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EU Green Public Procurement Criteria for Road Design, Construction and Maintenance

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1 INTRODUCTION

EU GPP criteria aim at facilitating public authorities the purchase of products, services and works with reduced environmental impacts. The use of the criteria is voluntary. The criteria are formulated in such a way that they can be, if deemed appropriate by the individual authority, integrated into its tender documents. This document provides the EU GPP criteria developed for the product group "Road Design, Construction and Maintenance". It is supported by a draft Guidance document that provides orientation on how to effectively integrate these GPP criteria into the procurement process. An accompanying Technical Report provides further details on the reasons for selecting these criteria and references for further information.

The criteria are divided into Selection Criteria, Technical Specifications, Award Criteria and Contract Performance Clauses. For each set of criteria there is a choice between two ambition levels:

- *The Core criteria are designed to allow easy application of GPP, focussing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum.*
- *The Comprehensive criteria take into account more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals*.

1.1 Definition and Scope

This GPP criteria set addresses the procurement process for Road design, construction and maintenance.

A ***road*** is defined as:

> *"Line of communication (travelled way) open to public traffic, primarily for the use of road motor vehicles, using a stabilized base other than rails or air strips*" (Eurostat, 2009)

Road construction is defined as:

> *"The preparation and building of a road using materials, including aggregate, bituminous and hydraulic binders and additives that are used for the sub-base, road-base and surfacing layers of the road "*

Road maintenance is defined as:

> *"all actions undertaken to maintain and restore the serviceability and level of service of roads (PIARC Road Dictionary), with the following two sub-categories:.*

- ***Routine maintenance*** is defined as*:*

  "all operations which can be scheduled on a periodical basis with a view to maintaining a satisfactory level of service which is as close as possible to the initial state and in accordance with the classification of the road" (PIARC Road Dictionary)

- ***Preventive maintenance and rehabilitation*** are defined as*:*

  "work undertaken to preserve or restore serviceability and to extend the service life of an existing road" (PIARC Road Dictionary).

  Preventive maintenance is typically applied to pavements in good condition having significant remaining service life, without significantly altering the structural capacity, while rehabilitation takes place when the structural efficiency of the existing facility is compromised.

Road reconstruction is defined as:

"work performed to upgrade the network or replace the entire road section" (CEDR 2013). From a procurement perspective, this phase is similar to the construction phase and therefore would be subject to a specific Invitation to Tender (ITT).

Roads are built in layers and three main types of road construction could be identified: flexible pavements, rigid pavements and semi-rigid pavements (Sherwood, 2001).

This criteria set contains recommendations that apply to both the construction of new roads and maintenance and rehabilitation of existing ones. The criteria are supported by guidance on the process of developing and procuring a new or maintained and rehabilitated road. The key stages in this process that are identified in the guidance are as follows:

- Preliminary scoping and feasibility;
- Detailed design and performance requirements;
- Construction or major extensions;
- Use of the road;
- Maintenance and operation;
- End of life (EoL), i.e. road decommissioning

The specific stages in this process during which formal procurement takes place, and for which criteria are provided in this document, are identified in Section 1.2.

For each of these activities, environmental criteria are proposed. The criteria address the main hot-spots along the whole life cycle of a road, from materials production (including raw materials extraction and transportation), to construction, use (fuel consumption during the road service life due to the pavement-vehicle interaction), maintenance (and operation) and EoL. The most significant environmental impacts are related to greenhouse gas emissions from fuel consumption during the use of the road and resource use to manufacture construction materials. Other environmental areas of interest, such as water and habitat preservation and noise emissions reductions are also addressed.

In general, the criteria focus on a road as a system rather than individual components. It should be noted that separate GPP criteria for street lighting and traffic signals[1] are available that can be used in the context of road procurement.

1 http://ec.europa.eu/environment/gpp/pdf/criteria/street_lighting.pdf

1.2 Applicability of the Green Public Procurement criteria for Road Design, Construction and Maintenance

Designing and procuring road construction, maintenance or rehabilitation activities with a reduced environmental impact is a complex process. In light of this complexity, a guidance document has been developed to provide procurers with orientation on how to effectively integrate the GPP criteria for Road Design, Construction and Maintenance into the procurement process (see the *Procurement practice guidance document*, provided as a separate document).

The process of constructing a new road or carrying out maintenance activities consists of a distinct sequence of procurement activities with related contracts. This sequence of procurement can have a significant influence on the outcome. This is because each type of contract brings with it distinct interactions between the procurer, the road design team and the contractors.

Depending on the procurement route adopted, these contracts may be awarded to the same contractor or are let separately. Some contracts may be integrated in a Design and Build (DB) or a Design, Build and Operate (DBO) arrangement, with the detailed design process, the main construction contract, the maintenance and operation contract all potentially co-ordinated by one contractor.

It is therefore important to identify the main points in the sequence of procurement activities where GPP criteria should be integrated. To this end these criteria are arranged to reflect the most common procurement activities and are accompanied by a guidance document which provides general advice on how and when GPP criteria can be integrated into this process. It also suggests, based on experience from projects across the EU, how the procurement sequence could be managed in order to achieve the best results, issues to consider at key stages along the process and specific types of expertise that may help to obtain better outcomes.

The following stages in the procurement process for a new or maintained road are covered by the proposed criteria. They have been identified as stages where formal procurement will take place or requires monitoring:

A. Selection of the design team and contractors;

B. Detailed design and performance requirements;

C. Construction or major extensions;

D. Use of the road;

E. Maintenance and operation;

F. End of life.

Depending on the ambition level of the project, time constraints and the experience of the contracting authority, not all of the GPP criteria included in this criteria set will be relevant. Moreover, depending on the preferred procurement sequence, criteria may be best addressed at specific stages. The strategic objectives and targets of the project should be determined at the outset of the project with reference to the GPP criteria set. The optimum stages for integration of GPP criteria should be evaluated to determine the procurement route. In all cases, it is recommended that GPP criteria are integrated into both internal planning and the procurement sequence at an early stage in order to secure the desired outcomes and achieve the best value for money.

1.3 Key environmental impacts

1.3.1 The most significant environmental impacts of roads

The main environmental impacts arise from daily traffic (fuel consumption by cars and heavy trucks) during the use phase of a road.

Rolling resistance associated to the pavement texture generally has the highest impact potential, because it is directly related to the vehicle fuel consumption. According to Wang et al. (2012a), a 10% reduction in rolling resistance could lead to 1-2% of improvement in fuel economy.

Congestion can be due to factors outside of the scope of public works (like rush hour traffic, accidents, breakdowns and adverse weather conditions) or due to factors directly related to them, such as lane/road closures necessary for road construction and/or maintenance. It can greatly influence vehicle fuel consumption due to queues and associated slowdown, both in the construction and in the maintenance phase.

The road life cycle stage with the second largest environmental impacts is indicated to be the construction phase, in which the hot-spots are related to the resources used and the emissions and ecosystem impacts associated with **materials production**, including extraction and **transportation**. Resource use is influenced by the amount of waste generated during product manufacturing, construction on-site and maintenance processes, which can be significant as a proportion of the overall material flows on a construction site. This highlights the importance of designing and specifying for resource efficiency, with the most significant road elements to address being the sub-grade, including earthworks and ground works, the sub-base, the base, binder and surface courses or the concrete slabs. In this respect the recycling and re-use of construction materials and products can contribute to reducing environmental impacts and development of a circular economy.

A related consideration in the case of large-volume, high-weight construction materials are impacts relating to the transportation of aggregates (natural, recycled or secondary) to production sites. Transport of these materials is typically by lorry, which results in fuel-related emissions that are generally greater than or equal to those for the production of such materials. If these materials are moved over distances greater than 25 km, the resulting emissions can contribute significantly to the environmental impacts of the production phase for the main road elements. Minimising transport-related emissions can help to promote the use of lower impact modes of transport such as rail or shipping for these materials. Finally, the use of recycled materials such as aggregates from construction and demolition waste can help develop a market for such materials, in line with EU Circular Economy objectives, and provide associated resource efficiency benefits.

In complex orography condition, the impacts related to **earthworks** and **ground works**, including soil stabilization, can accounted for the main part of the total emissions and up to 30% of the project cost.

Nowadays **maintenance and rehabilitation** is gaining an increased relevance due to decreases in new road construction. Maintenance has to be evaluated not as a simple repetition of restoration and repairing activities, but on the contrary as a complex network of design strategies including evaluation on rolling resistance, congestion and durability of road surface materials. This phase is dominated by material production and congestion, similar to the construction phase. Several studies indicate that there is a clear connection between durability and sustainability aspects. Thus when durable materials are used, the need for maintenance is reduced.

An important factor is the influence of **traffic flow** on the relative importance of the identified hot-spots:

- In high traffic roads (i.e. example motorways, highways, and main national roads), rolling resistance and congestion have the highest impacts on energy consumption and emissions. Materials production and transportation is the third most important aspect to be taken into consideration.

- In low traffic roads[2] (i.e. secondary and other roads): higher impacts on energy consumption and emissions come from materials production and transportation rather than from rolling resistance and congestion. The relative importance of materials production and transportation increases with the decrease of the traffic flow.

Some other impacts that are not generally included in LCA studies of roads but which are of particular importance are: **environmental noise emissions** and **storm-water drainage**. With regards to environmental noise, road traffic is perhaps the single most dominant source across most of the EU. There are two possible approaches to reduce noise from road traffic: to specify low-noise road surfaces *or* to install noise barriers. Concerning storm-water drainage, a number of pollutants are transferred from roads to watercourses. The key to treating stormwater and removing pollutants from roads is to remove floating material (litter and oils) and solid particles (sediment). There is a huge opportunity for road drainage systems to provide much needed **flood capacity** in flood risk areas. Today two broad types of engineered drainage systems exist which can be distinguished as "**hard engineering**" (more concrete based) or "**soft engineering**" (less concrete based). In terms of flood management, both can be tailored to significantly reduce the risk of flooding downstream.

1.3.2 How the life cycle impacts of construction materials are addressed

As already highlighted, construction materials are associated with significant environmental impacts. The criteria offer procurers and bidders a number of options for how to assess these impacts and how to choose lower impact road elements.

The criteria provide the option to make an overall assessment of the life cycle impacts of materials in order to enable bidders and their design teams to decide on improvements. These criteria are technically demanding, making them particularly suitable for more advanced projects with experienced design teams. Some criteria only address specific phases in the life cycle of a road. They are intended to promote measures to address known specific impacts and associated improvement options for specific materials. These criteria are less technically demanding and may be more suitable for less advanced projects and less experienced design teams.

The award criteria available to procurers are, in decreasing level of ambition and technical complexity, as follows:

1. Life Cycle Assessment (LCA): The carrying out of a Life Cycle Assessment (see comprehensive criterion B14). This requires bidders to evaluate the life cycle impacts of the main road elements.
2. Carbon footprint (CF): The carrying out of a Carbon footprint (see core criterion B14). This requires bidders to evaluate the life cycle Global Warming Potential of the main road elements.
3. Requiring recycled and re-used content: This requires bidders to provide materials with a minimum requirement as regards the amount of recycled and reused content for the main road elements (see criterion B15).
4. Requiring reduced emissions from transport for heavy materials: This rewards low CO_2e emissions from the transportation of the aggregates used for the main road elements (see criterion B16).

If a contracting authority decides to reward recycled or re-used content (3.) or reduced transport emissions (4.), it should consider setting criteria that take into account the specific conditions in the local market for construction materials. It is recommended to address potential trade-offs in environmental impacts by combining requirements on recycled and reused content and lower transport emissions. The relative weighting of the two criteria should ensure effective competition between potential suppliers whilst also encouraging tenders that deliver an overall environmental benefit.

2 Internationally, roads with traffic flows of less than 2000 vehicles per day are denoted as low volume roads (AASHTO, 1993).

The level of ambition chosen for the Invitation To Tender (ITT) will depend on the knowledge and experience of the contracting authority, the scale of the project and a judgement on the level of experience of potential bidders. The contracting authority will need to carefully balance the different environmental and non-environmental award criteria and communicate them clearly in the ITT.

Key Environmental Areas in Road life cycle and Key Environmental Impacts	Proposed EU GPP Road Design, Construction and Maintenance approach
Key environmental areas - Rolling resistance due to the pavement-vehicle interaction, and related fuel consumption, and associated greenhouse gas emissions, during the use phase of a road; - Depletion of natural resources, embodied energy and emissions associated with the manufacturing and transportation of road construction materials; - Excavated materials and soil, including topsoil, generated during site preparation, earthworks and groundwork. Construction and demolition of the road; - Noise emissions from road construction, use and maintenance; - Durability of the pavement surface courses. Optimisation of maintenance strategy to guarantee desirable performance for rolling resistance, durability and noise reduction; - Congestion due to construction and maintenance works; - Water pollution during road construction and during the use phase. Contribution of road surfaces to flooding. Habitat fragmentation and risks to flora and fauna during the road use phase. Key life cycle environmental impacts and parameters for resource use: - The following key environmental impact categories along the product life cycle are considered the most important ones: global warming potential, photochemical ozone formation, abiotic resource depletion, acidification, eutrophication, human toxicity, eco-toxicity, land use, exploitation of renewable and non-renewable primary energy resources, use of secondary and re-used materials and waste material flows.	- Design and construction to achieve low rolling resistance (within technically acceptable safety parameters) and low associated fuel consumption and emissions in motorways and highways by means of optimizing the macrotexture (measured as Mean Profile Depth MPD) and monitoring it during the road use phase; - Design and specification to reduce the embodied impacts and resource use associated with construction materials; - Design, specification and site management to maximize the on-site re-use of excavated materials and soils (including topsoil), maximize the re-use/recycling of construction and demolition waste (C&DW) and of waste from other industrial processes and to use construction materials with a high recycled or re-used content including by-products; - Specification of approaches to lower noise emissions (including nature-based solutions[3]) during construction, use and maintenance phase; - Increasing material durability and reducing maintenance needs; - Maintenance and rehabilitation strategies including a monitoring plan and a maintenance plan; - A Traffic Congestion Mitigation Plan including solutions such as alternative routes, tidal flow lanes and hard shoulders evaluated by means of an LCC analysis; - Introducing water pollution control components and stormwater retention capacity components, including soft engineered solutions (e.g. nature-based solutions) in the drainage system, including potential for habitat creation notably to reduce runoff into storm sewers and the overall amount of water entering local storm sewers or surface waters thereby significantly reducing flooding-related damages.

3 Nature-based solutions are locally adapted, resource efficient and systemic interventions that are inspired or supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience.

2 GPP CRITERIA FOR ROAD DESIGN, CONSTRUCTION AND MAINTENANCE

A. Selection of the design team and contractors

Core criteria	Comprehensive criteria
SUBJECT MATTER	
The construction of new resource efficient roads whose design considers wider environmental impacts including noise, drainage and vehicle fuel consumption during use. *Or* The maintenance works or major rehabilitation of existing roads in a resource efficient manner which considers wider environmental impacts including noise, drainage and vehicle fuel consumption during use.	
SELECTION CRITERIA	
These criteria may form part of a pre-selection procedure where a design team are procured by the contracting authority. The number and size of executed projects to prove the experience should be proportionate to the tendered project.	
A1. Competencies of the project manager and design team *These criteria may form part of a pre-selection procedure for the main contractor or where the services of a design team are procured by the contracting authority.* The project manager, engineers, architects, consultant and/*or* design team consortium shall have relevant competencies and experience in each of the following areas for which they would be responsible under the contract *(select as relevant to the specific contract):* - The project management of road construction and maintenance contracts that have delivered improved environmental performance; - Assessment of road environmental performance using multi-criteria certification schemes and carbon footprint tools in compliance with ISO 14067 or equivalent; - The specification, procurement and use of low environmental impact construction materials; - The use of construction materials with high recycled and re-used content and by-products in road construction and maintenance; - Traffic congestion mitigation plans and LCC analysis to identify the cost-optimal solution; - Real life road traffic noise mitigation solutions by means of low-noise pavements and noise barriers; - Increasing the durability of pavement courses, bearing capacity and fatigue resistance;	**A1. Competencies of the project manager and design team** *These criteria may form part of a pre-selection procedure for the main contractor or where the services of a design team are procured by the contracting authority.* The project manager, engineers, architects, consultant and/*or* design team consortium shall have relevant competencies and experience in each of the following areas for which they would be responsible under the contract *(select as relevant to the specific contract):* - The project management of road construction and maintenance contracts with improved environmental performance; - Evaluation of unevenness and macro-texture effects on rolling resistance and, consequently, on fuel consumption and relationship with skid resistance. Evaluation of macrotexture (measured as MPD) and durability related to construction materials. Use of MIRAVEC tool or, where existing, other assessment tools to evaluate fuel consumption; - The use of holistic assessment tools in the design and specification of environmentally improved roads including LCC and LCA. Comparative studies in compliance with ISO 14040 and ISO 14044; - The specification, procurement and use of low environmental impact construction materials; - The use of construction materials with high recycled and re-used content and by-products in road construction and maintenance; - Traffic congestion mitigation plans and LCC analysis to identify the cost-optimal

- Development and execution of monitoring and maintenance plans in real life cases; - Design and installation of stormwater pollution control components and stormwater retention capacity, ideally including soft engineered components, in the drainage systems. Project experience and Continuous Professional Development (CPD) of relevance to these areas shall be highlighted. *The contracting authority may increase the number of years for the collection of the technical evidence and may require proof of a minimum number of contracts according to the nature of the project.* **Verification**: Evidence in the form of information and references related to relevant contracts in the previous 5 years in which the above elements have been carried out. This shall be supported by CVs of personnel who will work on the project.	solution; - Real life road traffic noise mitigation solutions by means of low-noise pavements and noise barriers; - Increasing the durability of pavement courses, bearing capacity and fatigue resistance. Experience in long lasting pavements and perpetual pavements; - Development and execution of monitoring and maintenance plans in real life cases; - Design and installation of stormwater pollution control components and stormwater retention capacity, ideally including soft engineered components, in the drainage systems. Project experience and Continuous Professional Development (CPD) of relevance to these areas shall be highlighted. *The contracting authority may increase the number of years for the collection of the technical evidence and may require proof of a minimum number of contracts according to the nature of the road project.* **Verification**: Evidence in the form of information and references related to relevant contracts in the previous 5 years in which the above elements have been carried out. This shall be supported by CVs of personnel who will work on the project.
A2. Competencies of the main construction contractor *These criteria may form part of a pre-selection procedure for the main contractor.* The main construction contractor shall have relevant competencies and experience in the completion of road construction and maintenance contracts that have been shown to have delivered improved environmental performance. In the case of Design and Build (DB) *or* Design, Build and Operate (DBO) contracts, criterion A2 will also be relevant to the design team employed. Relevant areas of experience shall include (as appropriate to the project and the selected GPP criteria): - The commissioning of monitoring and routine maintenance activities on macro-texture (MPD); - Evaluation of durability related to construction materials; - The commissioning of a road congestion mitigation plan and management of congestion during construction and maintenance, including solutions such as alternative routes, tidal flow lane, hard shoulder, ITS devices and their evaluation by	**A2. Competencies of the main construction contractor** *These criteria may form part of a pre-selection procedure for the main contractor.* The main construction contractor shall have relevant competencies and experience in the completion of road construction and maintenance contracts that have been shown to have delivered improved environmental performance. In the case of Design and Build (DB) *or* Design, Build and Operate (DBO) contracts, criterion A2 will also be relevant to the design team employed. Relevant areas of experience shall include (as appropriate to the project and the selected GPP criteria): - The commissioning of monitoring and routine maintenance activities on macro-texture (MPD) and evaluation of the fuel consumption due to changes in MPD, unevenness and surface defects; - Evaluation of durability related to construction materials. Use of MIRAVEC tool or, where existing, other assessment tools to evaluate fuel consumption; - The commissioning of a road congestion mitigation plan and management of congestion during construction and maintenance, including solutions such as

means of LCC analysis; - The purchasing and use of low environmental impact construction materials and verification of their performance. Supply chain management to ensure compliance with any relevant road assessment and certification systems, for example CEEQUAL or Greenroads, *etc.*; - The purchasing and use of construction materials with high recycled and re-used content and by-products in road construction and maintenance; - The successful implementation of demolition waste and excavation materials and soil management plans in order to minimise waste production. Selection and knowledge of on-site and off-site treatment options; - Experience with low temperature asphalt with particular regards to best techniques related to health and safety of workers; - Construction of low-noise pavements; - Long lasting pavements and increase of durability of the surface layers of the pavement; - Construction and commissioning of water pollution control components and stormwater retention capacity, including soft engineered components. Project experience and Continuous Professional Development (CPD) of relevance to these areas shall be highlighted. *The contracting authority may increase the number of years for the collection of the technical evidence and may require a minimum number of contracts according to the nature of the project.* **Verification:** Evidence in the form of information and references related to relevant contracts in the last 5 years in which the above elements have been carried out. This shall also be supported by CVs for personnel who will work on the project.	alternative routes, tidal flow lane, hard shoulder, ITS devices and their evaluation by means of LCC analysis; - The purchasing and use of low environmental impact construction materials and verification of their performance. Supply chain management to ensure compliance with any relevant road assessment and certification systems, for example CEEQUAL or Greenroads *etc.*. Experience with LCA and LCC tools; - The purchasing and use of construction materials with high recycled and re-used content and by-products in road construction and maintenance; - The successful implementation of demolition waste and excavation materials and soil management plans in order to minimise waste production. Selection and knowledge of on-site and off-site treatment options; - Experience with low temperature asphalt with particular regards to best techniques related to health and safety of workers; - Construction and monitoring of low-noise pavements, analysis of the durability of noise reduction performance; - Long lasting pavements and increase of durability of the surface layers of the pavement; - Construction and commissioning of water pollution control components and stormwater retention capacity, including soft engineered components. Project experience and Continuous Professional Development (CPD) of relevance to these areas shall be highlighted. *The contracting authority may increase the number of years for the collection of the technical evidence and may require a minimum number of contracts according to the nature of the project.* **Verification:** Evidence in the form of information and references related to previous contracts in the last 5 years in which the above elements have been carried out. This shall be supported by evidence and data from: - Third party auditing (for example from the demolition waste audit); - LCA/LCC analysis of the main road element and/or; - Data collection from monitoring of, for example, the production and management of C&DW and excavated materials and soil, the performance parameters for road routine and preventive maintenance and rehabilitation, etc. This shall also be supported by CVs for personnel who will work on the project

Supporting notes:

- The evaluation of consultants, design teams and contractors requires an experienced evaluation panel. It may be appropriate to bring in external expertise, which may include the appointment of a project manager, and the setting up of a panel with the knowledge and experience to judge the experience of competing contractors. The lists included in selection criterion 1 and 2 are indicative and should be adapted to the project and the procurement stage.
- In the reform of the Public Procurement Directives[4,5] (published in the Official Journal 28th March 2014 and requiring transposition by Member States within 24 months), it is explicitly stated (Art. 66 of Directive 2014/24/EU) that the organisation, qualification and experience of staff assigned to performing the contract (where the quality of the staff assigned can have a significant impact on the level of performance of the contract) can be a criterion for awarding a contract. For complex contracts such as road contracts it can usually be expected that the quality of the project managers, design team, specialist consultants and contractors can have a significant impact on the performance of the project. Please note that the educational and professional qualifications of the service provider or contractor or those of the undertaking's managerial staff may only be evaluated *once* in a tender procedure, either at selection stage or as an award criterion (Annex XII, Part 2 f of Directive 2014/24/EU).

4 Directive 2014/24/EU on public procurement and repealing Directive 2004/18/EC.

5 Directive 2014/25/EU on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC.

B. Detailed design and performance requirements

Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
B1. Low temperature asphalt The design team *or the* DB tenderer *or* the DBO tenderer shall apply best practice and techniques for laying bituminous mixtures in order to lower the asphalt production and application temperature. The maximum temperature for laying the bituminous mixtures of surface and binder courses shall not exceed 140°C. Only in cases of higher viscosity special bituminous mixtures, laying temperatures up to greater than 140°C, but lower than 155°C, shall be allowed. **Verification:** The design team *or* DB tenderer *or* the DBO tenderer shall provide a technical report and a workplan of the design activities, indicating the mixing and laying techniques and the maximum temperatures required by these techniques, including technical data sheets on binder formulation and asphalt mix design provided by the producer(s).	**B1. Low temperature asphalt** The design team *or the* DB tenderer *or* the DBO tenderer shall apply best practice and techniques for laying bituminous mixtures in order to lower the asphalt production and application temperature. The maximum temperature for laying the bituminous mixtures of surface and binder courses shall not exceed 120°C. Only in cases of higher viscosity special bituminous mixtures, laying temperatures up to greater than 120°C, but lower than 155°C, shall be allowed. **Verification:** The design team *or* DB tenderer *or* the DBO tenderer shall provide a technical report and a workplan of the design activities, indicating the mixing and laying techniques and the maximum temperatures required by these techniques, including technical data sheets on binder formulation and asphalt mix design provided by the producer(s).

B2. Excavated Materials and Soil Management Plan

(Same requirements for Core and Comprehensive criteria)

Waste production during excavation, excluding construction and demolition waste, shall be recorded.

An Excavation Materials and Soil Management Plan shall be prepared establishing systems for the separate collection of:

(i) excavated materials resulting from excavation activities (for example from site preparation and levelling, foundation, basement and trench excavation), typically soil and stones, including subsoil;
(ii) topsoil.

Closed loop re-use on-site for both excavated materials and topsoil should be maximised according to the results of the carbon footprint or LCA performance assessment (see criterion B14). Separate excavated material collection for re-use, recycling and recovery shall respect the waste hierarchy in Directive 2008/98/EC.

Verification:

The design team *or* the DB tenderer *or* the DBO tenderer shall provide a extracted materials and topsoil management plan consisting of:

(i) A bill of quantities with estimates for excavated materials based on good practices, as defined in the Code of practice on soil management of DEFRA (2009) and/or in the ENCODE Protocol (2013);

(ii) Estimates of all materials diverted from landfill and identification of potential hazardous substances;

(iii) Estimates of the % by weight re-used and/or recycled materials on site;

(iv) Estimates of the % by weight re-used and/or recycled materials off site;

(v) Total amount of topsoil and strategies to preserve its quality.

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<td>B3. Performance requirements for water pollution control components in drainage systems

Unless sewer connections are specifically required by local regulations or specific circumstances

Road drainage systems shall not be connected to mains sewers.

The drainage system shall contain drainage components that aid the removal of any sediment and solid particles from stormwater.

Verification:
The design team or the DB tenderer or the DBO tenderer shall make it clear where drainage water shall be routed to and where and which sediment removal devices shall be incorporated into the drainage system.</td>
<td>B3. Performance requirements for water pollution control components in drainage systems

Unless sewer connections are specifically required by local regulations or specific circumstances

Road drainage systems shall not be connected to mains sewers.

The drainage system shall contain drainage components that aid the removal of any sediment and solid particles from stormwater. Such "hard engineered" drainage components shall be combined with "soft engineered" components (often referred to as SuDS).

Verification:
The design team or the DB tenderer or the DBO tenderer shall make it clear where drainage water shall be routed to and where and which sediment removal components/devices shall be incorporated into the drainage system and which of those components/devices follow SuDS principles.</td>
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<td colspan="2">B4. Performance requirements for stormwater retention capacity in drainage systems

(Same requirements for Core and Comprehensive criteria)

When required by legislation, or when of particular importance for the specific site

The drainage system shall be designed to be capable of:

- retaining the rainfall from a design storm[6] with a return period (frequency) of 1 in X years and duration of Y minutes across a defined drained area;

- restricting maximum runoff rates from the drainage system to no more than that of an equivalent greenfield site or another specific value clearly defined by the contracting authority in the ITT.

Verification:

The design team or the DB tenderer or the DBO tenderer shall be provided with the appropriate rainfall data for the design storm by the contracting authority.

Using this data, they shall run a hydraulic simulation using appropriate modelling software specified by the contracting authority. The simulation shall show that:

- At no point during the design storm event is the capacity of the drainage system exceeded and;

- At no point during the design storm event does the runoff rate exceed the value specified by the contracting authority.</td>
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6 See Figures A.7 and A.8 in Annex 5of the Technical Report

B5. Environmental Integration and Restoration Plan

(Same requirements for Core and Comprehensive criteria)

This criterion shall apply when suitable land for planting is available, which may include planting in any soft-engineered drainage infrastructure such as retention basins, ponds or artificial wetlands

An Environmental Integration and Restoration Plan shall be provided as part of the road design that includes the following details:

- A site map indicating the type, location and quantities/densities of all plant species (only non-invasive and native plant species shall be included);
- A description of the procedure used to select plant species and a brief rationale as to why each species is suitable for the particular environmental conditions on the site;
- Planting bed requirements: soil/compost/growing media used and their depths, initial fertiliser application, use of mulch, sowing of grass seeds;
- Planned measures to avoid soil erosion both prior to and after the establishment of vegetation cover;
- Expected maintenance requirements of the vegetated areas. Included any irrigation, grass cutting, pruning or replacement of plants.

The plan should be compiled in accordance with best practice guidelines such as those outlined in the COST 341 report or other similar literature.

Verification:
The design team *or* the DB tenderer *or* the DBO tenderer shall provide a copy of the Environmental Integration and Restoration Plan to the contracting authority.

B6. Monitoring of noise emission during construction and maintenance

(Same requirements for Core and Comprehensive criteria)

When planning permission or local/national legislation requires, or when specifically requested by the contracting authority

The design team *or* the DB tenderer *or* the DBO tenderer shall provide details of how temporary noise barriers (or permanent if part of the final design) shall be erected to reduce noise levels in the defined receptor area to less than X dB(A) as averaged L_{dEN} and Y dB(A) as averaged L_{night} values as defined in Annex I of the Environmental Noise Directive (2002/49/EC).

Verification: The design team *or* the DB tenderer *or* the DBO tenderer shall submit:

- a plan of the works site and receptor area as defined by the Environmental Impact Assessment, legislation or contracting authority where relevant;
- a timetable of works, highlighting when the most noisy works are to take place;
- specification of the noise barrier location and approximate properties coupled with basic acoustic calculations that demonstrate that noise mitigation in the receptor area will be feasible.

B7. Minimum requirement for low-noise pavement design	**B7. Minimum requirement for low-noise pavement design**
When local or national legislation requires, or when low-noise levels from this road are considered a priority	*When local or national legislation requires, or when low-noise levels from this road are considered a priority*
The design team *or* the DB tenderer *or* the DBO tenderer shall declare that the proposed low-noise pavement shall comply with the following close proximity (CPX) noise emission levels according to ISO/DIS 11819-2, as a function of the maximum allowed speed on the road	The design team *or* the DB tenderer *or* the DBO tenderer shall declare that the proposed low-noise pavement shall comply with the following close proximity (CPX) noise emission levels according to ISO/DIS 11819-2, as a function of the maximum allowed speed on the road

section: - 90 dB(A) at 50 kph, and/or - 95 dB(A) at 70 kph, and/or - 98 dB(A) at 90 kph. Test data used to support the design and any assumptions should account for the use of CPX test vehicles and/or trailers using the steel-belted radial tyre with dimensional code P225/60 R16 as defined in ASTM F2493-14, with a minimum of 5 mm tread. Any test data shall be corrected for a 20°C air temperature. Uncertainty analysis of test data shall be evaluated according to the Guide to the expression of uncertainty in measurement (ISO/IEC Guide 98-3:2008), and the tests shall show that the results, including their uncertainty, are not exceeding by more than 1 dB(A) the values stated above or those claimed with the design (if lower). **Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall describe the nature of the proposed low-noise pavement such as aggregate grading, aggregate maximum size, binder used, expected voids volume and expected CPX noise emission from test vehicles at the appropriate speed(s) for the road. The expected noise reduction performance of the new pavement values shall be based on laboratory and/or site measurements of test road sections and may be compared to other well-known low-noise reference surfaces. Data and information may be generated by the tenderer themselves from peer-reviewed published literature or from declarations signed by competent authorities in the field of noise measurement from road surfaces. After opening, a test report, signed by a competent authority, of CPX noise results from testing of agreed road sections at an agreed vehicle speed or speeds shall be provided which demonstrates compliance with the relevant noise emission limits. Spatial variance of the tested road section shall show that no individual parts of the test section exceed these overall limits by more than 2 dB(A).	section: - 87 dB(A) at 50 kph, and/or - 92 dB(A) at 70 kph, and/or - 95 dB(A) at 90 kph. Test data used to support the design and any assumptions should account for the use of CPX test vehicles and/or trailers using the a steel-belted radial tyre with dimensional code P225/60 R16 as defined in ASTM F2493-14, with a minimum of 5 mm tread. Any test data shall be corrected for a 20°C air temperature. Uncertainty analysis of test data shall be evaluated according to the Guide to the expression of uncertainty in measurement (ISO/IEC Guide 98-3:2008), and the tests shall show that the results, including their uncertainty, are not exceeding by more than 1 dB(A) the values stated above or those claimed with the design (if lower). **Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall describe the nature of the proposed low-noise pavement such as aggregate grading, aggregate maximum size, binder used, expected voids volume and expected CPX noise emission from test vehicles at the appropriate speed(s) for the road. The expected noise reduction performance of the new pavement values shall be based on laboratory and/or site measurements of test road sections and may be compared to other well-known low-noise reference surfaces. Data and information may be generated by the tenderer themselves from peer-reviewed published literature or from declarations signed by competent authorities in the field of noise measurement from road surfaces. After opening, a test report, signed by a competent authority, of CPX noise results from testing of agreed road sections at an agreed vehicle speed or speeds shall be provided which demonstrates compliance with the relevant noise emission limits. Spatial variance of the tested road section shall show that no individual parts of the test section exceed these overall limits by more than 2 dB(A).
B8. Performance requirement for lighting installations *(Same requirements for Core and Comprehensive criteria)* For this criterion, please refer to the EU GPP criteria for street lighting and traffic signals: http://ec.europa.eu/environment/gpp/pdf/criteria/street_lighting.pdf **Verification:** See the respective EU GPP criteria documents.	

B9. Performance requirement for road markings

(Same requirements for Core and Comprehensive criteria)

For this criterion, please refer to the EU GPP criteria for paints, varnishes and road markings, to be published soon at: http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Verification:

See the respective EU GPP criteria documents.

B10. Traffic Congestion Mitigation Plan

(Same requirements for Core and Comprehensive criteria)

A Traffic Congestion Mitigation Plan to be implemented during construction and maintenance activities, shall be presented with the road design and include:

- A timeline with expected construction and/or maintenance activities for the road service life;
- Alternative routes for diverted traffic during such activities, if necessary.

If the design team *or* the DB tenderer *or* the DBO tenderer includes congestion solutions during the use phase and any maintenance actions based on tidal flow lanes or hard shoulders to be used as lanes, they shall present an LCC analysis, including user cost externalities due to congestion.

For those roads where Intelligent traffic systems (ITS) are implemented for traffic management, the road shall be equipped with the devices needed to support the ITS: cameras, traffic lights, information screens and variable road signs.

Verification:
The design team *or* the DB tenderer *or* the DBO tenderer shall provide the detailed traffic congestion mitigation plan, the LCC analysis in accordance with ISO 15686-5 (if required) and the descriptions of the ITS devices (if required).

B11. Performance requirements for durability of pavement	**B11. Performance requirements for durability of pavement**
The nominal minimum service lifetime of the road pavement, excluding the surface course, shall be specified by the contracting authority but should not be shorter than: - 15 years for the binder course, with the option to reduce to no less than 10 years in case of specific conditions (such as an aggressive climate - *to be specified in the ITT)*; - 20 years for the base course for flexible/semi-rigid pavements and for the concrete slab for rigid pavements; - 40 years for the sub-base. *Additionally the contracting authority may specify a minimum nominal service lifetime for the surface course if the specific conditions of the road pavement allow setting a threshold.* **Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall provide a technical report specifying the minimum nominal service lifetime of the binder and base courses and the sub-	The nominal minimum service lifetime of the road pavement, excluding the surface course, shall be specified by the contracting authority but should not be shorter than: - 20 years for the binder course with the option to reduce to no less than 15 years in case of specific conditions (such as an aggressive climate - *to be specified in the ITT*); - 40 years for the base course for flexible/semi-rigid pavements and for the concrete slab for rigid pavements; - 60 years for the sub-base. *Additionally the contracting authority may specify a minimum nominal service lifetime for the surface course if the specific conditions of the road pavement allow setting a threshold.* **Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall provide a technical report specifying the minimum nominal service lifetime of the binder and base courses and the sub-

base course, which must not be shorter than indicated above. The report shall include the evaluation of the bearing capacity and the fatigue resistance, and the critical stresses and strains in the road pavement layers. The report shall include appropriate data and information, specifically related to: the physico-mechanical performance of materials, the construction techniques and processes used, and the construction activity workplan.	base course, which must not be shorter than indicated above. The report shall include the evaluation of the bearing capacity and the fatigue resistance, and the critical stresses and strains in the road pavement layers. The report shall include appropriate data and information, specifically related to: the physico-mechanical performance of materials, the construction techniques and processes used, and the construction activity workplan.
B12. Maintenance and Rehabilitation (M&R) Plan **Option 1** *This option applies in case of DBO contracts* The DBO tenderer shall include a M&R Plan in the detailed design. For each section of road characterised by specific construction methods, materials, environmental conditions, meteorological conditions and use, the M&R Plan shall, as a minimum: - Include routine, preventive and rehabilitation actions; - Optimise the cost-benefit ratio of the maintenance works; - Declare the environmental performance of any routine, preventive and rehabilitation action/strategy that have been included in the CF (according to the criterion B14 if applicable); - Include the cost, expected intervals between maintenance activities, the Traffic Congestion Mitigation Plan (according to the criterion B10) and the Demolition Waste Management Plan (according criterion E2) for each action. **Option 2** *This option applies in case of separate Design and Build contracts or DB contracts* The design team *or* DB tenderer shall include in the detailed design a global M&R Plan. For each section of road characterised by specific construction methods, materials, environmental conditions, meteorological conditions and use, the global M&R Plan shall include: - the environmental performance of the routine, preventive and rehabilitation actions (according to the criterion B14 CF if applicable); - the average intervals of all routine, preventive and rehabilitation actions (if it is not set by the contracting authority); - the Traffic Congestion Mitigation Plan (according to the criterion B10) and the Demolition Waste Management Plan (according criterion E2) for each action. **Verification:** The Design team *or* the DB tenderer *or* the DBO tenderer shall provide a technical report including appropriate data and information and the design activities workplan.	**B12. Maintenance and Rehabilitation (M&R) Plan** The design team *or* the DB tenderer *or* the DBO tenderer shall include a M&R Plan in the detailed design. For each section of road specifically characterised by specific construction methods, materials, environmental conditions, meteorological conditions and use, the M&R Plan shall, as a minimum: - Include routine, preventive and rehabilitation actions; - Optimise the cost-benefit ratio of the maintenance works; - Declare the environmental performance of any routine, preventive and rehabilitation action/strategy that have been included in the LCA (according to the criterion B14 if applicable); - Include the cost, expected intervals between maintenance activities, the Traffic Congestion Mitigation Plan (according to the criterion B10) and the Demolition Waste Management Plan (according criterion E2) for each action. **Verification:** The Design team *or* DB tenderer *or* DBO tenderer shall provide a technical report including appropriate data and information and the design activities workplan.

AWARD CRITERIA	
B13. N/A	**B13. Performance requirements on traffic fuel consumption due to rolling resistance** *Only for motorways and highways, main roads or national roads designed to bear high AADT[7] - Annual Average Daily traffic - at steady speed* The contracting authority may choose one of the options below to implement this criterion. For all three options, it must be required that the MPD shall ensure the compliance with the skid resistance and wet friction required by national, regional and/or local legislation. **Option 1** Points will be awarded to those offers that commit to a lower **MPD** of the road surface, within the range of safety conditions set by the skid resistance and the wet friction. **Option 2** Points will be awarded to those offers that commit to a lower **rolling resistance** of the road surface. This option should only be used if the following three requirements are met: 1. the contracting authority sets the test method to be used for the direct measurement of rolling resistance in the ITT, and; 2. the tenderers have access to laboratories that test the rolling resistance according to that test method, and; 3. the test method is validated according to the provisions of ISO 17025. **Option 3** Points will be awarded to those offers that commit to a road surface which will reduce **traffic fuel consumption.** The contracting authority will provide the tenderers with the tool including the planning data (route, traffic flow, average degree of curvature, rise and fall/gradient). The tenderer shall include the design parameters influencing the fuel consumption declaring those values together with their levels of uncertainty, and the level of uncertainty of the traffic fuel consumption estimation.

7 High AADT may vary across EU countries and regions, therefore the range regarded as 'high' should be evaluated by each Road Authority. As a general rule of thumb, literature indicates that the threshold between high and low traffic volume is around 2000-3000 AADT.

	Verification:
	
	<u>All options:</u> The design team, DB tenderer or DBO tenderer shall provide the detailed design including the performance parameters declared together with test results on a representative test sample of the surface. Tests shall be carried out by an independent laboratory complying with the general principles of ISO 17025.
	
	<u>Option 1:</u> the MPD shall be measured according to the standard ISO 13473-1.
	
	<u>Option 2:</u> the rolling resistance shall be measured by means of the test method set by the contracting authority in the ITT.
	
	<u>Option 3:</u> The design team, DB tenderer or DBO tenderer shall provide the results of the expected fuel consumption by means of the MIRAVEC tool or, where existing, other equivalent assessment tools. To be regarded equivalent, those tools shall include the following parameters:
	
	- Fuel consumption model for free flow traffic based on:
	  o Vehicle characteristics (type, fuel used, Euro class);
	  o Rolling resistance, air resistance, average degree of curvature, rise and fall/gradient, velocity;
	- Rolling resistance dependent on ambient temperature, IRI, MPD;
	- Vehicle velocity, based on posted speed, vehicle type, traffic volume, gradient, IRI and rutting present;
	- Idle time.

B14. LCA performance of the main road elements

If the impact of the road use phase is to be considered, this criterion shall be used in combination with the award criterion B13 Performance requirements on traffic fuel consumption due to rolling resistance.

This criterion may only be applied where a Bill of Quantities[8] for a reference road is to be provided to bidders as the basis for comparison or where designs submitted by different bidders are to be compared during a competitive process.

Additional technical guidance shall be followed during the procurement process, as provided in Annex A (Carbon Footprint option).

A technical evaluator specialised in CF shall assist in preparing the ITT and shall carry out a critical review of the submissions.

Points will be awarded on the base of the improvement of the carbon footprint (CF) of the road including at least the main road elements listed in Table (a) in comparison with a reference road *or* other competing designs.

The basis for the comparison shall be specified in the ITT.

Table (a) Scope of the road elements to be evaluated

New construction or major extension	Maintenance and rehabilitation
· Sub-grade, including earthworks and ground works · Sub-base · Base, binder and surface *or* concrete slabs · Additional ancillary road elements *(optional)*	· Base, binder and surface *or* concrete slabs

The performance shall be evaluated by carrying out a Carbon Footprint (CF) of the road in accordance with ISO 14067 or equivalent. The ITT shall specify the method that shall be used for the evaluation (see Annex A).

The bidder that shows the lowest carbon footprint will be ranked with the highest value.

Where analysis using the CF option is carried out prior to procurement of the main contractor, the successful tenderer shall prepare a handover document including the key assumptions and results with specific regard to:

- *earthworks and groundwork solutions;*
- *materials suggested to be used, techniques applied such as WMA, HWMA, CMA and*

B14. LCA performance of the main road elements

If the impact of the road use phase is to be considered, this criterion shall be used in combination with the award criterion B13 Performance requirements on traffic fuel consumption due to rolling resistance.

This criterion may only be applied where a Bill of Quantities[8] for a reference road is to be provided to bidders as the basis for comparison or where designs submitted by different bidders are to be compared during a competitive process.

Additional technical guidance shall be followed during the procurement process, as provided in Annex B (LCA option).

A technical evaluator specialised in LCA shall assist in preparing the ITT and shall carry out a critical review of the submissions.

Points will be awarded on the base of the improvement in the life cycle assessment performance (LCA) of the road including at least the main road elements listed in Table (b) in comparison with a reference road *or* other competing designs.

The basis for the comparison to be used shall be specified in the ITT.

Table (b) Scope of the road elements to be evaluated

New construction or major extension	Maintenance and rehabilitation
· Sub-grade, including earthworks and ground works · Sub-base · Base, binder and surface *or* concrete slabs · Additional ancillary road elements *(optional)*	· Base, binder and surface *or* concrete slabs

The performance shall be evaluated by carrying out a Life Cycle Assessment (LCA) of the road in accordance with ISO 14040/14044. The ITT shall specify which of the following methods shall be used for the evaluation (see Annex B):

(i) Impact Category results: The aggregated characterisation results for each indicator obtained using the specified LCA method; or

(ii) LCA tool score: A single score obtained using a national or regional LCA tool used by public authorities;

In each case the methodology shall include, as a minimum, the Lifecycle Impact Category Indicators specified in Annex B.

8 Bill of Quantities is defined as *'a list of items giving detailed identifying descriptions and firm quantities of the work comprised in a contract'* (RICS 2011).

recycled content, re-used content and/or by-products; - *CO_2e emissions per tonne of transported materials from production site to the worksite (baseline mass haul plan);* - *% of recycling, re-use of excavated materials and construction and demolition waste on-site and off-site;* - *Maintenance activities and frequencies.* **Verification:** The Design team *or* the DB tenderer *or* the DBO tenderer shall provide a bill of materials for the proposed design and the CF results, which shall be reported according to ISO 14067 or equivalent. The comparison with the reference road shall be written up in a concise technical report that compares the proposed design option(s) and calculates the improvement potential. The technical report shall describe how the "technical points to address" (as set out in Annex A) have been covered. *The handover document will be used by the contracting authority for the future ITT in case of separated design and build contracts or will be updated and further improved by the main construction contractor or the DB contractor or the DBO contractor before starting the construction phase.* *The successful tenderer shall conclude the design phase with the preparation of the handover document.* *The successful DB tenderer or DBO tenderer shall prepare the handover document before starting the construction phase.* *The technical report shall be subject to a critical review by the contracting authorities appointed LCA technical evaluator. The critical review shall follow the guidelines in Annex C.*	*Energy harvesting technologies shall be included in the LCA according to Annex B point d.* *Where LCA analysis is carried out prior to procurement of the main contractor, the successful tenderer shall prepare a handover document including the key assumptions and results with specific regard to:* - *earthworks and groundwork solutions;* - *materials suggest to be used, techniques applied such as WMA, HWMA, CMA and recycled content, re-used content and/or by-products;* - *CO_2e emissions per tonne of transported materials from production site to the worksite (baseline mass haul plan);* - *% of recycling, re-use of excavated materials and construction and demolition waste on-site and off-site;* - *Maintenance activities and frequencies.* **Verification**: The Design team *or* the DB tenderer *or* the DBO tenderer shall provide a bill of materials for the proposed design and the LCA results, which shall be reported according to ISO 14044. The comparison with the reference road shall be written up in a concise technical report that compares the proposed design option(s) and calculates the improvement potential. The technical report shall describe how the "technical points to address" (as set out in Annex B) have been covered. *The handover document will be used by the contracting authority for the future ITT in case of separated design and build contracts or will be updated and further improved by the main construction contractor or the DB contractor or the DBO contractor before starting the construction phase.* *The successful tenderer shall conclude the design phase with the preparation of the handover document.* *The successful DB tenderer or DBO tenderer shall prepare the handover document before starting the construction phase.* *The technical report shall be subject to a critical review by the contracting authorities appointed LCA technical evaluator. The critical review shall follow the guidelines in Annex C.*

B15. Incorporation of recycled content

It is recommended to consider combining this criterion with criterion B16, but should not be used if criterion B14 is selected[9].

The contracting authority shall award points to tenderers that achieve greater than or equal to 15% by weight of the recycled content, re-used content and/or by-products[10] for the sum of the main road elements in Table (c).

The minimum content requirement for award could be set higher if agreement is reached with the design team prior to tendering for the main contractor.

The contracting authority may decide to allocate more points to the re-used content rather than to the recycled content according to the specific local conditions

Table (c) Scope of the road elements to be evaluated

New construction or major extension	Maintenance and rehabilitation
· Sub-grade, including earthworks and ground works; · Sub-base; · Base, binder and surface *or* concrete slabs.	· Base, binder and surface *or* concrete slabs.

The recycled content as well as the re-used content shall be calculated on the basis of an average mass balance of re-used, recycled materials and/or by-products according to how they are produced and delivered to site (*as applicable*):

- For each ready mixed batch from which deliveries are dispatched to the construction site in accordance with standards on:
  - aggregates EN 13242, EN 13285;
  - asphalt pavement EN 13043, EN 13108-1, EN 13108-2, EN 13108-3, EN 13108-4, EN 13108-5, EN 13108-6, EN 13108-7, EN 13108-8;
  - concrete pavement EN 206, EN 12620, EN13877;
  - hydraulically bound granular mixtures EN 14227 part 1 to 5;
  - stabilised soil EN 14227 part 10 to 15.
- On an annual basis for factory made slabs and elements with claimed content levels in accordance with EN 12620 and EN 206, EN 13877 and national legislation.

B15. Incorporation of recycled content

It is recommended to consider combining this criterion with criterion B16, but should not be used if criterion B14 is selected[9].

The contracting authority shall award points to tenderers that achieve greater than or equal to 30% by weight of the recycled content, re-used content and/or by-products[10] for the sum of the main road elements in Table (d).

The minimum content requirement for award could be set higher if agreement is reached with the design team prior to tendering for the main contractor.

The contracting authority may decide to allocate more points to the re-used content rather than to the recycled content according to the specific local conditions

Table (d) Scope of the road elements to be evaluated

New construction or major extension	Maintenance and rehabilitation
· Sub-grade, including earthworks and ground works; · Sub-base; · Base, binder and surface *or* concrete slabs.	· Base, binder and surface *or* concrete slabs.

The recycled content as well as the re-used content shall be calculated on the basis of an average mass balance of re-used, recycled materials and/or by-products according to how they are produced and delivered to site (*as applicable*):

- For each ready mixed batch from which deliveries are dispatched to the construction site in accordance with standards on:
  - aggregates EN 13242, EN 13285;
  - asphalt pavement EN 13043, EN 13108-1, EN 13108-2, EN 13108-3, EN 13108-4, EN 13108-5, EN 13108-6, EN 13108-7, EN 13108-8;
  - concrete pavement EN 206, EN 12620, EN13877;
  - hydraulically bound granular mixtures EN 14227 part 1 to 5;
  - stabilised soil EN 14227 part 10 to 15.
- On an annual basis for factory made slabs and elements with claimed content levels in accordance with EN 12620 and EN 206, EN 13877 and national legislation.

9 If specific local conditions and planning policies support the use of recycled content, the contracting authority can evaluate, on a case by case basis, the possibility to include a criterion on recycled content within the ITT alongside the holistic criterion B14 CF/LCA. The assumptions and life cycle inventory data relating to the production and construction phase of the recycled materials would need to be included in the response to B14.

10 A by-product is defined in art. 5 of the Waste Framework Directive as *'A substance or object, resulting from a production process, the primary aim of which is not the production of that item....*'

Verification: The design team *or* the DB tenderer *or* the DBO tenderer shall propose the recycled content, re-used content and/or by-products quantifying the proportional contribution of the recycled content and/or re-used content to the overall weight of the specified road elements, based on the information provided by the producer(s) of the construction material. The design team *or* the DB tenderer *or* the DBO tenderer shall describe how the recycled content will be calculated and verified, including, as a minimum, batch documentation as the Type Test report, factory production control documentation and delivery documentation, and how the third party verification will be arranged during the construction phase.	**Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall propose the recycled content, re-used content and/or by-products quantifying the proportional contribution of the recycled content and/or re-used content to the overall weight of the specified road elements, based on the information provided by the producer(s) of the construction material. The design team *or* the DB tenderer *or* the DBO tenderer shall describe how the recycled content will be calculated and verified, including, as a minimum, batch documentation as the Type Test report, factory production control documentation and delivery documentation, and how the third party verification will be arranged during the construction phase.

B16. Performance requirements for CO_2e emissions from the transportation of aggregates

(Same requirements for Core and Comprehensive criteria)

This criterion should not be used where criterion B14 is applied. It is recommended to consider combining this criterion with B15 in order to achieve an overall environmental benefit. This should always be done based on an understanding of the local market conditions and by establishing and clearly specifying in the ITT a weighting of the two criteria that will ensure effective competition and reward bids that offer the best overall environmental performance.

Points will be awarded in proportion to the reduction in the CO_2e emission/tonne of aggregates [11] for use in the production of the main road elements listed in Table (e). The method and tool to be used to calculate the CO_2e emissions from the transportation shall be specified in the ITT. *In some Member States there may already be permitting requirements and associated tools made available for the calculation of transport-related CO_2 equivalent emissions, in which case the bidders shall declare the emissions based on using these rules.*

A maximum target for CO_2e emissions/tonne of aggregates transported could be set by the contracting authority based on information from the design team. This, together with their assumptions and rules, shall be included in the ITT for the main contractor.

Table (e) Scope of the road elements to be evaluated

New construction or major extension	**Maintenance and rehabilitation**
· Sub-grade, including earthworks and ground works; · Sub-base; · Base, binder and surface *or* concrete slabs; · Additional ancillary road elements *(optional).*	· Base, binder and surface *or* concrete slabs.

Verification:

The design team *or* the DB tenderer *or* the DBO tenderer shall provide an estimate of the CO_2e/tonne for aggregates that are used in the specified road elements using the calculation tool specified in the ITT. The transport mode(s) shall be specified and the emissions factor for each transport mode multiplied by the relevant quantities of materials as stated in the Bill of Quantities (BoQ).

11 Aggregates can encompass: i) natural aggregates (such as sand, gravel, crushed rocks), ii) recycled aggregates (such as materials from Construction & Demolition Waste) and iii) secondary aggregates (such as slag and ashes from industrial processes)

B17. Requirements for water pollution control "soft engineered" components in drainage systems

(Same requirements for Core and Comprehensive criteria)

Points will be awarded to drainage system designs that incorporate "soft engineered" components (often referred to as SuDS) as follows:

- Filter trenches with low (<25mm) or no kerbs at roadside covering at least 40% of the roadside (0.25X points);
- Grassed swales covering at least 40% of the roadside (0.5X points);
- Vegetated retention basins with unlined bases for infiltration through which all road drainage is directed prior to reaching the local surface watercourse (0.5X points);
- Vegetated retention ponds with linings to create artificial wetlands and/or a permanent water body in all or part of the basin which all road drainage is directed through prior to reaching the local surface watercourse (0.75X points).

More than one SuDS feature may be incorporated into the drainage design.

These systems shall be designed in accordance with best practice guidelines, for example as detailed in "The SUDS Manual C697" published by CIRIA in 2007 or other similar but more recent literature.

Verification:

The design team *or* the DB tenderer *or* the DBO tenderer shall provide details of these drainage solutions and clearly indicate them in the design. Where relevant, reference shall be made to best practice design details and how these are incorporated in the design.

B18. Requirements for stormwater retention capacity in drainage systems that incorporate "soft engineered" components

(Same requirements for Core and Comprehensive criteria)

Points will be awarded for drainage systems that incorporate "soft engineered" components (often referred to as SuDS) that incorporate stormwater retention devices that improve site aesthetics and contribute to potential habitat creation as follows:

- Grassed swales with check dams and an orifice plate at the base to act as retention devices during intense rainfall events but normally be dry (0.50X points);
- Vegetated retention basins with unlined bases for infiltration and overflows for severe conditions through which all road drainage is directed prior to reaching the local surface watercourse (0.50X points);
- Vegetated retention ponds with linings to create artificial wetlands and/or a permanent water body in all or part of the basin which all road drainage is directed through prior to reaching the local surface watercourse (0.75X points).

Any one or all features may be incorporated into the drainage design and may be combined with other "hard engineered" drainage components as per site requirements.

These systems shall be designed in accordance with best practice guidelines, for example as detailed in "The SUDS Manual C697" published by CIRIA in 2007 or other similar but more recent literature.

Verification:

The design team *or* the DB tenderer *or* the DBO tenderer shall provide details of these drainage solutions and clearly indicate them in the design. Where relevant, reference shall be made to best practice design details and how these are incorporated in the design.

B19. Performance requirements for wildlife passages across the road Points will be awarded for drainage infrastructure (culverts or underpasses) that aids the safe passage of small fauna and amphibious or aquatic species across the road. Points shall be awarded as follows: - Filter trenches with low (<25 mm) or no kerbs at roadside covering at least 40% of the roadside (0.5X point); - At least 50% of all culverts for the passage of surface water across the road base shall provide flat and dry walkways for small fauna (0.5X point); - All culverts that channel permanent surface water courses do not prevent the upstream migration of fish or amphibious species (0.5X point). Culverts that permit the passage of small fauna or aquatic species shall be designed according to best practice guidelines, for example as published in the COST 341 Handbook or any similar documentation suggested by the contracting authority. **Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall provide the details of any kerbs, filter trenches or culverts and compare it to best practice guidelines identified by the contracting authority.	**B19. Performance requirements for wildlife passages across the road** Points will be awarded for drainage infrastructure (culverts or underpasses) that allows the safe passage of small fauna, and amphibious or aquatic species across the road. Points shall be awarded points as follows: - Filter trenches with no kerbs at roadside covering at least 60% of the roadside (0.5X point); - All culverts for the passage of surface water across the road base shall provide flat and dry walkways for small fauna (0.5X point); - All culverts that channel permanent surface water courses do not prevent the upstream migration of fish or amphibious species (0.5X point). Culverts that permit the passage of small fauna, or aquatic species shall be designed according to best practice guidelines, for example as published in the COST 341 Handbook or any similar documentation suggested by the contracting authority. **Verification:** The design team *or* the DB tenderer *or* the DBO tenderer shall provide the details of any kerbs, filter trenches or culverts and compare it to best practice guidelines identified by the contracting authority.
B20. Performance claim for low-noise road pavement design *(Same requirements for Core and Comprehensive criteria)* Points will be awarded if the pavement design claims to achieve CPX noise emissions that are >1 dB(A) lower than the minimum technical requirements (see B7). Points will be awarded in proportion to the number of decibels (dB(A) by which the estimated performance improves on the minimum technical requirements. **Verification:** *Same as stated in the verification for criterion* B7.	

C. Construction or major extensions

Core criteria	Comprehensive criteria
CONTRACT PERFORMANCE CLAUSE	
C1. Commissioning of the road construction The main construction contractor *or* the DB constructor *or* the DBO contractor has to ensure that the commissioning of the road construction conforms to the agreed designs and specifications. Particular attention should be paid to the following aspects: - CF/LCA performance of the main road elements (criterion B14) *or* the CO_2 emissions per tonne of transported materials (criterion B16); - Excavated Materials and Soil Management Plan (criterion B2); - Water pollution control components, stormwater retention capacity and Environmental Integration and Restoration Plan and wildlife passage design in the drainage system (criteria B3, B4, B5, B17, B18, B19); - Pavement durability (criterion B11); - Traffic Congestion Mitigation Plan implementation (criterion B10). The main construction contractor *or* the DB constructor *or* the DBO contractor shall, in case a significant deviation from the design requirements during the construction phase is considered necessary, inform the contracting authority and agree, if justified, upon any deviation. For cases where no agreement is reached, the contract clauses should lay down a pre-determined procedure for deciding upon appropriate and proportional penalties for non-compliance and/or remedial or mitigation actions.	**C1. Commissioning of the road construction** The main construction contractor *or* the DB constructor *or* the DBO contractor has to ensure that the commissioning of the road construction conforms to the agreed designs and specifications. Particular attention should be paid to the following aspects: - pavement macrotexture (MPD) (see criterion B13); - CF/LCA performance of the main road elements (criterion B14) *or* the CO_2 emissions per tonne of transported materials (criterion B16); - Excavated Materials and Soil Management Plan (criterion B2); - Water pollution control components, stormwater retention capacity and Environmental Integration and Restoration Plan and wildlife passage design in the drainage system (criteria B3, B4, B5, B17, B18, B19); - Pavement durability (criterion B11); - Traffic Congestion Mitigation Plan implementation (criterion B10). The main construction contractor *or* the DB constructor *or* the DBO contractor shall, in case a significant deviation from the design requirements during the construction phase is considered necessary, inform the contracting authority and agree, if justified, upon any deviation. For cases where no agreement is reached, the contract clauses should lay down a pre-determined procedure for deciding upon appropriate and proportional penalties for non-compliance and/or remedial or mitigation actions.
C2. N/A	**C2. Quality of the completed road - monitoring of the performance parameters** The main construction contractor *or* the DB contractor *or* DBO contractor shall monitor the agreed rolling resistance performance parameters affecting the traffic fuel consumption after the construction before the road opening and 6 months after the opening (in-service road), and provide a copy of test results. In case of non-compliant results, refer to general contract performance clause text in C1.

C3. Incorporation of recycled content

(Same requirements for Core and Comprehensive criteria)

When materials are delivered to the work site, recycled content claims with clear traceability shall be verified for each batch[12] of product.

The main construction contractor *or* the DB contractor *or* the DBO contractor shall verify claims by providing either:

- an independent third party certification of the traceability and mass balance for the product and/or recyclate;
- *or* equivalent documentation provided by producer(s).

C4. Monitoring of the low temperature asphalt

(Same requirements for Core and Comprehensive criteria)

The laying temperature of the low temperature asphalt shall be verified for each batch[13] of product at the worksite.

The main construction contractor *or* the DB contractor *or* the DBO contractor shall provide either:

- an independent laboratory certification of the maximum laying temperature of the asphalt;
- *or* equivalent documentation provided by asphalt producer(s).

C5. Commissioning of the Excavated Materials and Soil Management Plan

(Same requirements for Core and Comprehensive criteria)

The main construction contractor *or* DB contractor *or* DBO contractor shall implement a system to monitor and report on actions involving excavated materials and soil during the progress of construction work on-site. This system shall include data accounting for the weights generated (topsoil and excavated materials), the percentages re-used/recycled on site and percentages re-used and/or recycled off site.

It shall also track and verify the destination of consignments of excavated materials. The monitoring and tracking data shall be provided to the contracting authority on an agreed periodic basis.

The main construction contractor *or the* DB contractor *or* the DBO contractor shall, in cases where a significant deviation from the excavated materials and soil management plan proposed in the design phase is considered necessary, inform the contracting authority and agree, if justified, upon any deviation.

C6. Inspection of water pollution control components in drainage systems

(Same requirements for Core and Comprehensive criteria)

The contractor shall perform site inspection to establish the drainage system dimensions, pathways and connections between drainage components and that these are in accordance with the design plans. Information shall be sent to the contracting authority based upon an agreed timetable.

In case of unsatisfactory or non-compliant results, refer to general contract performance clause text in C1.

12 "Batch" means a quantity of uniformly labelled product manufactured by the same mixing plant, under the same conditions according to a set mix design with the same input materials.

13 "Batch" means a quantity of uniformly labelled product manufactured by the same mixing plant, under the same conditions according to a set mix design with the same input materials.

C7. Construction of water pollution control "soft engineered" components in drainage systems

(Same requirements for Core and Comprehensive criteria)

The contractor shall perform site inspections both during and after the installation of the vegetated drainage components and ensure that appropriate measures are taken in accordance with best practice guidelines for the establishment of vegetated covers in SUDS drainage components. Information shall be sent to the contracting authority based upon an agreed timetable.

In case of unsatisfactory or non-compliant results, refer to general contract performance clause text in C1.

C8. Inspection of stormwater retention capacity in drainage systems

(Same requirements for Core and Comprehensive criteria)

The main construction contractor *or* the DB contractor *or* the DBO contractor shall inspect the drainage system during the construction stage to ensure that it follows the agreed design and ensure that it meets the dimensions, slopes and other technical details specified in the design.

In case of unsatisfactory or non-compliant results, refer to general contract performance clause text in C1.

C9. Inspection of stormwater retention capacity in drainage systems that incorporate "soft engineered" components

(Same requirements for Core and Comprehensive criteria)

The main construction contractor *or the* DB contractor *or* the DBO contractor shall carry out site inspections both during and after the installation of the vegetated drainage components and ensure that appropriate measures are taken in accordance with best practice guidelines for the establishment of vegetated covers in SuDS drainage components.

In case of unsatisfactory or non-compliant results, refer to general contract performance clause text in C1.

C10. Commissioning of the Environmental Integration and Restoration Plan

(Same requirements for Core and Comprehensive criteria)

During the works, the main construction contractor *or* the DB contractor *or* the DBO contractor shall submit to site inspection of the works site to ensure that the plan has been implemented.

Upon completion of the works the main construction contractor *or* the DB contractor *or* the DBO contractor shall submit to a final site inspection of the works site to ensure that the plan, and any agreed deviations from the plan, has been implemented.

In case of unsatisfactory or non-compliant results, refer to the general contract performance clause text in C1.

C11. Inspection of wildlife passages across the road and other measures

(Same requirements for Core and Comprehensive criteria)

The main construction contractor *or* the DB contractor *or* the DBO contractor shall undertake inspection of any filter trenches or culverts included in his offer both during and immediately after construction and ensure that they meet the minimum requirements of the technical details specified in the design and that they meet the conditions required for the award of points.

In case of unsatisfactory or non-compliant results, refer to general contract performance clause text in C1.

C12. Monitoring noise emission during construction

(Same requirements for Core and Comprehensive criteria)

During construction/maintenance works, the main construction contractor *or* the DB contractor *or* the DBO contractor shall ensure that:

- an appropriate noise barrier is in place in accordance with or exceeding the design;
- noise levels in the receptor area shall be monitored during the timetable agreed with the contracting authority;
- noise data is processed to produce singular L_{den} and L_{night} values for each day during the works timetable that can be compared to the limits agreed upon with the contracting authority.

If the L_{den} and or L_{night} values during the agreed monitoring period are found to exceed the limits defined in the accepted tender, the contracting authority can stop the works or introduce penalties as defined in the ITT. Any penalties shall increase in proportion to the product of the number of dB(A) by which the limits were exceeded and the time during which non-compliance occurred.

C13. Conformity of production testing of low-noise pavements

(Same requirements for Core and Comprehensive criteria)

Upon completion of the works, and 4-12 weeks after opening of the road, the main construction contractor, DB contactor or the DBO contractor shall submit to CPX testing for Conformity of Production with the design claims for noise emissions from the road surface by independent and competent third parties.

Testing shall be conducted using a customised vehicle and in accordance with ISO/DIS 11819-2. The reference tyres to be used during these tests shall be the P225/60R16 Radial Standard Reference Test Tyre as defined in ASTM F2493-14 and this should be clearly communicated in the ITT.

Tests should be carried out under dry conditions and for porous road surfaces, only after at least 2 days since the last rainfall.

If the CPX data does not meet the design claims then the DB contractor *or* DBO contractor shall be subject to financial penalties and/or the obligation to carry out remedial works at no additional cost to the contracting authority.

If spatial analysis reveals that only one small part of the road section fails to meet the noise limits, any remedial action should apply only to that area.

The framework for any applicable penalties or remedial action shall be clearly stated in the ITT.

C14. Commissioning of the Traffic Congestion Mitigation Plan

(Same requirements for Core and Comprehensive criteria)

The main construction contractor *or* the DB contractor *or* the DBO contractor shall provide documentary evidence of the correct implementation of the Traffic Congestion Mitigation Plan.

The contracting authority will verify the specific requirements for congestion (ITS devices, tidal flow lanes and hard shoulder) after the construction before the road opening and 6 months after the opening (in-service road).

The main construction contractor *or* the DB contractor *or* the DBO contractor shall, in case of a significant deviation from the Traffic Congestion Mitigation Plan proposed in the design phase is considered necessary, inform the contracting authority and agree, if justified, upon any deviation.

In case of unsatisfactory or non-compliant results, refer to general contract performance clause text in C1.

D. Use of the road

Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
D1. Durability of performance of low-noise pavements *When local or national legislation requires, or when low-noise levels from this road are considered a priority* Noise emissions from a low-noise road surface, as measured by the Close Proximity (CPX) method defined in ISO/DIS 11819-2, shall not exceed the following limits, as a function of the maximum speed limit of the road, during the 5 year period after conformity of production testing. - 93 dB(A) at 50 kph, and/or - 98 dB(A) at 70 kph, and/or - 101 dB(A) at 90 kph. Testing shall be carried out at least once during each 30 month period after opening of the road. CPX test vehicles and/or trailers shall use the steel-belted radial tyre with dimensional code P225/60 R16 as defined in ASTM F2493-14, with a minimum of 5 mm tread. Test data shall be corrected for a 20°C air temperature. Uncertainty analysis of test data shall be evaluated according to the Guide to the expression of uncertainty in measurement (ISO/IEC Guide 98-3:2008), and the tests shall show that the results, including their uncertainty, are not exceeding by more than 1 dB(A) the values stated above or more ambitious values claimed with the design. Spatial variance of the tested road section shall show that no individual parts of the test section exceed these overall limits by more than 2 dB(A). **Verification:** Test reports of CPX tests carried out by independent and competent authorities and in accordance with ISO/DIS 11819-2 shall be submitted to the contracting authority and shall comply with the above limits, as appropriate.	**D1. Durability of performance of low-noise pavements** *When local or national legislation requires, or when low-noise levels from this road are considered a priority* Noise emissions from a low-noise road surface, as measured by the Close Proximity (CPX) method defined in ISO/DIS 11819-2, shall not exceed the following limits, as a function of the maximum speed limit of the road, during the 5 year period after conformity of production testing. - 90 dB(A) at 50 kph, and/or - 95 dB(A) at 70 kph, and/or - 98 dB(A) at 90 kph. Testing shall be carried out at least once during each 30 month period after opening of the road. CPX test vehicles and/or trailers shall use the steel-belted radial tyre with dimensional code P225/60 R16 as defined in ASTM F2493-14, with a minimum of 5 mm tread. Test data shall be corrected for a 20°C air temperature. Uncertainty analysis of test data shall be evaluated according to the Guide to the expression of uncertainty in measurement (ISO/IEC Guide 98-3:2008), and the tests shall show that the results, including their uncertainty, are not exceeding by more than 1 dB(A) the values stated above or more ambitious values claimed with the design. Spatial variance of the tested road section shall show that no individual parts of the test section exceed these overall limits by more than 2 dB(A). **Verification:** Test reports of CPX tests carried out by independent and competent authorities and in accordance with ISO/DIS 11819-2 shall be submitted to the contracting authority and shall comply with the above limits, as appropriate.

CONTRACT PERFORMANCE CLAUSE
D2. Durability of performance of low-noise pavements *(Same requirements for Core and Comprehensive criteria)* During the 5 year period after conformity of production testing, the main construction contractor *or* the DB contactor *or* the DBO contractor shall submit to CPX testing of noise emissions from the road surface, according to the method defined in the Technical Specification D1, by independent and competent third parties. Tests should be carried out under dry conditions and for porous road surfaces, only after at least 2 days since the last rainfall. If the CPX data does not meet the appropriate limits for the durability of performance criterion, then the DB contractor *or* DBO contractor shall be subject to financial penalties and/or the obligation to carry out remedial works at no additional cost to the contracting authority. The framework for any applicable penalties or remedial action shall be clearly stated in the ITT.
D3. Commissioning of the Maintenance and Rehabilitation (M&R) Plan *(Same requirements for Core and Comprehensive criteria)* *This option applies in case of DBO contracts, where monitoring is carried out by the DBO contractor* The DBO contractor shall, case a significant deviation from the M&R Plan proposed in the design phase is considered necessary, inform the contracting and agree, if justified, upon any deviation.

E. Maintenance and operation

Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
E1. Tar-containing asphalt *(Same requirements for Core and Comprehensive criteria)* *The contracting authority may apply this criterion if tar content of surface layers (surface + binder courses) and base course layer(s) exceeds the limit set by the national legislation* If the tar content of the to-be-reclaimed asphalt exceeds the limit set by the national legislation, best available techniques (*according to what is considered as best available techniques in each MS with reference to the local situation)* to treat the reclaimed asphalt containing tar shall be applied and their application shall be described in a technical report. **Verification:** The main construction contractor *or* the DB contractor *or* the DBO contractor shall submit a technical report consisting of best available techniques to treat the reclaimed asphalt containing tar through cold mixing on site and/or off-site options. A system shall be used to monitor and account for tar-containing reclaimed asphalt and to track off site destination and on site re-use, specifying amount of materials and identifying the location (maps, GIS). Monitoring data shall be provided to the contracting authority.	
E2. Demolition Waste Audit and Management Plan A minimum of 70% by weight of the non-hazardous waste generated during demolition, including backfilling, shall be prepared for re-use, recycling and other forms of material recovery. This shall include: (i) Concrete, RAP, aggregates recovered from the main road elements; (ii) Materials recovered from ancillary elements. Backfilling shall not be allowed in greenfield sites outside the roadway. Backfilling in permeable areas of the roadway shall be realised only with excavated materials and soils. Re-used, recycled and recovered materials shall only be used for backfilling in impermeable areas of the roadway. The main construction contractor *or* the DB contractor *or* the DBO contractor shall carry out a pre-demolition audit in order to determine what can be re-used, recycled or recovered. This shall comprise: (i) Identification and risk assessment of hazardous waste; (ii) A bill of quantities with a breakdown of different road materials; (iii) An estimate of the % re-use and recycling potential based on proposals for systems of separate collection during the demolition process. The materials, products and elements identified shall be itemised in a Demolition Bill of	**E2. Demolition Waste Audit and Management Plan** A minimum of 90% by weight of the non-hazardous waste generated during demolition, including backfilling, shall be prepared for re-use, recycling and other forms of material recovery. This shall include: (i) Concrete, RAP, aggregates recovered from the main road elements; (ii) Materials recovered from ancillary elements. Backfilling shall not be allowed in greenfield sites outside the roadway. Backfilling in permeable areas of the roadway shall be realised only with excavated materials and soils. Re-used, recycled and recovered materials shall only be used for backfilling in impermeable areas of the roadway. The main construction contractor *or* the DB contractor *or* the DBO contractor shall carry out a pre-demolition audit in order to determine what can be re-used, recycled or recovered. This shall comprise: (i) Identification and risk assessment of hazardous waste; (ii) A bill of quantities with a breakdown of different road materials; (iii) An estimate of the % re-use and recycling potential based on proposals for systems of separate collection during the demolition process. The materials, products and elements identified shall be itemised in a Demolition Bill of

Quantities. **Verification:** The main construction contractor *or* the DB contractor *or* the DBO contractor shall submit a pre-demolition audit that contains the specified information. A system shall be implemented to monitor and account for waste production. The destination of consignments of waste and end-of-waste materials shall be tracked using consignment notes and invoices. Monitoring data shall be provided to the contracting authority.	Quantities. **Verification:** The main construction contractor *or* the DB contractor *or* the DBO contractor shall submit a pre-demolition audit that contains the specified information. A system shall be implemented to monitor and account for waste production. The destination of consignments of waste and end-of-waste materials shall be tracked using consignment notes and invoices. Monitoring data shall be provided to the contracting authority.
CONTRACT PERFORMANCE CLAUSES	
E3. Commissioning of the Maintenance and Rehabilitation (M&R) Plan *(Same requirements for Core and Comprehensive criteria)* The main construction contractor *or* the DB contractor *or* the DBO contractor shall commit to maintain the road according to the M&R Plan (see criterion B12).	
E4. Commissioning of the road maintenance The main maintenance contractor *or* the DB constructor *or* the DBO contractor has to ensure that the commissioning of the road maintenance conforms to the agreed designs and specifications. Particular attention should be paid to the following aspects: - CF/LCA performance of the main road elements (criterion B14) *or* the CO_2 emissions per tonne of transported materials (criterion B16); - Water pollution control components, stormwater retention capacity and Environmental Integration and Restoration Plan and wildlife passage design in the drainage system (criteria B3, B4, B5, B17, B18, B19); - Pavement durability (criterion B11); - Traffic Congestion Mitigation Plan implementation (criterion B10). The main construction contractor *or* the DB constructor *or* the DBO contractor shall, in case of a significant deviation from the design requirements during the construction phase is considered necessary, inform the contracting authority and agree, if justified, upon any deviation. In cases where no agreement is reached, the contracting authority should have in place a decision tree for deciding upon appropriate and proportional penalties for non-compliance and/or remedial or mitigation actions.	**E4. Commissioning of the road maintenance** The main maintenance contractor *or* the DB constructor *or* the DBO contractor has to ensure that the commissioning of the road maintenance conforms to the agreed designs and specifications. Particular attention should be paid to the following aspects: - pavement macrotexture (MPD) (see criterion B13); - CF/LCA performance of the main road elements (criterion B14) *or* the CO_2 emissions per tonne of transported materials (criterion B16); - Water pollution control components, stormwater retention capacity and Environmental Integration and Restoration Plan and wildlife passage design in the drainage system (criteria B3, B4, B5, B17, B18, B19); - Pavement durability (criterion B11); - Traffic Congestion Mitigation Plan implementation (criterion B10). The main construction contractor *or* the DB constructor *or* the DBO contractor shall, in case of a significant deviation from the design requirements during the construction phase is considered necessary, inform the contracting authority and agree, if justified, upon any deviation. In cases where no agreement is reached, the contracting authority should have in place a decision tree for deciding upon appropriate and proportional penalties for non-compliance and/or remedial or mitigation actions.

E5. Incorporation of recycled content

(Same requirements for Core and Comprehensive criteria)

The same as C3.

E6. Monitoring of the low temperature asphalt

(Same requirements for Core and Comprehensive criteria)

The same as C4.

E7. Commissioning of the Environmental Integration and Restoration Plan

(Same requirements for Core and Comprehensive criteria)

During the works, the main construction contractor or the DB contractor or the DBO contractor shall ensure that any appropriate actions are carried out so that the established vegetation cover and habitat quality can be maintained. Such may include but are not limited to: the application of mulch/compost, pruning, replacement of dead plants *etc*…

In case of unsatisfactory or non-compliant results, refer to the general contract performance clause text in E4.

E8. Monitoring noise emission during maintenance

(Same requirements for Core and Comprehensive criteria)

The same as C12.

E9. Commissioning of the Traffic Congestion Mitigation Plan

(Same requirements for Core and Comprehensive criteria)

The same as C14.

F. End of life	
Core criteria	**Comprehensive criteria**
TECHNICAL SPECIFICATIONS	
F1. Demolition waste audit and management plan *(Same requirements for Core and Comprehensive criteria)* *The same as E2.*	

3 LIFE CYCLE COSTING

Life Cycle Costing (LCC) considerations have informed the development of the EU GPP criteria for Road Design, Construction and Maintenance. LCC can be used to assess the total cost of ownership of a road over its design or service life. In particular it enables *'comparative cost assessments to be made over a specified period of time, taking into account all relevant economic factors both in terms of initial capital costs and future operational and asset replacement cost'.*

3.1 The rationale and scope for considering life cycle costs

LCC is particularly relevant to achieving an improved environmental performance because higher initial capital costs may be required to achieve lower life-cycle running costs. It therefore represents a method for making effective, long-term investment decisions.

For road infrastructures, asset management provides a systematic process for maintaining, upgrading, and operating physical assets in a cost-effective manner using a series of road management procedures and tools for both short- and long-term planning.

LCC is often the first step towards creating a comprehensive asset management approach. An LCC can be used as a tool during the project definition, concept design and detailed design stages, where it can be used to select and value engineer the design that will provide the lowest overall cost (and highest residual value) along the life cycle of the asset. A full LCC exercise may be carried out with reference to the ISO standard 15685-5 or equivalent.

3.2 How the GPP criteria can reduce life cycle costs

The EU GPP criteria for Road Design, Construction and Maintenance will have a positive influence on some of the key factors influencing the overall life cycle costs of a road. These are briefly highlighted below, with reference to the main LCC cost variables, noting that the potential benefits will always depend on the specific characteristics of each project (e.g. location, climatic conditions, local availability, construction practices):

- *Acquisition costs*:
  - The Selection Criteria can be used to procure skilled project managers, design teams, cost consultants and contractors, which will tend to reduce the risk of cost overruns on innovative projects.
  - The accompanying GPP guidance highlights how cost savings can be identified through early options appraisal, for example through evaluating different road alignments.
  - The criteria on resource efficient construction encourage a reduction in transport costs for major construction materials (e.g. asphalt, concrete, aggregates) and encourage the use of low temperature asphalt, which is less energy demanding during the production phase. All of these may contribute to reduced build costs. Furthermore, earthworks and ground works can account for up to 30% of the project costs in complex orography condition and the criteria on excavated materials management optimization is aimed at these costs reduction.
- *Operation, maintenance and rehabilitation costs:*
  - Maintenance and rehabilitation strategies seek to guarantee pavements' best performances and cost-optimal solutions from the preservation, improvement, and operation of the infrastructure assets. In addition, if maintenance activities are scheduled on time, congestion costs can be minimized.

- The quality of construction of low rolling resistance pavement surfaces, drainage systems and low noise pavements is also addressed, to ensure that design performance is achieved, as well as the correct commissioning to ensure these parameters perform to design specifications.
- The criteria include the option to carry out a Carbon Footprint or a Life Cycle Assessment of a road, which allows for the modelling and optimization of the lifespan of the road as a whole and for individual road elements based on estimates of maintenance and rehabilitation costs and expected useful lifespans.
- A minimum nominal service life of road pavements (excluding the surface layer) has also been considered taking into account that most durable materials might entail higher construction costs, but those expenses could be offset by means of less maintenance demand.
- Including specific requirements for Design, Build and Operate projects can be used to incentivise contractors to minimise long-term operating costs, including routine maintenance, preventive maintenance and rehabilitation costs, to the benefit of both parties.

- *Residual Value:*
  - Implementation of the GPP criteria set will demonstrate that the road has an improved environmental performance, which, because it reduces running costs and demonstrates responsible investment, may in turn contribute to sustaining or improving its future asset value.

Furthermore, the criteria take into account intangible benefits, such as amenity, user comfort and satisfaction. For example, the mitigation of traffic congestion can contribute to the users (drivers) comfort and reduce lost vehicle hours.

Finally, a reduction in the costs to society of specific environmental impacts (environmental externalities) may also be obtained by applying the criteria, e.g.:

- Criteria on rolling resistance associated to the pavement structure and roughness are directly related to the vehicle fuel consumption during the use phase (a 10% reduction in rolling resistance can lead to 1-2 % reduction in fuel consumption) and therefore in GHG emissions. This also results in economic benefits for the road users (drivers).
- Criteria on congestion aim at reducing the extra fuel consumption and air emissions related to congestion that can be a substantial component of the road life cycle costs, particularly for motorways and highways;
- Criteria on environmental noise pollution affect both human health and wider economic factors such as property value. External costs of noise emissions from passenger vehicles on roads have been estimated to be on average €2/ 1000pkm (passenger kilometres) and from freight vehicles to be €2.5/ 1000 ton.km – adding up to an estimated total of around €20 billion in 2008 across the EU-28.
- Criteria on drainage systems ("hard or soft engineering") can help reducing the risk of flooding. Currently, flood damages in the EU are estimated to amount to €5.3-6.4 billion per year, adversely affecting the lives of 200,000 people each year. A recent study of the Commission's Joint Research Centre predicts that the annual cost of these damages could increase 7-8 fold by 2050, reaching €40 billion and adversely affecting 500,000 people each year.

Technical annexes

Annex A

Supporting guidance for criterion* B14 *(core criterion): Option 1 – Carbon footprint (CF)

The award criterion B14 (core criterion) states that Carbon Footprint (CF) could be used by bidders in order to demonstrate how they have reduced the environmental impact of a road construction. This brief guidance note describes:

- When this criteria can be used;
- The rules required to ensure that bids are comparable; and
- The technical support required for bid selection.

All use of CF shall be carried out with reference to ISO 14067 or equivalent.

1.1 When can CF option 1 be used?

The use of criteria B14 is only recommended where a comparison can be made of improvement options against a reference road design and/or between different road designs. It is therefore relevant to the following procurement scenarios:

- Where the client already has a reference road design and bill of quantities that has been appraised in order to provide a guide price for comparison with bids;
- Where a design competition is to be used to encourage proposals of innovative road designs by design teams and/or contractors.

In these scenarios a CF analysis can be made an award requirement.

1.2 Will additional expertise be required to evaluate bids?

In any tender process for road construction and maintenance the procurer is likely to require supporting design and technical expertise in order to set requirements and evaluate designs. The procurer may therefore wish to call upon this expertise at two stages in the procurement process:

1. When putting together the design brief and performance requirements: Bidders shall be instructed on what technical requirements they should follow in order to ensure that the designs submitted are comparable.
2. When evaluating designs and improvement options: A technical evaluation of tenderers' responses to this criterion should be carried out in order to support the procurer.

A technical evaluator shall be required to carry out a critical review of each tenderer's CF analysis according to the guidance in Annex C.

1.3 What instructions should be given to bidders?

The following technical instructions should be incorporated into the ITT in order to ensure that bids are comparable. Where designs are to be evaluated against a reference road, this shall be clearly stated and the bill of materials provided.

Technical instructions for bidders using CF for road evaluations

Technical point to address	**What this means in practice**
a. Method and inventory data	The impact assessment method and life cycle inventory (LCI) data to be used by each design team shall, as far as possible, be specified to ensure comparability. Verified primary data may be used to supplement gaps following the guidance in ISO 14067 or equivalent, and for data from EPDs, ISO 14025 and EN 15804. ISO 21930 could also be used as underlying standards, if relevant. The level of uncertainty shall be addressed by including: 1. a qualitative assessment of the uncertainties based on the sources of background data, how it was obtained or compiled and what kind of process and technology it represents; as well as 2. a quantitative assessment for the two most significant road elements identified from the analysis (see point d. and Tables a and b in criterion B14).
b. Comparison on the basis of functional equivalence	The following characteristics of the road shall be specified as a reference point for each design (see ISO 14067 or equivalent): - Relevant technical and function requirements, as described in the performance requirements; - The requested service life.

	A common functional unit shall be used to present the results (see ISO 14067 or equivalent).
c. Definition of the road life cycle and boundaries	The boundary for the analysis shall be cradle-to-grave including construction (including materials production and transportation) maintenance and operation and EoL. Allocation for recycled or re-used materials shall be made according to the following rules: – Input (product stage): according to the rules in ISO 14067 or equivalent; – Output (end of life or maintenance stages): according to the rules in EN 15804 section 6.4.3.
d. Road elements within the scope of the criteria	The scope of the criteria shall, as a minimum, comprise the following road elements: - Sub-grade, including earthworks and ground works; - Sub-base; - Base, binder and surface or concrete slabs; - Additional ancillary road elements (optional)
e. Lifecycle category indicator to be used for evaluation purposes	Global warming potential (GWP)

Annex B

Supporting guidance for criterion* B14 *(comprehensive criterion): Option 2 - LCA analysis

The award criterion B14 states how Life Cycle Assessment (LCA) could be used by bidders in order to demonstrate how they have reduced the environmental impact of the construction of a road. This brief guidance note describes:

- When this criterion can be used;
- The rules required to ensure that bids are comparable; and
- The technical support required for bid selection.

All use of LCA shall be carried out with reference to ISO 14040/14044.

2.1 When can LCA option 2 be used?

The use of criteria B14 is only recommended where a comparison can be made of improvement options against a reference road design and/or between different road designs. It is therefore relevant to the following procurement scenarios:

- Where the client already has a reference road design and bill of quantities that has been appraised in order to provide a guide price for comparison with bids;
- Where a design competition is to be used to encourage innovative road designs to be brought forward by design teams and/or contractors.

In these scenarios an LCA analysis can be used as an award criterion.

2.2 Will additional expertise be required to evaluate bids?

In any tender process for road construction and maintenance the procurer is likely to require supporting design and technical expertise in order to set requirements and evaluate designs. The procurer may therefore wish to call upon this expertise at two stages in the procurement process:

1. When putting together the design brief and performance requirements: Bidders shall be instructed on what technical requirements they should follow in order to ensure that the designs submitted are comparable.
2. When evaluating designs and improvement options: A technical evaluation of tenderers' responses to this criterion should be carried out in order to support the procurer.

A technical evaluator shall be required to carry out a critical review of each tenderers LCA analysis according to the guidance in Annex C.

2.3 What instructions should be given to bidders?

The following technical instructions should be incorporated into the ITT in order to ensure that bids are comparable. Where designs are to be evaluated against a reference road, this shall be clearly stated and the bill of materials provided.

Technical instructions for bidders using LCA for road evaluations

Technical point to address	What this means in practice
a. Method and inventory data	The impact assessment method and life cycle inventory (LCI) data to be used by each design team shall, as far as possible, be specified to ensure comparability. Verified primary data may be used to supplement gaps following the guidance in ISO 14040/14044, and for data from EPDs, ISO 14025 and EN 15804. ISO 21930 could also be used as underlying standards, if relevant. The level of uncertainty shall be addressed by including: 1. a qualitative assessment of the uncertainties based on the sources of background data, how it was obtained or compiled and what kind of process and technology it represents; as well as 2. a quantitative assessment for the two most significant road elements identified from the analysis (see point d. and Tables a and b in criterion B14).
b. Comparison on the basis of functional equivalence	The following characteristics of the road shall be specified as a reference point for each design (see ISO 14040/14044): – Relevant technical and function requirements, as described in the performance requirements; – The requested service life. A common functional unit or reference unit shall be used to present the results (see ISO 14040). Service lifetime shall be considered in the definition of the functional unit.
c. Definition of the road life cycle and boundaries	The boundary for the analysis shall be cradle-to-grave including construction (including materials production and transportation) maintenance and operation and EoL (see ISO 14040). Allocation for recycled or re-used materials shall be made according to the following rules: – Inputs (product stage): according to the rules in ISO 14044, Section 4.3.4.3; – Outputs (end of life or maintenance stages): according to the rules in EN 15804 section 6.4.3.
d. Road elements within the scope of the criteria	The scope of the criteria shall, as a minimum, comprise the following road elements: – Sub-grade, including earthworks and ground works; – Sub-base; – Base, binder and surface or concrete slabs; – Additional ancillary road elements (optional). When applied, energy harvesting technologies shall be included in the LCA as ancillary road elements and electricity generated during the operation phase shall be discounted from the energy consumed during this phase.
e. Lifecycle category indicators to be used for evaluation purposes	As a minimum the following impact category indicators, identified in EN 15804, shall be used: – Global Warming Potential (GWP); – Formation potential of tropospheric ozone photochemical oxidants (POCP); – Depletion potential of the stratospheric ozone layer (ODP); – Acidification potential of soil and water (AP); – Eutrophication potential (EP); – Abiotic Resource Depletion Potential for elements (ADP_elements); – Abiotic Resource Depletion Potential of fossil fuels (ADP_fossil fuels). Other indicators describing resource use, waste and output flows identified by EN 15804 can also be, partially or fully, included if they are not already covered by other GPP criteria, *e.g.*, a recycled content. A weighting system for the selected impact category indicators shall be applied in order to evaluate the overall score. This system shall be selected by the contracting authority on the basis of: – a suitable existing weighting system, such as the weighting systems adopted in some national LCA schemes; *or* – a weighting system proposed by the LCA technical evaluator (see Annex C). Where an LCA tool generates an aggregated scoring for the road, only the result for the impact categories identified in EN 15804 shall be taken into account.

Annex C

Brief for LCA technical evaluator

The role of the technical evaluator will be to assist the procurer in setting the ground rules for the tenderers, with reference to either Annex A or B, depending on the option chosen.

The technical evaluator shall propose and agree with the contracting authority the weighting of the LCIA indicator results, which shall be indicated in the ITT.

Once tenders have been opened, the technical evaluator will either:

(i) Carry out a critical review of the CFs for methodological choices, data quality and comparability; or

(ii) Carry out a critical review of the LCAs for methodological choices, data quality and comparability.

The critical review will be carried out with reference to ISO 14044, section 6, ISO 14065 in case of carbon footprint, and the following sections of the European Commission's Product Environmental Footprint (PEF) Recommendation (2013/179/EU):

- Critical review (section 9, p-68);
- Data collection checklist (Annex III);
- Data quality requirements (section 5.6, p-36);
- Interpretation of results (section 7, p-61).