Design Manual for Roads and Bridges

General Principles and Scheme Governance
General information

GG 103
Introduction and general requirements for sustainable development and design

Revision 0

Summary
This document introduces the general requirements for sustainable development and design.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Jul 2019	GG 103 document created to outline general requirements for sustainable development and design. This full document has been written to comply with the new Highways England drafting rules.

Foreword

Publishing information

This document is published by Highways England.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

Integrating sustainable development into design enhances the performance of assets and infrastructure.

The design of highway and all-purpose trunk road projects can deliver sustainable benefits for the environment, the economy and society in general.

This document, together with the National Application Annexes, describes how sustainable development and good road design can be applied to the design of motorway and all-purpose trunk roads. It aligns with a range of global, European and national commitments on sustainable development and standards of design.

Defining sustainable development

Sustainable development is a concept that seeks to ensure that economic, environmental and social and cultural factors are central to the way development is taken forward to ensure the needs of society are addressed in both the present day, and in the longer term.

Across the United Kingdom each country has included the concept of sustainable development in national policy and legislation. However, all definitions share a focus on the needs of present and future generations, and each nation recognises the importance of sustainable development in relation to the design of infrastructure.

Definitions of sustainable development applicable to the Overseeing Organisations are presented in the relevant National Application Annexes.

The role of design

Design has a fundamental role to play in achieving sustainable development. Decisions made by the designer will affect the economy, the environment and society both now and in the future.

Design also plays a key role in how places are perceived, and roads and bridges are a key part of this perception. As well as promoting sustainable development in design this document introduces the concept of 'good road design'. Good road design aims to put people at its heart by designing an inclusive, resilient and sustainable road network; appreciated for its usefulness but also its elegance, reflecting in its design the beauty of the natural, built and historic environment through which it passes, and enhancing it where possible.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Terms and definitions

Terms

Term	Definition
Circular approach	A circular approach to the use of materials is where products are kept in use for as long as possible, and after they reach the end of their useful life they are recovered or regenerated to retain as much value as possible.
Climate change	Long-term changes in global or regional weather patterns.
Design lifecycle	The period of time between the early stages of design and the point at which the designed item no longer exists in its designed form. NOTE: Design lifecycle includes the stages of option identification, option selection, preliminary design and detailed design though to construction, operation and maintenance and end of useful life.
End of first life	The lifecycle stage in which a material, product or asset is demounted, deconstructed or demolished as it is no longer able to serve its intended purpose. NOTE: 'End of first life' implies that the material, product or asset in question is managed so that it is diverted from 'energy from waste' and landfill.
Project	Works on the road network to which the Design Manual for Roads and Bridges is applicable. NOTE: The applicability of this document is defined in the scope.
Resource efficient	Minimising the use of materials, energy and other resources in order to reduce environmental impacts and costs.
Responsibly sourced	The process of taking into the account social, environmental and economic dimensions of materials and products prior to their use.
Whole life	The period from which the components of an object are first obtained to the time when that object ceases to exist in its intended form. NOTE: Usefully described as the cradle to grave period, it encompasses elements such as extraction and processing of materials, design, construction, ongoing management and eventual decommissioning.

1. Scope

Aspects covered

1.1 The requirements in this document shall be applied to all designs.

NOTE *Figure A.1 in Appendix A shows design and its influence on the project lifecycle.*

1.2 The principles, requirements and advice set out in this document shall be applied to all design lifecycle stages, from inception through to end of first life.

1.3 Materials, products and services provided by the supply chain that support the delivery of design lifecycle outcomes must be specified in accordance with National, UK and EU law.

1.4 In meeting the requirements in this document projects shall demonstrate compliance with relevant requirements and advice in the Design Manual for Roads and Bridges.

Implementation

1.5 This document shall be implemented forthwith on all schemes on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 1.N].

Use of GG 101

1.6 The requirements contained in GG 101 [Ref 1.N] shall be followed in respect of activities covered by this document.

2. The importance of identifying legal, environmental, economic, social and cultural factors in sustainable development and design

2.1 The application of this document shall be interpreted in accordance with the legal, economic, environmental, social and cultural factors in which a design operates.

NOTE 1 Legal, environmental, economic, social and cultural factors can operate at different scales.

NOTE 2 Identification of legal context can involve review of legislation and policy that applies at national and extra national scales as well as legislation and policy that applies solely to a specific local area.

NOTE 3 Legal, environmental, economic, social and cultural factors can influence the way in which priorities are balanced.

2.2 Interpretation of legal, environmental, economic, social and cultural factors shall inform the development of solutions throughout the design lifecycle.

NOTE An iterative approach to the identification of legal, environmental, economic, social and cultural factors can identify appropriate design solutions that have not been identified at earlier stages of design.

3. Addressing opportunities and risks

3.1 Sustainable development shall be demonstrated by designs that address opportunities and risks.

3.1.1 Opportunities and risks may arise from:

1) environmental, economic, social and cultural factors;
2) legislation, policy and guidance;
3) future economic, environmental, social and technological trends, including any relevant uncertainties behind those trends;
4) the design, construction, management, maintenance and decommissioning of the project; and
5) costs of design, construction, management, maintenance and decommissioning of the project.

3.2 Opportunities and risks shall be managed in an iterative way as design work evolves to ensure sustainable development is achieved.

4. Goals of sustainable development

4.1 The goals of sustainable development shall be delivered throughout the design lifecycle.

4.2 The goals of sustainable development require that the design shall aspire to:

1) improve the health, safety and wellbeing of those affected by road infrastructure;
2) improve land, water and air quality;
3) support a sustainable economy;
4) represent good 'whole life' value across the design life of road infrastructure;
5) embrace innovation;
6) reduce inequalities and ensure access to all;
7) use responsibly sourced materials that minimise adverse impacts on people and their environment;
8) be resource efficient and reflect a circular approach to the use of materials;
9) minimise greenhouse gas emissions;
10) be resilient to future climate change;
11) protect, and where possible enhance, the surrounding environmental and cultural context;
12) be shaped by the opinions of communities and road users.

4.3 Where additional goals of sustainable development have been identified by the Overseeing Organisation, these shall be delivered throughout the design lifecycle.

NOTE *Overseeing Organisation-specific requirements associated with the goals of sustainable development can be provided in the National Application Annexes.*

4.4 Projects shall identify and assess how local, legal, environmental, economic, social and cultural factors (Section 2) affect the delivery of the goals; and how the goals can address opportunities and risks (Section 3).

NOTE *Achieving the goals of sustainable development can involve identifying individual design solutions that achieve multiple goals. For example, a design solution that reduces pollution to water can also enhance local biodiversity.*

4.5 A design solution shall take all reasonable steps to maximise contribution towards all goals of sustainable development.

5. The principles of good road design

5.1 All design activities and approaches shall apply the principles of good road design.

NOTE *The principles of good road design are contained in the Overseeing Organisations' National Application Annexes.*

6. Monitoring, evaluating and reporting

6.1 Projects shall monitor, evaluate and report on the application of sustainable development and good road design throughout the design lifecycle in accordance with the requirements of the Overseeing Organisation.

NOTE *Overseeing Organisation-specific requirements on the approaches to monitoring, evaluation and reporting can be provided in the Overseeing Organisations' National Application Annexes.*

7. Normative References

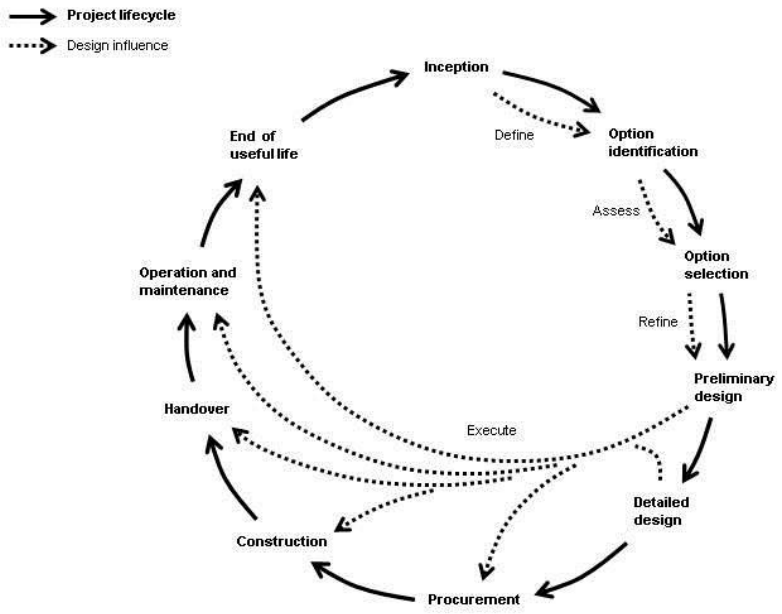
The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

Appendix A. Design and its influence on the project lifecycle

Figure A.1 shows design and its influence on the project lifecycle. In particular it shows how the design stages influence subsequent project stages.

Figure A.1



General Principles and Scheme Governance
General information

GG 103
England National Application Annex to GG 103 Introduction and general requirements for sustainable development and design

Revision 0

Summary
This National Application Annex sets out the Highways England specific principles and requirements on sustainable development and design.

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Introduction

Background

This National Application Annex sets out the Highways England principles and specific requirements on sustainable development and design.

Sustainable development is defined in Highways England's Licence to Operate, as "encouraging economic growth while protecting the environment and improving safety and quality of life for current and future generations" [Ref 4.I].

Sustainable development can be applied to the design and management of roads by:

1) supporting national and local economic growth and regeneration;
2) protecting and improving the safety of road users and road workers;
3) protecting, managing and enhancing the environment;
4) improving the well-being of road users and communities affected by the network, and;
5) ensuring efficiency and value for money.

In accordance with Part 5.26 of the Highways England Licence, projects are required to demonstrate that due regard has been given to the relevant principles and guidance on good design [Ref 4.I].

Good road design ensures the strategic road network displays quality through being safe, functional and effective, responding positively and sensitively to the landscape character, cultural heritage and communities through which it passes, while also supporting the goals of sustainable development.

The approach to the application of the goals of sustainable development is described separately from the approach to good road design in this document.

Although sustainable development and good road design are treated as separate but equally import topics, there is a strong relationship between both concepts. Indeed the UK Government state that good quality design is an integral part of sustainable development [Ref 2.I]. However there are also important differences in application as outlined below.

Goals of sustainable development and good road design

Goals of sustainable development	Good road design
Sustainable development goals seek to deliver essential social, environmental and economic priorities.	Principles of good design seek to deliver social, environmental and economic priorities in a way that responds in a practical and creative way to both the function and identity of a place.
Sustainable development goals set a specification for performance.	Principles of good design inform how to approach and deliver a specification.
Sustainable development goals exist to sustain human, social, financial, natural and manufactured capital stocks.	Principles of good design exist to sustain capital stocks but also to fulfil a wider intellectual imperative to deliver a beautiful road.
Sustainable development is a broad agenda. It applies to all aspects of the wider economy including affordability and equity where human habitats are safe, resilient and sustainable.	There is no wider agenda to good design. Good design applies to places or spaces that work well for everyone, look good, last well and will adapt to the needs of future generations.
Sustainable development goals are supported by requirements that can be shown to have been achieved, usually through quantitative or objective demonstration.	Principles of good design are supported by statements that can be judged to have informed the design, often through qualitative and visual demonstration.

Appendix E/B sets out a process map that highlights potential synergies between sustainable development and good road design that can be achieved in application.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 3.N] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
SuDS	Sustainable drainage systems
PAS 2080	Publicly Available Specification 2080

Terms and definitions

Terms

Term	Definition
Climate change	Long-term changes in regional or global weather patterns.
Deconstruction, demounting and decommissioning	Processes undertaken at the end of the useful life of a product or structure. NOTE: Deconstruction is the process of separating structures into component parts, demounting is the process of separating a degraded part from a structure and decommissioning is the process of taking a component or structure out of use in a sustainable way.
Disturbance effects on local economies	The effects of actions which can alter the way in which local economies operate. NOTE: A road can create a geographical barrier to a village shopping centre that previously was used by a neighbouring village, or can reduce the feeling of tranquillity at a local tourist attraction causing a loss of custom.
Greenhouse gases	Gases such as carbon dioxide and nitrous oxide that contribute to climate change.
High quality soils	Soils of significant quality in terms of their agricultural productivity (e.g. best and most versatile land) or ability to deliver significant benefits (for instance to support valuable habitats).
Natural, built and historic environment	Terms that categorise components of the environment. NOTE 1: Natural environment describes naturally occurring, as opposed to human-made, aspects of our surroundings as well as features formed by an interaction between humans and the natural world, including landscapes and green infrastructure, biodiversity and ecosystems, and geological diversity. NOTE 2: The built environment is composed of human-made surroundings, and encompasses buildings and infrastructure. NOTE 3: The historic environment encompasses elements of both the natural and built environment and is defined by the National Planning Policy Framework as "all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora" [Ref 3.I].
Stakeholders	Persons affected by or with an interest in a project, including statutory and non-statutory consultees.
Strategic Design Panel	A panel with representation from credible experts and relevant stakeholders whose role is to independently advise Highways England and encourage design excellence in the landscape, engineering and built environment aspects of projects. NOTE: The panel does not have any statutory function in its own right, but its advice can inform and support project development and the statutory consent process.

Terms (continued)

Term	Definition
Transport connectivity	The ability to complete a journey to a destination. NOTE 1: An enhancement to transport connectivity would make that journey easier to complete. NOTE 2: For instance, a park and ride facility that allows easier access to a city centre by linking to the bus or rail network would enhance transport connectivity.
Wellbeing	A positive physical, social and mental state enhanced by various social and environmental conditions such as strong and inclusive communities, good health, personal security, rewarding employment, and a healthy and attractive environment [Ref 6.I].
Whole life costing	The total cost of owning an asset over its entire life, including environmental and social costs. NOTE 1: Whole life cost includes all costs borne during the lifecycle of a project, from design to disposal, including maintenance costs. NOTE 2: Whole life costing is carried out at the pre-project stage and refined throughout later options and development phases of project delivery and design following methodologies prescribed by Highways England.

E/1. Goals of sustainable development (GG 103, 4.1)

E/1.1 In meeting the goals of sustainable development projects shall demonstrate consistency with the requirements and advice in Sections E/1 and relevant requirements and advice in the Design Manual for Roads and Bridges.

NOTE *Requirements are linked to each goal of sustainable development.*

E/1.2 Where available, information gathered from economic, environmental and other assessments associated with the project shall help inform the design response to sustainable development.

Improve the health, safety and well-being of those affected by road infrastructure

E/1.3 The achievement of safety shall be the primary consideration of all design.

E/1.4 Design shall identify and respond to any adverse effects on health, safety and well-being from projects.

E/1.5 Measures appropriate to safeguard the resilience of the network from sources of flood risk shall be identified, assessed and incorporated into design.

E/1.6 Opportunities to include Sustainable Drainage Systems (SuDS) shall, where relevant, be incorporated into design.

E/1.7 Measures to manage noise shall be enacted in accordance with the Noise Policy Statement for England [Ref 5.N].

Improve land, water and air quality

E/1.8 Opportunities to prevent future land contamination and to remediate current land contamination shall be identified, assessed and incorporated into design.

E/1.9 Opportunities to preserve and improve the quality of surface and groundwater and reduce water consumption shall be identified, assessed and incorporated into design.

E/1.10 Opportunities to achieve air quality improvements from construction, use and decommissioning shall be identified, assessed and incorporated into the design.

Serve to support a sustainable economy

E/1.11 Measures that support local, regional or national economic objectives shall be identified and, where relevant, incorporated into design.

E/1.12 Opportunities to reduce disturbance effects on local economies shall be identified and, where relevant, incorporated into design.

E/1.12.1 Opportunities to reduce disturbance effects on local economies may include:

1) measures to reduce severance of businesses from resources or markets;
2) measures to minimise changes to the productivity of environmental resources upon which local business depend (for example loss of high quality soils).

Represent good 'whole life' value across the design life of road infrastructure

E/1.13 Whole life costing shall be used to inform all design decisions, particularly when demonstrating the pay back periods for, and cost benefits of, innovations.

E/1.14 Measures to reduce the need for maintenance, repair, refurbishment, and replacement to increase design life shall be identified and, where feasible, incorporated into the design.

Embrace innovation

E/1.15 Innovations (design, technology, practice, behaviour, other) that deliver enhanced sustainable development outcomes shall, where relevant, be identified, and subject to necessary approvals required by Highways England, incorporated into the design.

Reduce inequalities and ensure access to all

E/1.16 Adjustments to any aspect of design that address the needs of users and stakeholders with protected characteristics that are covered by the Equality Act 2010 [Ref 2.N], or who are affected by socio-economic disadvantage, shall be identified, assessed and incorporated into the design.

E/1.17 Where opportunities arise designs shall seek to foster good relations between people with protected characteristics and those without protected characteristics.

E/1.18 Where it is safe to do so opportunities to improve accessibility for all network users shall be identified, assessed and incorporated into the design.

E/1.18.1 Opportunities to improve accessibility for all network users may include:

1) identification and assessment of the local accessibility needs of non-motorised users where the road network allows for their accommodation to better link with local facilities;
2) identification and assessment of the needs of users with mobility issues where pedestrians interface with the road network;
3) enhancements to transport connectivity.

NOTE *Enhancements to transport connectivity can include improved links to park and ride or rail facilities or other opportunities to improve the sustainability of journeys.*

Use responsibly sourced materials that minimise adverse impacts on people and their environment

E/1.19 Designs shall not restrict the use of materials with proven sustainability credentials [Ref 5.I].

Be resource efficient and reflect a circular approach to the use of materials

E/1.20 Design solutions shall seek to minimise the consumption of materials and the generation of waste.

E/1.20.1 Opportunities to reuse site-won materials or arisings from on-site demolition, where available, should be identified, assessed and incorporated into design.

E/1.21 Safe design solutions that enable deconstruction, demounting and decommissioning to facilitate future high value recycling, re-manufacture or re-use at end of first life, shall be identified and where feasible incorporated into design.

Minimise greenhouse gas emissions

E/1.22 Carbon emissions (greenhouse gases or carbon dioxide equivalents) associated with the whole life of a project shall be minimised.

E/1.22.1 The minimisation of carbon emissions may be achieved by working in accordance with a recognised standard or specification agreed with Highways England e.g. Carbon Management in Infrastructure PAS 2080:2016 [Ref 1.N].

Be resilient to future climate change

E/1.23 Resilience to future climatic conditions specific to the local and surrounding area shall be identified, assessed and incorporated into the design [Ref 1.I].

NOTE *Information on projected climatic changes is available from the United Kingdom Climate Projections (UKCP) [Ref 7.I].*

Protect, and where possible enhance, the surrounding environmental and cultural context

E/1.24 The design shall work in sympathy with, and seek to enhance, the surrounding natural, built and historic environment.

E/1.25 When designing a project there shall be no net loss of biodiversity.

E/1.25.1 In the longer term, the design should encourage gains in biodiversity.

E/1.26 Design shall seek to limit the impact of light pollution resulting from the road network.

Be shaped by the opinions of communities and road users

E/1.27 Stakeholders shall be engaged to help shape the approach to sustainable development incorporated into the design.

NOTE *Processes of engagement exist in studies in project delivery and assessment.*

E/1.28 Stakeholder engagement shall appropriately reflect the diversity of the area in which a project is to be delivered.

E/1.29 Stakeholder engagement shall involve people with protected characteristics who may be affected by designs.

E/2. The principles of good design (GG 103, 5.1)

E/2.1 The principles of good road design shall inform the design of motorway and all-purpose trunk roads. Good road design:

1) makes roads safe and useful;
2) is inclusive;
3) makes roads understandable;
4) fits in context;
5) is restrained;
6) is environmentally sustainable;
7) is thorough;
8) is innovative;
9) is collaborative;
10) is long lasting [Ref 6.N].

NOTE 1 Supporting information to each principle of good road design is contained in Appendix E/A.

NOTE 2 Information gathered from environmental and other assessments associated with the project can help inform the design response to the principles of good road design.

E/3. Monitoring, evaluating and reporting (GG 103, 6.1)

Evidencing design approaches to the goals of sustainable development

E/3.1 Evidence shall be submitted to Highways England at the preliminary and detailed design stages to show:

1) how the goals of sustainable development and associated requirements and advice have been applied;
2) how the assessment of legal, environmental, economic, social and cultural factors (GG 103, Section 2) has influenced the application of the goals of sustainable development;
3) how management of opportunities and risk (GG 103 Section 3) has informed the application of the goals of sustainable development.

E/3.1.1 Evidence of design approaches should be submitted in a concise form, wherever possible signposting Highways England to more detailed information provided through other assessment processes.

NOTE *Indicators of success can support demonstration of the application of goals of sustainable development across the different stages of design.*

E/3.2 Clear justification shall be required where sustainable development goals or associated requirements are deemed not relevant to a project.

NOTE *Evidence of design approaches can be submitted using one or more media formats agreed with Highways England.*

Evidencing the achievement of good design

E/3.3 Evidence that demonstrates how engagement with stakeholders has influenced the interpretation of principles of good road design in relation to the project shall be submitted to Highways England at the outset of preliminary design and updated at the detailed design stage.

E/3.4 Evidence that demonstrates the sensitivity of project location and potential for substantial impact on the landscape or other significant effects shall be submitted to Highways England at the outset of option identification and updated at the preliminary and detailed design stages.

E/3.5 Highways England shall be consulted to determine whether a review is required by the Strategic Design Panel.

E/3.6 Evidence that demonstrates the application of the principles of good road design shall be submitted to Highways England at the preliminary design stage and updated at the detailed design stage and at handover.

NOTE *Indicators of success can support the demonstration of the application of principles of good road design across the different stages of design.*

E/3.7 Evidence on the application of good road design shall accord with the criteria for good design outlined in the National Policy Statement for National Networks [Ref 4.N].

Competency requirements

E/3.8 A competent named individual or individuals shall be identified and made responsible for coordinating, responding to, and managing the delivery of the agreed approach to sustainable development and good road design.

E/3.9 Competence for the named individual or individuals shall be demonstrated by recording and submitting to Highways England:

1) experience of sustainable development and design;
2) membership of a relevant professional body;
3) evidence of continuing professional development or qualifications relevant to sustainable development or design.

NOTE *No individual is likely to have expertise in all topics linked to goals of sustainable development and principles of good road design and can draw from the advice of topic specific specialists where they lack expertise.*

E/4. Normative References

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	HM Treasury . Construction Leadership Council. PAS 2080:2016, 'Carbon Management in Infrastructure'
Ref 2.N	The Stationery Office. UK Government. 'Equality Act 2010'
Ref 3.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 4.N	Department for Transport. 'National Policy Statement for National Networks'
Ref 5.N	Defra. 'Noise Policy Statement for England'
Ref 6.N	Highways England. 'The Road to Good Design' , 2018

E/5. Informative References

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. 'Climate Adaptation Risk Assessment Progress Update'
Ref 2.I	Ministry of Housing. 'Communities and Local Government. Guidance: Design'
Ref 3.I	Department of Housing. 'Communities and Local Government: National Planning Policy Framework'
Ref 4.I	Department of Transport. 'Highways England Licence'
Ref 5.I	CIRIA. 'Minimising Risk through Responsible Sourcing'
Ref 6.I	HM Government. 'Our Health and Wellbeing Today'
Ref 7.I	Met Office and Environment Agency. 'UK Climate Projections'

Appendix E/A. Principles of good road design

E/A1 Principles of good road design

1: Good road design makes roads safe and useful

Safety is fundamental to good road design; it is integral to both the usefulness of its function and the confidence of road users and their well-being. Good design creates safe roads which support and link to other wider imperatives, both nationally and locally, and that are fundamentally useful, meeting users' need for mobility effectively.

2: Good road design is inclusive

Inclusive environments facilitate dignified and equal use by all. An inter-disciplinary design process involves and places people's needs and views at its heart, nurturing well-being and creating a shared sense of ownership of the road. All users and communities are considered carefully in order to reduce barriers to access and participation, particularly mindful of the most vulnerable.

3: Good road design makes roads understandable

Easy to read, a good road is intuitive to use so as to be safe and efficient for all. 'Self-explaining roads' focus on the essentials and eliminate unnecessary and confusing clutter to make them legible, while responding to place and enhancing both environmental and economic outcomes.

4: Good road design fits in context

The aesthetic quality of a road and its design in relation to the places through which it passes, is integral to its function and the experience of those that use it. Good road design demonstrates sensitivity to the landscape, heritage and local community, seeking to enhance the place while being true to structural necessities. It builds a legacy for the future.

5: Good road design is restrained

Functional, but responding positively and elegantly to the context, good road design allows for the expression of the character and identity of the places and communities through which a road passes. Good road design can enhance a sense of place and add to what we have inherited, particularly through the use of appropriate materials and traditions, but does not make unnecessary superficial or superfluous visual statements.

6: Good road design is environmentally sustainable

Making an important contribution to the conservation and enhancement of the natural, built and historic environment, good road design seeks to achieve net environmental gain. It is multi-functional, resilient and sustainable, allowing for future adaptation and technical requirements, while minimising waste and the need for new materials.

7: Good road design is thorough

The result of robust processes that create a continual cycle of improvement, good road design starts with an in-depth understanding of people, place and context; learning from best practice worldwide. The design of all elements of the road environment are considered together and integrated into a responsive design.

8: Good road design is innovative

Responding positively to change, good road design captures opportunities for betterment and develops in tandem with emerging new technologies. Designing to a standard is not the same as achieving good design; an innovative and resourceful approach that is mindful of context is necessary to achieve better outcomes.

9: Good road design is collaborative

Collaboration ensures roads are useful to and accepted by the communities they serve. Collaborative working requires a rigorous process that identifies dependencies and wider opportunities, and

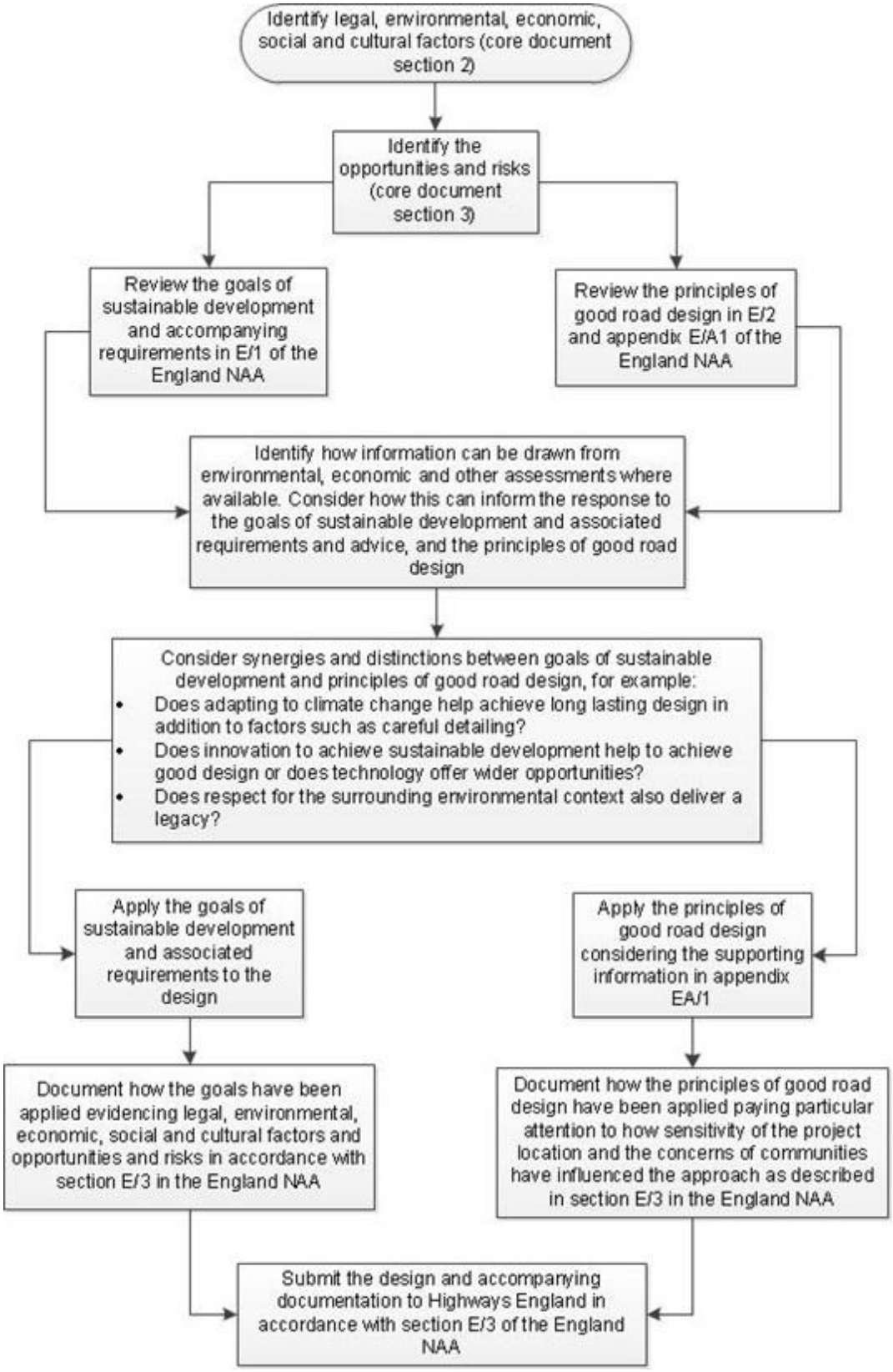
facilitates effective communication and engagement from the start. Community engagement will be led by a local sense of culture, place and value.

10: Good road design is long-lasting

With quality materials and careful detailing, good road design brings lasting value. The design process requires sufficient time for challenges to be resolved before delivery and is adaptable to future needs and technologies as part of the commitment to whole-life operation, management and maintenance.

Appendix E/B. A potential approach to meeting the requirements in GG 103

Figure E/B.1



Department for Infrastructure
An Roinn Bonneagair

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Introduction

Background

This National Application Annex sets out the Department for Infrastructure, Northern Ireland principles and specific requirements on sustainable development and design. Section 25 of the Northern Ireland (Miscellaneous Provisions) Act, 2006 includes a statutory duty that "a public authority must, in exercising its functions, act in a way it considers best calculated to contribute to the achievement of sustainable development in Northern Ireland, except to the extent that is considers that any such action is not reasonably practical in all the circumstances of the case" 2006 [Ref 4.I].

Sustainable development is defined as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' [Ref 4.N]. The design and management of roads can make a major contribution to sustainable development. For example, design can reduce negative environmental, social and economic impacts of a road scheme, and can realise benefits.

While a design can be made more sustainable, design should also fundamentally be good design. The Strategic Planning Policy Statement for Northern Ireland sets out that 'Good design can change lives, communities and neighbourhoods for the better' and involves 'shaping how all elements of the built and natural environment relate to each other' [Ref 4.N]. While good design can further sustainable development, it should also encompass how the built environment functions and can create more successful places, can attract business investment, and can encourage responsible innovation and originality. Good design is as relevant to roads and bridges as it is to other forms of construction.

The approach to the application of the goals of sustainable development is described separately from the approach to good road design in this document.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 2.N] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
SuDS	Sustainable drainage systems
PAS2080	Publicly Available Specification 2080

Terms and definitions

Terms

Term	Definition
Climate change	Long-term changes in regional or global weather patterns.
Deconstruction, demounting and decommissioning	Processes undertaken at the end of the useful life of a product or structure. NOTE: Deconstruction is the process of separating structures into component parts, demounting is the process of separating a degraded part from a structure and decommissioning is the process of taking a component or structure out of use in a sustainable way.
Greenhouse gases	Gases such as carbon dioxide and nitrous oxide that contribute to climate change.
High quality soils	Soils of significant quality in terms of their agricultural productivity (e.g. best and most versatile land) or ability to deliver significant benefits (for instance to support valuable habitats).
Stakeholders	Persons affected by or with an interest in a project, including statutory and non-statutory consultees.
Transport connectivity	The ability to complete a journey to a destination. NOTE 1: An enhancement to transport connectivity would make that journey easier to complete. NOTE 2: For instance, a park and ride facility that allows easier access to a city centre by linking to the bus or rail network would enhance transport connectivity.
Well-being	A positive physical, social and mental state enhanced by various social and environmental conditions such as strong and inclusive communities, good health, personal security, rewarding employment, and a healthy and attractive environment [Ref 5.I].
Whole life value	The optimum balance of stakeholders' aspirations needs and requirements, and whole life costs. NOTE 1: Decisions are based on broader criteria than initial capital cost and take account of stakeholders other than those traditionally involved in the immediate decision-making process. NOTE 2: It includes economic, social and environmental aspects associated with design, construction, operation and decommissioning [Ref 2.I].

NI/1. Goals of sustainable development (GG103, 4.1)

NI/1.1 In meeting the goals of sustainable development, consistency with the requirements and advice in Sections NI/1 and relevant requirements and advice in the Design Manual for Roads and Bridges shall be demonstrated on a project level.

NOTE *Requirements are linked to each goal of sustainable development.*

NI/1.2 Where available, information gathered from economic, environmental and other assessments associated with the project shall help inform the design response to sustainable development.

Improve the health, safety and well-being of those affected by road infrastructure

NI/1.3 The achievement of road safety shall be the primary focus of all design.

NI/1.4 Adverse effects on health, safety and well-being from projects shall be identified and rectified as part of the design.

NI/1.5 Measures appropriate to safeguard the resilience of the network from sources of flood risk shall be identified, assessed and incorporated into design.

NI/1.6 Opportunities to include Sustainable Drainage Systems (SuDS) shall, where relevant, be incorporated into design.

NI/1.7 Measures to manage noise shall be enacted in accordance with the Noise Policy Statement for Northern Ireland [Ref 3.N].

Improve land, water and air quality

NI/1.8 Opportunities to prevent future land contamination and to re-mediate current land contamination shall be identified, assessed and incorporated into design.

NI/1.9 Opportunities to preserve and improve the quality of surface and groundwater and reduce water consumption shall be identified, assessed and incorporated into design.

NI/1.10 Opportunities to achieve air quality improvements from construction, use and decommissioning shall be identified, assessed and incorporated into the design.

Serve to support a sustainable economy

NI/1.11 Measures that support Northern Ireland's economic priorities and any locally relevant economic priorities shall be identified and, where relevant, incorporated into design.

NOTE *Northern Ireland's re-balancing and rebuilding priorities for growth [Ref 1.I] can be supported through the design of road infrastructure where they are relevant.*

Represent good 'whole life' value across the design life of road infrastructure

NI/1.12 Design decisions shall be informed by the achievement of whole life value, particularly when demonstrating the pay back periods for, and cost benefits of, innovations.

NI/1.13 Measures to reduce the need for maintenance, repair, refurbishment, and replacement to increase design life shall be identified and, where feasible, incorporated into the design.

Embrace Innovation

NI/1.14 Innovations (design, technology, practice, behaviour, other) that deliver enhanced sustainable development outcomes shall, where relevant, be identified, and subject to necessary approvals required by Department for Infrastructure, Northern Ireland incorporated in to the design.

Reduce inequalities and ensure access to all

NI/1.15 Where it is safe to do so, opportunities to improve accessibility for all network users shall be identified, assessed and, if approved, incorporated into the design.

NI/1.15.1 Opportunities to improve accessibility for all network users may include:

1) identification and assessment of the local accessibility needs of non-motorised users where the road network allows for their accommodation to better link with local facilities;
2) identification and assessment of the needs of users with mobility issues where pedestrians interface with the road network;
3) enhancements to transport connectivity.

NOTE *Enhancements to transport connectivity can include improved links to park and ride or rail facilities or other opportunities to improve the sustainability of journeys.*

Use responsibly sourced materials that minimise adverse impacts on people and their environment

NI/1.16 Designs shall not restrict the use of materials with proven sustainability credentials [Ref 3.I].

Be resource efficient and reflect a circular approach to the use of materials

NI/1.17 The consumption of materials and the generation of waste shall be minimised in the design solution.

NI/1.17.1 Opportunities to reuse site-won materials or arisings from on-site demolition, where available, should be identified, assessed and incorporated into design.

NI/1.18 Safe design solutions that enable deconstruction, demounting and decommissioning to facilitate future high value recycling, re-manufacture or re-use at end of first life, shall be identified and where feasible incorporated into design.

Minimise greenhouse gas emissions

NI/1.19 Carbon emissions (greenhouse gases or carbon dioxide equivalents) associated with the whole life of a project shall be minimised.

NI/1.19.1 The minimisation of carbon emissions may be achieved by working in accordance with a recognised standard or specification agreed with Department for Infrastructure, Northern Ireland (e.g. PAS 2080:2016 Carbon Management in Infrastructure) PAS 2080:2016 [Ref 1.N].

Be resilient to future climate change

NI/1.20 Resilience to future climatic conditions specific to the local and surrounding area shall be identified, assessed and incorporated into the design.

NOTE *Information on projected climatic changes is available from the United Kingdom Climate Projections (UKCP) [Ref 6.I].*

Protect, and where possible enhance, the surrounding environmental and cultural context

NI/1.21 The design shall work in sympathy with, and seek to enhance, the surrounding natural, built and historic environment.

NI/1.22 The impact of light pollution resulting from the road network shall be limited by the design.

Be shaped by the opinions of communities and road users

NI/1.23 Stakeholders shall be engaged to help shape the approach to sustainable development.

NOTE *Processes of engagement exist in studies in project delivery and assessment.*

NI/1.24 The diversity of the area in which a project is to be delivered shall be appropriately reflected in the stakeholder engagement.

NI/2. The principles of good road design

NI/2.1 The principles of good road design shall inform the design of motorway and all-purpose trunk roads.

NOTE 1 Good road design:

1) *makes roads safe and useful;*
2) *is inclusive;*
3) *makes roads understandable;*
4) *fits in context;*
5) *is restrained;*
6) *is environmentally sustainable*
7) *is thorough;*
8) *is innovative;*
9) *is collaborative;*
10) *is long lasting.*

NOTE 2 Supporting information to each principle of good road design is contained in Appendix NI/A.

NOTE 3 Information gathered from environmental and other assessments associated with the project can help inform the design response to the principles of good road design.

NI/3. Monitoring, evaluating and reporting

Evidencing design approaches to the goals of sustainable development

NI/3.1 Evidence shall be submitted to Department for Infrastructure, Northern Ireland at the preliminary and detailed design stages to show:

1) how the goals of sustainable development and associated requirements and advice have been applied;
2) how the assessment of legal, environmental, economic, social and cultural factors (GG 103, Section 2) has influenced the application of the goals of sustainable development;
3) how management of opportunities and risk (GG 103 Section 3) has informed the application of the goals of sustainable development.

NI/3.1.1 Evidence of design approaches should be submitted in a concise form, wherever possible signposting Department for Infrastructure, Northern Ireland to more detailed information provided through other assessment processes.

NOTE *Indicators of success can support demonstration of the application of goals of sustainable development across the different stages of design.*

NI/3.2 Where sustainable development goals or associated requirements are deemed not relevant to a project, a record shall be made of the justification for this decision.

NOTE *Evidence of design approaches can be submitted using one or more media formats agreed with Department for Infrastructure, Northern Ireland.*

Evidencing the achievement of good design

NI/3.3 Evidence that demonstrates engagement with stakeholders and how this has influenced the interpretation of the principles of good road design in relation to the project shall be submitted to Department for Infrastructure, Northern Ireland during preliminary design and updated at detailed design stage.

NI/3.4 Evidence that demonstrates consideration of the sensitivity of project location and potential for substantial impact on the landscape or other significant effects shall be submitted to Department for Infrastructure, Northern Ireland at option identification and updated at the preliminary and detailed design stages.

NI/3.5 Evidence that demonstrates the application of the principles of good road design shall be submitted to Department for Infrastructure, Northern Ireland at the preliminary design stage and updated at the detailed design stage and at handover.

NOTE *Indicators of success can support the demonstration of application of principles of good road design across the different stages of design.*

NI/3.6 Evidence on the application of good road design shall accord with the criteria for good design outlined in the Strategic Planning Policy Statement for Northern Ireland [Ref 4.N].

Competency requirements

NI/3.7 A competent named individual or individuals shall be identified and made responsible for coordinating, responding to, and managing the delivery of the agreed approach to sustainable development and good road design.

NI/3.8 Competence for the named individual or individuals shall be demonstrated by recording and submitting to Department for Infrastructure, Northern Ireland:

1) experience of sustainable development and design;
2) membership of a relevant professional body;

3) evidence of continuing professional development or qualifications relevant to sustainable development or design.

NOTE *No individual is likely to have expertise in all topics linked to goals of sustainable development and principles of good road design and can draw from the advice of topic specific specialists where they lack expertise.*

NI/4. Normative References

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	HM Treasury . Construction Leadership Council. PAS 2080:2016, 'Carbon Management in Infrastructure'
Ref 2.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 3.N	Department of the Environment Northern Ireland. 'Noise Policy Statement for Northern Ireland'
Ref 4.N	Department of the Environment. 'Strategic Planning Policy Statement for Northern Ireland'

NI/5. Informative References

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Northern Ireland Executive. 'Economic Strategy: Priorities for Sustainable Growth and Prosperity'
Ref 2.I	Department of Finance and Personnel Central Procurement Directorate. Sustainable Construction Group. 'Guidance Note 7: Sustainable Design in the Built Environment'
Ref 3.I	CIRIA. 'Minimising Risk through Responsible Sourcing'
Ref 4.I	Her Majesty's Stationery Office. 'Northern Ireland (Miscellaneous Provisions) Act, 2006 Chapter 33, 345139 19585' , 2006
Ref 5.I	HM Government. 'Our Health and Wellbeing Today'
Ref 6.I	HMSO . Met Office . 'UK Climate Projections'

Appendix NI/A. Principles of good road design

1: Good road design makes roads safe and useful

Safety is fundamental to good road design; it is integral to both the usefulness of its function and the confidence of road users and their well-being. Good design creates safe roads which support and link to other wider imperatives, both nationally and locally, and that are fundamentally useful, meeting users' need for mobility effectively.

2: Good road design is inclusive

Inclusive environments facilitate dignified and equal use by all. An inter-disciplinary design process involves and places people's needs and views at its heart, nurturing well-being and creating a shared sense of ownership of the road. All users and communities are considered carefully in order to reduce barriers to access and participation, particularly mindful of the most vulnerable.

3: Good road design makes roads understandable

Easy to read, a good road is intuitive to use so as to be safe and efficient for all. 'Self-explaining roads' focus on the essentials and eliminate unnecessary and confusing clutter to make them legible, while responding to place and enhancing both environmental and economic outcomes.

4: Good road design fits in context

The aesthetic quality of a road and its design in relation to the places through which it passes, is integral to its function and the experience of those that use it. Good road design demonstrates sensitivity to the landscape, heritage and local community, seeking to enhance the place while being true to structural necessities. It builds a legacy for the future.

5: Good road design is restrained

Functional, but responding positively and elegantly to the context, good road design allows for the expression of the character and identity of the places and communities through which a road passes. Good road design can enhance a sense of place and add to what we have inherited, particularly through the use of appropriate materials and traditions, but does not make unnecessary superficial or superfluous visual statements.

6: Good road design is environmentally sustainable

Making an important contribution to the conservation and enhancement of the natural, built and historic environment, good road design seeks to achieve net environmental gain. It is multi-functional, resilient and sustainable, allowing for future adaptation and technical requirements, while minimising waste and the need for new materials.

7: Good road design is thorough

The result of robust processes that create a continual cycle of improvement, good road design starts with an in-depth understanding of people, place and context; learning from best practice worldwide. The design of all elements of the road environment are considered together and integrated into a responsive design.

8: Good road design is innovative

Responding positively to change, good road design captures opportunities for betterment and develops in tandem with emerging new technologies. Designing to a standard is not the same as achieving good design; an innovative and resourceful approach that is mindful of context is necessary to achieve better outcomes.

9: Good road design is collaborative

Collaboration ensures roads are useful to and accepted by the communities they serve. Collaborative working requires a rigorous process that identifies dependencies and wider opportunities, and facilitates effective communication and engagement from the start. Community engagement will be led by a local sense of culture, place and value.

10: Good road design is long-lasting

With quality materials and careful detailing, good road design brings lasting value. The design process requires sufficient time for challenges to be resolved before delivery and is adaptable to future needs and technologies as part of the commitment to whole-life operation, management and maintenance.

General Principles and Scheme Governance
General information

GG 103
Scotland National Application Annex to GG 103 Introduction and general requirements for sustainable development and design

Revision 0

Summary
Please contact Transport Scotland for the application of GG 103. The email address is: TSStandardsBranch@transport.gov.scot

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

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Contents

Release notes

Version	Date	Details of amendments
0	Jul 2019	Transport Scotland National Application Annex to GG 103

Llywodraeth Cymru
Welsh Government

General Principles and Scheme Governance
General information

GG 103
Wales National Application Annex to GG 103 Introduction and general requirements for sustainable development and design

Revision 0

Summary
Please contact Welsh Government for the application of GG 103. The email address is: Standards_Feedback_and_Enquiries@gov.wales

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: CustomerHelp@wales.gsi.gov.uk

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