design principles are structured on The Road to Good Design (Highways England, 2018) themes which place a strong emphasis on community safety and inclusivity, therefore many of the PFCC guiding principles are incorporated throughout. However, an additional design principle has been included (STR: 12 Suicide Prevention) in direct response to the PFCC Guiding Principles.
- 1.3.25 PFCC's guiding principles can be found in Appendix A: PFCC Guiding Principles.



## 1.4 Design Principles

- 1.4.1 The feedback received at statutory consultation was grouped together by area and similarity of issues raised. These were then used to develop the scheme-wide design principles and also area specific design principles as highlighted out in column four of the design principle tables.
- 1.4.2 The purpose of the design principles are:
- To define high quality design principles which set the framework within which, through the DCO, the detailed design of the proposed scheme would be required to respond; taking account of the sites' changing surroundings.
  - To provide enough information to guide the EIA and embed essential measures for the mitigation of significant effects.
  - Give confidence to stakeholders that their requirements and aspirations for the new infrastructure (including the road, landscape and structures) would be taken into account.
  - To capture National Highways design related commitments in response to public consultation and ensure that these are followed through to detailed design.
  - To establish how National Highways has, and would continue to take account of the criteria for good design set out in the NN NPS and Road to Good Design, in order to ensure that the development is as sustainable and as aesthetically sensitive, durable, adaptable and resilient as it can reasonably be.
- 1.4.3 In the following sections of this chapter the preliminary proposed scheme is set out, explaining how these design principles could be realised through the proposed scheme design. Each section is divided by Road to Good Design theme or design discipline and each relevant design principles are reproduced in a simple table, to clearly demonstrate how the illustrative design responds to them.

### 1.4.4

#### Connecting people

'People are at the heart of our design work, making good roads safe and useful, inclusive and understandable. Good road design reflects users' needs, engages with communities and works intuitively for all' (Highways England, 2018).

Ref. no.	Design principle name	Design principle	Document Reference	CA
PEO.01	Walking, cycling and horse riding (WCH)	WCH crossings and the paths surrounding the route have a design that is safe, considers the convenience of users, and the local traffic network, and the context of the surrounding landscape character.	Streets, rights of way and access plans [AS-007/008]	All
PEO.02	WCH user experience	In order to allow enable users to stay aware of their location and use crossings safely, WCH crossings across and adjacent to the proposed scheme would include clear and informative signage to provide wayfinding for users.	LTN 1/20 Traffic Signs Regulations and General Directions (TSRGD) 2016	All
PEO.03	WCH network	In order to enable users to stay aware of their location and use crossings safely, WCH crossings across and adjacent to the proposed scheme would include clear and informative signage to provide wayfinding for users.		All
PEO.04	WCH Accessibility	The design of the new WCH routes maximise access for users (including those with limited mobility) through good design whilst considering and mitigating the potential impacts from misuse.	Streets, rights of way and access plans [AS-007/008]	All
PEO.05	WCH safety	WCH routes are separated where possible from the mainline A12 in order to maximise safety of users and their experience. This would be achieved by separating all WCH paths and crossings from the mainline A12, providing the appropriate separation from the carriageway at junctions and local roads, and providing barriers to prevent unauthorised access.	LTN 1/20 TSRGD 2016	All



Ref. no.	Design principle name	Design principle	Document Reference	CA
PEO.06	WCH (detailed design)	The surfacing, signage, boundary treatments and access controls would be designed with consideration of the surrounding context. Surfacing, signage, boundary treatments and access controls are adapted where appropriate to better fit with their surrounding context as WCH routes travel between rural and urban environments.	LTN 1/20 TSRGD 2016	All
PEO.07	WCH bridges	Structures such as bridges are situated in places relevant to the existing WCH network, to address both historical severance and severance caused by the proposed scheme.	Streets, rights of way and access plans [AS-007/008]	All
PEO.08	Horse-riding	The WCH network would provide a safe crossing for horse-riders by addressing historic bridleway severance.	Streets, rights of way and access plans [AS-007/008]	CA.1

#### Connecting places

1.4.5 *'Good road design demands a deep understanding and response to place, to create a quality aesthetic experience for the user and wider community. This is restrained and environmentally sustainable design, in fitting with the context.'* (Highways England, 2018).

Ref. No.	Design principle name	Design principle	Document Reference	CA
PLA.01	Design language	The design has been developed according to a common design language whilst remaining sensitive to place. As the proposed scheme travels through both rural and urban contexts, the design language is adapted to be appropriate to its surroundings.	Environmental masterplan [APP-086/088] Structures engineering drawings and sections [APP-031/032] Highway engineering sections drawings [APP-027/030]	All

PLA.02	Efficient design	Structures, landscape, and engineering design are efficient in their use of resources and multifunctional where practicable.	Environmental masterplan [APP-086/088] Structures engineering drawings and sections [APP-031/032] Highway engineering sections drawings [APP-027/030]	All
PLA.03	Highways environment	The amount of roadside furniture and signage is reduced or combined as far as practical, whilst remaining within safety standards.	TSRGD 2016 Traffic Sign Manuals	All
PLA.04	Future development	The route of the proposed scheme and related design would be 'forward looking' in regard to future development. The design of the proposed scheme would avoid constraining future development through severance of land parcels or the placement of new habitats, structures and WCH routes.	Environmental masterplan [APP-086/088] Structures engineering drawings and sections [APP-031/032] Highway engineering sections drawings [APP-027/030]	All
PLA.05	Severance	The severance of communities is avoided and where practicable, improved through the provision of new WCH crossings and routes.	Streets, rights of way and access plans [AS-007/008]	All
PLA.06	Access	Where access from properties and other roads to the existing A12 is removed to improve safety, alternative access to the local road network is provided.	Highway engineering sections drawings [APP-027/030] Permanent Works Plans [AS-002]	All
PLA.07	Habitat connectivity	The fragmentation of habitats is reduced as far as reasonably practicable by avoiding unnecessary barriers to movement of animals or colonisation by plants.	Environmental masterplan [APP-086/088]	All



PLA.08	New habitats	New habitats and ecosystems are created where borrow pits or works compounds are located. These habitats are designed with consideration to the wider ecosystem and as discussed in PLA.07, design proposals would ensure their connectedness to the surrounding ecosystem.	<a href="#">Environmental masterplan [APP-086/088]</a>	All
PLA.09	Potential for A120 link road	A link road between the A12 and the A120 was announced in March 2020 as a 'pipeline Scheme' in the second Road Investment Strategy (RIS2). Efforts would be made to coordinate with and provide all relevant design information to the A120 team.	<a href="#">Interrelationship Document [AS-022]</a>	TBC

### Connecting Processes

1.4.6 *'A successful outcome focused on people and places requires good design processes. These are collaborative, thorough and innovative, generating long-lasting outcomes that are of benefit to users and the wider community'* (Highways England, 2018)

Ref. No.	Design Principle Name	Design Principle	Document Reference	CA
PRO.01	Design Review	The proposed scheme would continue to engage with the National Highways Design Review Panel on the development of the detailed design and adapt the design according to comments raised by the panel.	<a href="#">Design and Access Statement (Chapter 3, Consultation, Engagement and Design Development)</a>	All
PRO.02	Stakeholder consultation	The design process has been guided by engagement with stakeholders from the start of the design process. The range of views of stakeholders affected would be taken into account and where practicable, reflected in the detailed design of the proposed scheme.	<a href="#">Consultation Report [APP-045]</a> <a href="#">Outline Construction Traffic Management Plan (Chapter 3 Communication and engagement)</a>	All
PRO.03	Carbon reduction	All design proposals have been developed with the goal of reducing carbon emissions in mind. Beyond reducing emissions through journey times, low-carbon materials and construction processes shall be specified in the design where practicable and economically viable.	<a href="#">Chapter 15 Climate, Environmental Statement [APP-082]</a>	All

PRO.04	Maximising biodiversity	The detailed design of structures, buildings and landscape shall be developed with the goal of maximising biodiversity where practical and within the scope of the proposed scheme.	<a href="#">Chapter 9 Biodiversity, Environmental Statement [APP-076]</a>	All
PRO.05	Minimal waste and need for new materials	The design of the proposed scheme seeks to reduce the level of waste and need for new materials in constructing the proposed scheme. This would be achieved by creating borrow pits to minimise the amount of new earth and minerals brought onsite, where practicable, the reuse of existing structures, signage, lighting and technology, and efficient and well-managed construction processes. This would contribute towards minimising carbon reductions, as discussed in principle PRO.03, and delivering value for money.	<a href="#">Chapter 11 Material Assets and Waste, Environmental Statement [APP-078]</a>	All
PRO.06	Mineral resources	The design of the proposed scheme considers the use of mineral resources from the outset. Where practicable, the proposed scheme would avoid mineral sterilisation and mineral use. This would be achieved through minimising land take in Mineral Safeguarding Areas, specified in Chapter 10, Geology and Soils, of the Environmental Statement [Document Reference: TR010060/APP/6.1].	<a href="#">Chapter 10 Geology and Soils, Environmental Statement [APP-077]</a>	CA.1 and CA.3



### Structures

1.4.7 This section relates to specific requirements for bridges, culverts and other structures across the proposed scheme.

Ref. No.	Design Principle Name	Design Principle	Document Reference	CA
STR.01	Serviceable in use	The detailed design of structures would ensure that they fulfil their function and are able to withstand the required abnormal heavy vehicle loads (Heavy Load Route No. 82) without restriction. As discussed in PEO.07, bridges and other structures would be placed in locations that integrate with the wider WCH and road network.	Structures engineering drawings and sections [APP-031/032] Streets, rights of way and access plans [AS-007/008]	All
STR.02	Safe to build for workers and public	The detailed design for structures should consider the speed, efficiency and safety of each feature's installation. Construction sequencing, precasting and prefabrication of standardised bridge components would be proposed to reduce the amount of in situ working, in turn leading to less potential for risk of accidents to the workforce and public.	Structures engineering drawings and sections [APP-031/032]	All
STR.03	Design for maintenance	The detailed design of structures should consider their future maintenance from the outset. Whilst materials and designs would be chosen to minimise the need for maintenance, structures should be positioned and designed in such a way that would enable safe maintenance works to be carried out with minimal disruption to A12 users.	Structures engineering drawings and sections [APP-031/032]	All
STR.04	Design for durability	The selection of materials used for structures has been considered for their durability qualities, minimising future maintenance requirements. Where practicable, detailed designs would be adaptable for future needs and technologies, balanced against cost constraints and their suitability to the local context.	Structures engineering drawings and sections [APP-031/032]	All

STR.05	Value for money	The proposed scheme should deliver value for money by achieving its objectives, as set out in Chapter 2.4 of the Case for the proposed scheme, Scheme Aims and Objectives, [APP-249]. The detailed design of the proposed scheme should deliver these aims and objectives in a cost-efficient manner, considering the cost of construction and materials throughout the design process. Cost-effectiveness <del>would</del> will be weighed against <b>quality of existing local landscape character</b> , aesthetic value, safety, and other design principles discussed in this chapter.	Structures engineering drawings and sections [APP-031/032]	All
STR.06	Bridges (detailed design)	The detailed design of bridges shall share a consistent design approach that uses similar details with appropriate diversification for their local context. Bridges should be incorporated within their context through their material palette and associated landscaping for aesthetic purposes.	Structures engineering drawings and sections [APP-031/032]	All
STR.07	Barriers and fences	In order to avoid duplication leading to the creation of visual clutter, environmental, boundary, and security fences are combined into a single structure as much is reasonably practicable. Parapets and acoustic barriers are also combined where appropriate. The materials used for barriers and fences have been considered for their durability, cost, and their surrounding landscape context.	Structures engineering drawings and sections [APP-031/032] Environmental masterplan [APP-086/088]	All
STR.08	Noise barriers	Proposals balance mitigation requirements for noise and visual impacts in such a way as to minimise the negative impact on tranquility and landscape character. The materials used for noise barriers have been considered with respect for the surrounding context of landscape to avoid the perceived urbanisation of rural areas.	Environmental masterplan [APP-086/088]	All



STR.10	Fit into environment: Urban places	Structures are designed to be incorporated unobtrusively within their environment. Structures should complement the local character context, using similar materials to surrounding structures where practicable.	Structures engineering drawings and sections [APP-031/032]	CA.1 and CA.6
STR.11	Fit into environment: Rural places	The detailed design for structures in rural settings should seek to minimise their impact on the local environment. This should be achieved through use of a muted material palette and incorporating the structure into the local character context through earthworks and planting.	Environmental masterplan [APP-086/088]	CA.2, CA.3, CA.4 and CA.5
STR.12	Suicide Prevention	Structures are designed in accordance with National Highways Suicide Prevention Strategy (National Highways, 2022).	Structures engineering drawings and sections [APP-031/032]	All

LST.03	Place sensitivity (detailed design)	The detailed design of lighting, signage and technology features should be responsive to their local landscape character. Consideration should be given to the rural or urban location of their placement, and the proximity of heritage assets. Appropriate material palettes and forms should be selected accordingly. Lighting, signage and technology should contribute to a sense of place, contribute towards a place's amenity, help prevent crime and fear of crime.	DMRB (TD 501) BS5489-1 Design of road lighting TSRGD 2016 Traffic Sign Manuals	All
LST.04	Intuitive wayfinding	For both motor and WCH users across the proposed scheme, clear and intuitive signage, positioned in the most suitable locations to aid journeys, would aid wayfinding.	LTN 1/20 TSRGD 2016	All
LST.05	Unnecessary signage (detailed design)	The detailed design of the proposed scheme should avoid unnecessary traffic signage to minimise clutter, especially where it would act as a roadside distraction or detract from local amenity.	TSRGD 2016 Traffic Sign Manuals	All
LST.06	Lighting signs	Wayfinding signs do not always need to be illuminated by internal or external lighting, or use reflective materials, particularly for signage in the WCH network. The use of lighting with signage should be evaluated against safety, effectiveness and potential light pollution.	TSRGD 2016	All
LST.07	Lighting design	Lighting designs should enhance night-time use, enjoyment and provide safe passage for users of the A12 and surrounding WCH network.	DMRB (TD 501) BS5489-1 Design of road lighting	All
LST.08	Light pollution	The need for lighting to promote user safety and enjoyment should be balanced where practicable with the need to promote biodiversity and avoidance of light pollution.	DMRB (TD 501) BS5489-1 Design of road lighting	All
LST.09	Lighting: rural context	Lighting, signage and technology should balance the need for safety and effectiveness with the need for discretion in order to maintain the rural context of the route and surrounding WCH network. Lighting should be discreet whilst still being visible and should minimise light pollution.	DMRB (TD 501) BS5489-1 Design of road lighting	CA.2 and CA.4

### Lighting, signage and technology

1.4.8 *'Road design is more bound to place and function than other design fields, with specific demands of technical design and safety that must be met. Since aesthetic considerations must accept these demands, the potential for variation is more challenging, but still possible for many elements such as signs and lighting'* (Highways England, 2018)

Ref. No.	Design Principle Name	Design Principle	Document Reference	CA
LST.01	Lighting safety	Lighting, signage and technology used across the proposed scheme would adhere to and support the most modern and effective safety measures. Signage would clearly communicate risk and danger to drivers, cyclists, pedestrians and horse riders.	DMRB (TD 501) BS5489-1 Design of road lighting TSRGD 2016 Traffic Sign Manuals	All
LST.02	Aesthetic value (detailed design)	The detailed design of lighting, signage and technology should consider aesthetic value and its surrounding context of landscape, balanced against safety, cost and durability considerations.	TSRGD 2016 Traffic Sign Manuals	All



LST.10	Sensitive lighting (detailed design)	Sensitive lighting design should include the use of horizontally mounted flat glass lanterns, the use of modern dimmable light emitting diodes (LED) with cut-off properties, together with dynamic systems of operation to provide the minimum amount of light required at different times.	DMRB (TD 501) BS5489-1 Design of road lighting	All
LST.11	Column Height (detailed design)	Minimise the height of lighting columns, particularly where on elevated parts of the proposed scheme.	DMRB (TD 501) BS5489-1 Design of road lighting	All
LST.12	Main road signs	Sensitive location of main road signs to limit visual intrusion within the landscape.	TSRGD 2016 Traffic Sign Manuals	All

### Landscape

1.4.9 The proposed scheme is based upon the following landscape design principles, which have been applied to the ES Figure 2.1 Environmental Masterplan [APP-086 / APP-087] which would be carried forward into the detailed design as per Schedule 2, Part 1 to the draft DCO [APP-039].

Ref. no.	Design principle name	Design principle	Document Reference	CA
LSC.01	Retain vegetation	Retain as much existing vegetation as possible where it provides an important visual screening function and/or forms part of the landscape structure. Where vegetation loss is unavoidable, replace and extend areas of proposed planting into the landscape to provide screening and to contribute towards the surrounding framework of vegetation.	Environmental masterplan [APP-086/088] First Iteration Environmental Management Plan (EMP): Appendix A: REAC, clause LV17 [APP-185]	All
LSC.02	Maximise biodiversity	Maximise the biodiversity value of habitat throughout the proposed scheme extent and improve wildlife connectivity by incorporating linear habitats such as hedgerows and lines of trees, linking with retained woodland and hedgerows where possible.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.03	Landscape	Reinforce the landscape character and biodiversity by planting native species typically found within the surrounding landscape.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All

LSC.04	Visual	Provide visual interest for local residents, users of public rights of way and public open space; including incorporating intermittent planting to allow views out from the road for drivers using the A12.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.05	Screening	Filter, screen and contain views of major junctions and integrate into the surrounding landscape framework of native planting.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.06	Drainage and floodplain	Aim to limit the overall extent of the proposed scheme as much as possible when considering the design and location of drainage ponds and floodplain compensation areas.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.07	Drainage (detailed design)	Integrate drainage and earthworks sensitively into the surrounding landscape in terms of earth modelling and planting, and carefully consider structure design over watercourses, aiming to minimise visual intrusiveness, connectivity for wildlife and maintain the character of the landscape and views along valley floors.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.08	Floodplain	Within areas of floodplain keep land take and vegetation loss to an absolute minimum to retain the locally distinctive willow plantations. Ensure proposed planting contributes to the pattern and character of existing vegetation.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.09	Junction alignment	Alignment of the proposed scheme and location of junctions and borrow pits would be designed to reduce landscape and visual effects.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All



LSC.10	Structures (detailed design)	Careful design of major structures, signage and gantries to limit visual intrusion and to help integrate these into the wider landscape.	Structures engineering drawings and sections [APP-031/032] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.11	Earthworks (detailed design)	Refinement of the design of earthworks to create natural gradients and slopes that achieve better integration with the surrounding landform, where space and material are available.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.12	Borrow pits and attenuation	Sensitive design of borrow pits and attenuation ponds, to integrate these features into the landscape and reduce visual intrusion.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.13	Species	Planting of native hedgerows, shrubs and trees would reduce adverse landscape and visual effects. Consideration of the species, pattern and distribution of proposed hedgerows, shrubs and trees along the proposed scheme would reflect the distinctive local character of vegetation within the adjacent landscape and provide screening for visual receptors.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.14	Minimise scale	Dense native tree and shrub planting on and adjacent to highway earthworks would create woodlands, copses and shelterbelts in order to break up the scale of the road, screen structures, traffic and lighting, and help integrate the proposed scheme into the existing landscape pattern.	Environmental masterplan [APP-086/088]	All
LSC.15	Integration	Support green infrastructure objectives through use of planting to link into existing field boundary vegetation to provide screening and integration into the local pattern and character, as well as connection of existing wildlife corridors.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All

LSC.16	Planting	Use of locally indigenous native and non-native plants as appropriate to reflect the distinctive local character, such as the replication of willow plantation on valley floors.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
LSC.17	Screening	Consideration of balance between screening the proposed scheme, and retention of views out from the highway through breaks in the planting to help create a sense of place and stimulating visual experience for vehicle travellers where practicable.	Environmental masterplan [APP-086/088] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All

#### Borrow Pit Restoration

Ref. no.	Design principle name	Design principle	Document Reference	CA
BPR.01	Gradient (detailed design)	Borrow pits would be shaped to form natural gradients with rounded contours to integrate into the surrounding landscape.	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
BPR.02	Waterbodies (detailed design)	Where waterbodies remain after excavation these would include scalloped edges and shallow slopes or berms for safety, and to improve access and egress for animals.	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
BPR.03	Planting	Planting within the restored borrow pits would include woodland planting where screening is required along with intermittent tree and scrub planting and individual trees in species-rich grassland.	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
BPR.04	Boundaries	Boundaries with new or gapped up hedgerows with trees would tie into existing features to help restore the landscape pattern and maintain ecological connectivity.	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
BPR.05	Aquatic and wetlands	Aquatic and wetland planting would be introduced at the margins of waterbodies along with areas of wet woodland planting.	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
BPR.06	Flood Risk Assessment	Borrow pits would be restored such that the designed flood mitigation would function as described in the Flood Risk Assessment (Appendix 14.5 of the ES) [TR010060/APP/6.3]	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All



### Veteran Trees

Ref. no.	Design principle name	Design principle	Document Reference	CA
VT.01	Loss (detailed design)	Where the loss of ancient or veteran trees is unavoidable the hulk of the ancient or veteran tree would be left as close as possible to its original location to benefit invertebrates and fungi. If that is not possible they would be moved near other ancient and veteran trees in the area.	Chapter 8 Landscape, Environmental Statement [APP-075] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All
VT.02	Compensation (detailed design)	Loss would be compensated for by planting young trees of the same species near to the trees they are replacing. Over planting of young trees would be implemented where practicable to ensure a good survival rate.	Chapter 8 Landscape, Environmental Statement [APP-075] First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	All

### Gas Pipeline: Technical Design

Ref. no.	Design principle name	Design principle	Document Reference	CA
GPTD.01	Protection of Existing Network	Directly impacted elements of the existing distribution network will be identified and avoided or protected where feasible.	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3
GPTD.02	Scheme Design and Construction Interfaces	If scheme design and construction interfaces cannot be resolved via engineered protection measures, distribution mains will be diverted by fabrication, testing and commissioning of new sections of distribution main pipelines (i.e. diversions).	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3
GPTD.03	Easements	Diversions will be situated within an easements (as required for all high pressure pipelines) negotiated with local landowners, local authorities, and National Highways. Easement extents depend upon the size and pressure of the diversion.	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3

GPTD.04	Pipe Cover	Diversions will have 1000mm nominal cover to the crown of pipe.	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3
GPTD.05	Pipe Depth	Diversions will be designed and constructed at suitable depths to avoid direct interface with the proposed highways scheme, associated infrastructure and mitigation measures e.g. replacement habitat areas	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3
GPTD.06	Operation and Maintenance (O&M)	Suitable measures and access for operation and maintenance.	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3
GPTD.07	Above Ground Identification of Underground Pipeline	On completion of the diversion, new pipelines will be identified above ground in accordance with Statutory Undertaker standards.	See Design Principles (Paragraph 1.3.21) for design guidance and specifications	CA.3

### Gas Pipeline: Environmental considerations

Ref. no.	Design principle name	Design principle	Document Reference	CA
GPEC.01	Retain Vegetation	Retain as much existing vegetation as reasonably possible where it provides an important visual screening function and/or forms part of the landscape structure. The working width for the diverted pipeline corridor would be reduced as far as reasonably practicable through woodland and where the gas main diversion crosses hedgerow field boundaries.	First Iteration EMP: Appendix A: REAC, clause LV13 [APP-185]	CA.3
GPEC.02	Loss of Veteran Trees (detailed design)	Where the loss of ancient or veteran trees is unavoidable the hulk of the ancient or veteran tree would be left as close as possible to its original location to benefit invertebrates and fungi. If that is not possible they would be moved near other ancient and veteran trees in the area.	First Iteration EMP: Appendix A: REAC, clause LV15 [APP-185]	CA.3

GPEC.03	Compensation Planting (detailed design)	Replacement planting will be in accordance with Cadent standards and specifications. Use of locally indigenous native and non-native plants as appropriate to reflect the distinctive local character. Large trees are generally excluded from planting within the pipeline easement.	First Iteration EMP: Appendix A: REAC, clause LV14 [APP-185]	CA.3
GPEC.04	Protection of Main Rivers	All Main River crossing(s) would be installed using trenchless techniques. The gas main diversion would be tunnelled under Main Rivers, avoiding potential impacts to hydromorphology or flood risk caused by in-channel working. Mitigation measures and good construction practices would be employed to reduce water quality and flood risk impacts from construction activities, such as managing construction drainage and treating runoff as required, before discharge to receiving watercourses.	First Iteration EMP: Appendix A: REAC, clause LV15 [APP-185]	CA.3
GPEC.05	Aesthetic value (detailed design)	Consideration of aesthetics and good design would consist of replanting along the easement of the gas main diversion and would be carried out in accordance with Cadent Gas guidance and best practice standards. Where woodland vegetation would be lost and trees could not be replaced in situ due to the restrictions of the pipeline easement, native shrub planting would be used in line with that guidance. Where tree lines and tree belts would be lost and could not be replaced due to the restrictions of pipeline, native hedgerow planting would be used in line with the guidance.	First Iteration EMP: Appendix A: REAC, clause LV14 [APP-185]	CA.3

GPEC.06	Resilience to Climate change	The design has been developed taking into account the potential implications of climate change such as resilience to flooding and high temperatures. As the pipeline will be installed underground it will not increase flood risk but also being underground will be protected from flooding events.	First Iteration EMP: Appendix A: REAC, clause LV17 [APP-185]	CA.3
GPEC.07	Common Law and Statutory Nuisance	An Environmental Management Plan will be implemented that will include measures to reduce noise, dust, odour and artificial light during the construction period for the pipeline diversion.	First Iteration EMP: Appendix A: REAC	CA.3
GPEC.08	Waste Management	The pipeline diversion will be subject to a Site Waste Management Plan (SWMP) that will form part of the Environmental Management Plan.	First Iteration EMP: Appendix L: Site Waster Management Plan	CA.3





## Appendix A Guiding Principles for Essex PCFF

Essex Police
<ul style="list-style-type: none"> <li>Promoting an integrated offer through the concept of a shared, environmentally sustainable co-located community estate (including Police, Fire, healthcare, voluntary sector and other key public services where appropriate, efficient and effective) that shares facilities in appropriate locations within the community, creating a more local, visible and accessible policing.</li> </ul>
<ul style="list-style-type: none"> <li>To work with planners and developers to ensure that new developments in Essex provide a mix of well-designed homes, open spaces and promote neighbourhoods that consider community safety and wellbeing that provide benefit to all communities.</li> </ul>
<ul style="list-style-type: none"> <li>Ensuring 'Secured by Design' standards are incorporated and fully exhausted throughout new development (including associated buildings) as a minimum whilst maximising opportunities against current and future technological and crime pattern changes linked to digital/cyber offences.</li> </ul>
<ul style="list-style-type: none"> <li>That the prevention of crime and Disorder is supported through well-designed places that includes the provision of a sense of community and safety.</li> </ul>
<ul style="list-style-type: none"> <li>Encouragement of proactive Police Service related communication to new residents and communities that promote public confidence and cohesion.</li> </ul>
<ul style="list-style-type: none"> <li>Incorporating provision of affordable housing for Police service staff through a 'homes for all' approach.</li> </ul>
<ul style="list-style-type: none"> <li>Ensuring that all work, education and public spaces are sufficiently well designed to promote safe, secure communities and environments.</li> </ul>
<ul style="list-style-type: none"> <li>To be engaged with master-planning for any transport related developments, collaboratively working with the relevant authorities to ensure that new developments are planned and designed to improve safety on the various networks. This will include preventing KSI (those Killed or Seriously Injured) Road Traffic Collisions where possible.</li> </ul>
<ul style="list-style-type: none"> <li>To include infrastructure considerations to ensure and develop an efficient policing response in the future. This may include such matters as Vehicle Charging points.</li> </ul>
Essex County Fire and Rescue Service
<ul style="list-style-type: none"> <li>Promoting an integrated community services offer through the concept of a shared, co-located community estate (including Police, Fire, healthcare, voluntary sector and other key public services) that shares facilities in appropriate locations within the community, creating more local, visible and accessible Fire Service.</li> </ul>
<ul style="list-style-type: none"> <li>To work with planners and developers to ensure that new developments in Essex provide a mix of well-designed homes, open spaces and promote neighbourhoods that consider community safety and wellbeing that provide benefit to existing communities.</li> </ul>
<ul style="list-style-type: none"> <li>Working with London Fire Brigade and other partners, ensuring 'Safer By Design standards are incorporated and fully exhausted throughout new development whilst futureproofing against future technological and risk pattern changes to ensure buildings are designed with safety and accountability as standard.</li> </ul>
<ul style="list-style-type: none"> <li>Ensuring RoSPA Safer By Design principles are considered and included in planning, construction and operational phases of development.</li> </ul>

<ul style="list-style-type: none"> <li>During developmental planning and construction, consideration to be given, under advisement, for technological capabilities (i.e. Smart Alarms) alongside data and A.I., to help predict and prevent fires and promote and improve safety.</li> </ul>
<ul style="list-style-type: none"> <li>That risk mitigation is supported through well-designed places that promote a sense of community and safety and provide high-quality local employment, skills and training opportunities, affordable housing, safe recreation and leisure facilities and are environmentally sustainable.</li> </ul>
<ul style="list-style-type: none"> <li>Encouragement of proactive emergency services communication to new residents and communities that promote public confidence and cohesion.</li> </ul>
<ul style="list-style-type: none"> <li>Incorporating provision of affordable housing for emergency services staff through a 'homes for all' approach.</li> </ul>
<ul style="list-style-type: none"> <li>Ensuring that all work, education and public spaces are sufficiently well designed to promote safe, secure communities and environments.</li> </ul>
<ul style="list-style-type: none"> <li>Strive towards achieving a fit for purpose emergency tri-service estate responding to emerging demands and risk linked to growth in Essex.</li> </ul>
<ul style="list-style-type: none"> <li>To be engaged with master-planning for developments, jointly working with the highways authority to ensure that new developments are planned and designed to improve safety on our roads network thereby mitigating KSI (those Killed or Seriously Injured) Road Traffic Collisions where possible.</li> </ul>

East of England Ambulance Service
<ul style="list-style-type: none"> <li><b>Theme 1</b> – based on strong, compassionate and effective leadership throughout the Trust, we will further develop a culture that puts our patients at the heart of everything we do by providing safe, high quality care.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 2</b> – We will achieve operational and clinical performance in line with national best practice.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 3</b> – We will recruit and develop the right level of qualified staff and further expand the valuable and contribution from our volunteers.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 4</b> – We will deliver a training and education programme that supports our role within health and social care systems and improves the experience and outcomes for our patients.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 5</b> – We will continue to create an environment that people love to work in through the development of our people, our clinical outcomes, our estates, fleet and digital support that together makes us the employer of choice.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 6</b> – We will build on the successful transformation projects by creating a culture of continuous quality improvement, transformation and innovation focussed on our key priorities.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 7</b> – We will build on our collaboration and become an effective system leader, working closely with our health and social care partners, communities and emergency services colleagues to provide the gateway to urgent and emergency care.</li> </ul>
<ul style="list-style-type: none"> <li><b>Theme 8</b> – We will value every pound we spend as an organisation and continue to improve the value for money we offer within the service.</li> </ul>

Further information and technical checklists available at [REDACTED] and searching emergency services



