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Joint Research Centre

Institute for Prospective Technological Studies

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2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

GPP criteria process description

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•**IE – Petten, The Netherlands**

• ***Institute for Energy***

•**IRMM – Geel, Belgium**

• ***Institute for Reference Materials and Measurements***

•**ITU – Karlsruhe, Germany**

Institute for Transuranium Elements

IES/ IHCP/ IPSC – Ispra, Italy

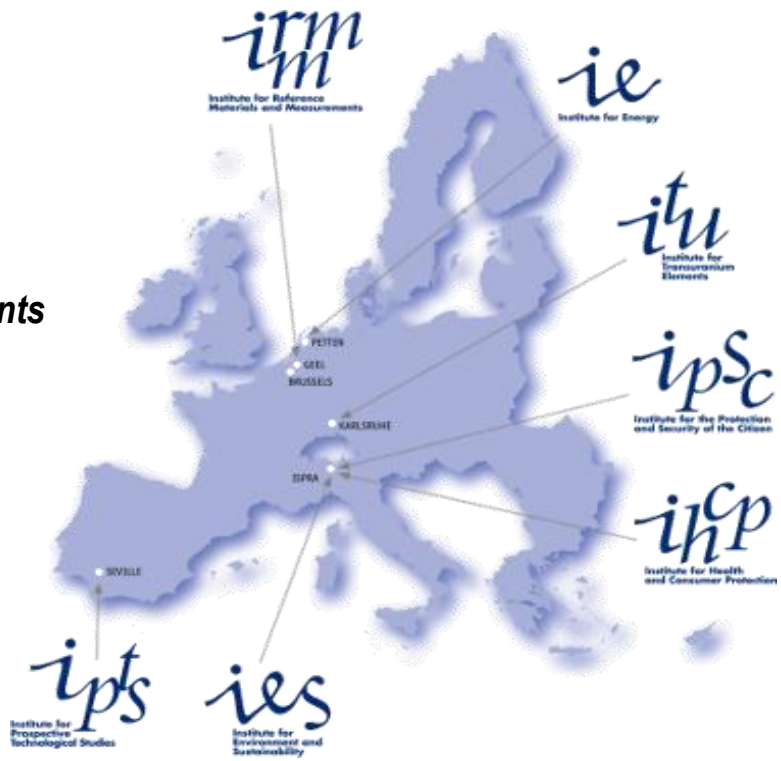
Institute for Environment and Sustainability

· ***Institute for Health and Consumer Protection***

Institute for the Protection and Security of the Citizen

•**IPTS – Sevilla, Spain**

• ***Institute for Prospective Technological Studies***



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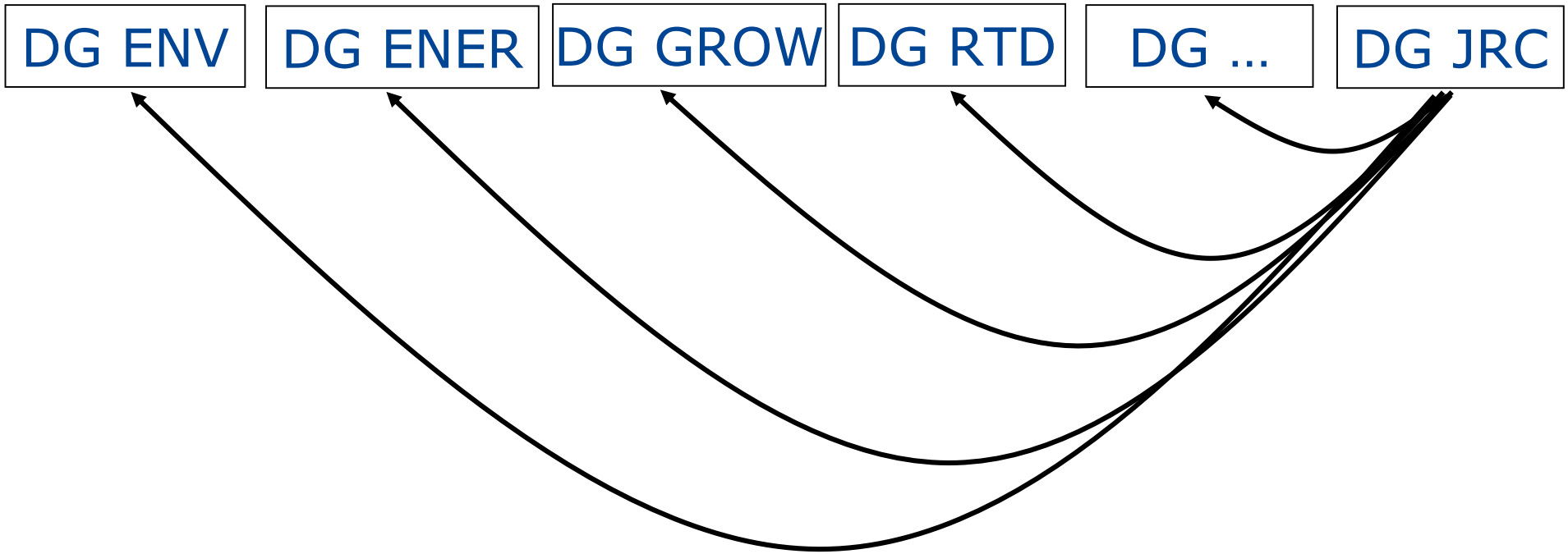
Joint Research Centre in the context of the European Commission:



Provide support to EU policy making process by developing **science based responses to policy challenges** that have both a socio-economic and a technological dimension.

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Activities in support of Product Policy

IPTS supports the development and implementation of environmental product policies, amongst them the EU Ecolabel Regulation, the **Green Public Procurement** Communication, the Energy Related Products Directive and the Energy Labelling Directive.

This includes the techno-economic research as well as the operational management particularly of the stakeholder consultation.

GPP criteria process development

Product Group Identification (GPP AG)

Preparatory work

Preliminary Report

Technical report (draft criteria areas and guidance on procurement) 1

1st AHWG 12.03.2014

Translate criteria areas into criteria

Technical report (draft criteria and guidance on procurement) 2

2nd AHWG Today 28.01.2015

Final Draft Criteria

Final Draft GPP Criteria

Written Consultation (optional)

GPP Advisory Group

Inter-service consultation

Final GPP Criteria

EC website – ENV GPP
http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Today's 2nd AHWG

Agenda

1.	**Opening and welcome. GPP criteria process description**	**09:30-09:45**
2.	**Project overview and scope proposal**	**09:45-10:00**
3.	**Criteria proposal on pavement-vehicle interaction**	**10:00-10:45**
4.	**Criteria proposal on resource efficient construction.** LCA performance requirements	**10:45-11:30**
	Coffee break	***11.30-11:45***
5.	**Criteria proposal on resource efficient construction.** Recycled content, materials transportation, asphalt	**11:45-13:00**
	Lunch	***13:00-14:00***
6.	**Criteria proposal on resource efficient construction.** Excavated materials and soil management, waste management	**14:00-14:30**
7.	**Criteria proposal on noise emissions**	**14:30-15:30**
8.	**Criteria proposal on water and habitat preservation**	**15:30-16:30**
	Coffee break	***16:30:16:45***
9.	**Criteria proposal on congestion**	**16:45-17:00**
10.	**Criteria proposal on maintenance and rehabilitation strategies**	**17:00-17:30**
11.	**Developing guidance for the procurement of road construction**	**17:30-17:45**
12.	**Conclusions, next steps and closure of the meeting**	**17:45-18:00**

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Road construction

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

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Project overview and scope proposal

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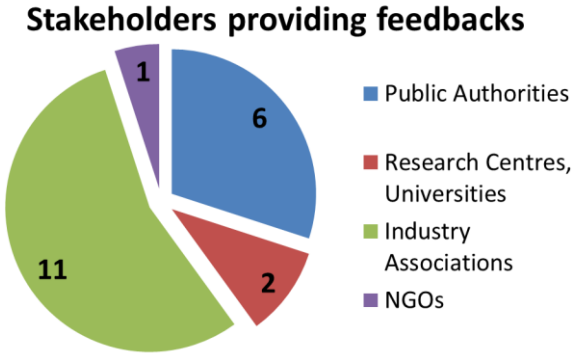
Project overview

Preliminary report, Technical report(v1): **20.02.2014**

1st AHWG: **12.03.2014**

Stakeholders consultation - first round: **20.02.2014 – 30.04.2014**



Technical report(v2), Draft GPP criteria proposal(v1): **22.12.2014**

Stakeholders consultation – second round: **23.12.2014 – 22.02.2015**

Stakeholders

EU GPP Advisory Group (MSs + five stakeholders: Industry, NGOs, local/regional government)

+

121 Registered stakeholders (Public Authorities, Research centres and universities, Industry, NGOs)

Definition

Road *"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 *"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"* (previous GPP criteria)

Classification of roads

Market analysis

Eurostat	**IRF**
Motorway / freeway	*Motorways*
Express road	*Highways, main or national roads*
Road outside a built-up area	*Secondary or regional roads*
	Other roads - Rural
Road inside a built-up area: urban road	*Other roads - Urban*

Road maintenance (Weninger-Vycudil, 2009 - ERA-NET PO3 project)

Routine maintenance: *small measures to **repair local deterioration** (cracks, potholes...) and **operational activities** (e.g. winter maintenance...). The objective of these measures is to keep the road (pavement and the other sub-assets) in a defined (**minimum**) **condition level** and to **avoid** progressive **deterioration**.....*

Periodic maintenance: *measures with a **long lasting improving effect** to the condition of the sub-asset or component... They are **planned** as soon as the condition of the **component falls below a given warning level** and they have to be conducted according to a **priority rating** (e.g. LCC-analysis) ....*

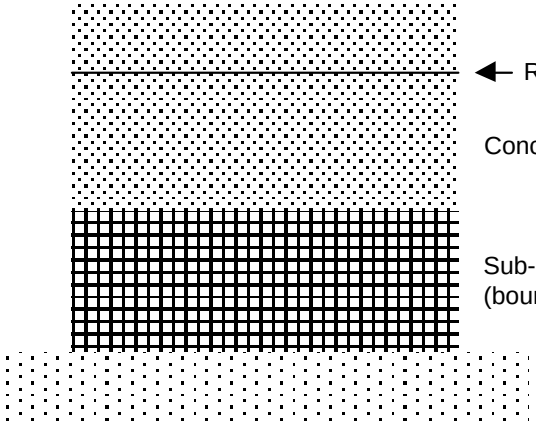
Upgrade and extension: *measures which **upgrade** the **existing sub-asset** or component or **extend the infrastructure** to a **higher level** than the original new condition.... Normally only the part of the works which is attributed to the **basic improvement** (**rehabilitation**) is paid from the maintenance budget*

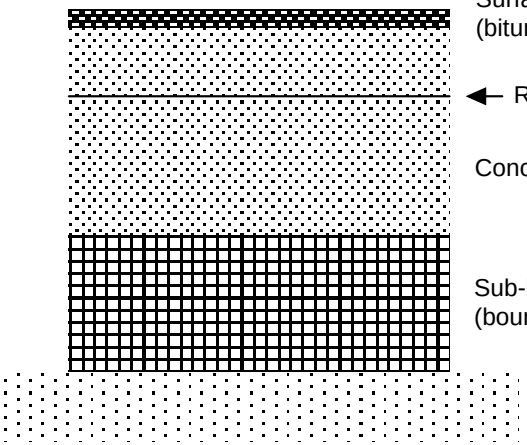
> ***Rehabilitation**: works undertaken to **extend the service life of an existing facility**. This includes **placement of an overlay** and/or other work necessary to **return an existing roadway**, including shoulders, **to a condition of structural** or **functional adequacy**, for the specified service life. This might include the **partial** or **complete removal** and **replacement** of portions of the **pavement (Caltrans, 2013)***

Categorization of roads

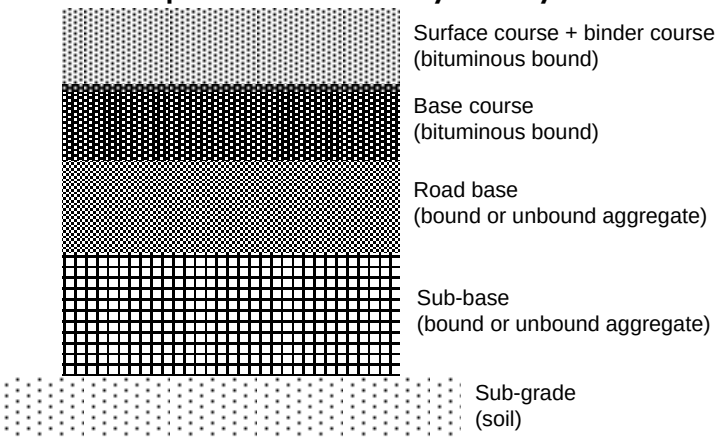
Pavement condition

Rigid pavements layer system

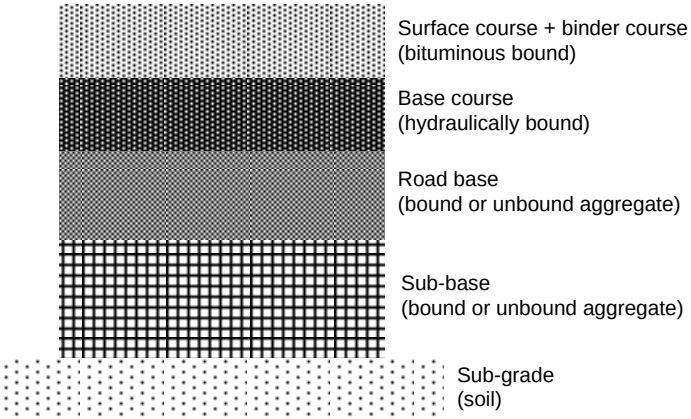




Flexible pavement layer system



Semi-rigid pavement layer system



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Scope proposal

Phases considered

- **Materials production including raw materials extraction** (including upstream supply chain, transportation, off-site equipment, use of by-products and recycled/reused/recovered materials)

- **Construction** (including clearance, earthworks, ground works & stabilisation, on-site equipment, pavement and drainage systems construction , congestion, noise)

- **Use** (including the daily traffic and thus vehicle fuel consumption during the road service life). Allocation with structural characteristics and surface texture

- **Maintenance (and operation)** (including routine and periodic maintenance and rehabilitation, lighting and road ancillary elements, congestion, noise)

- **End-of-life (EoL)** Surface courses removed during maintenance or decommissioning

Exclusion from the scope

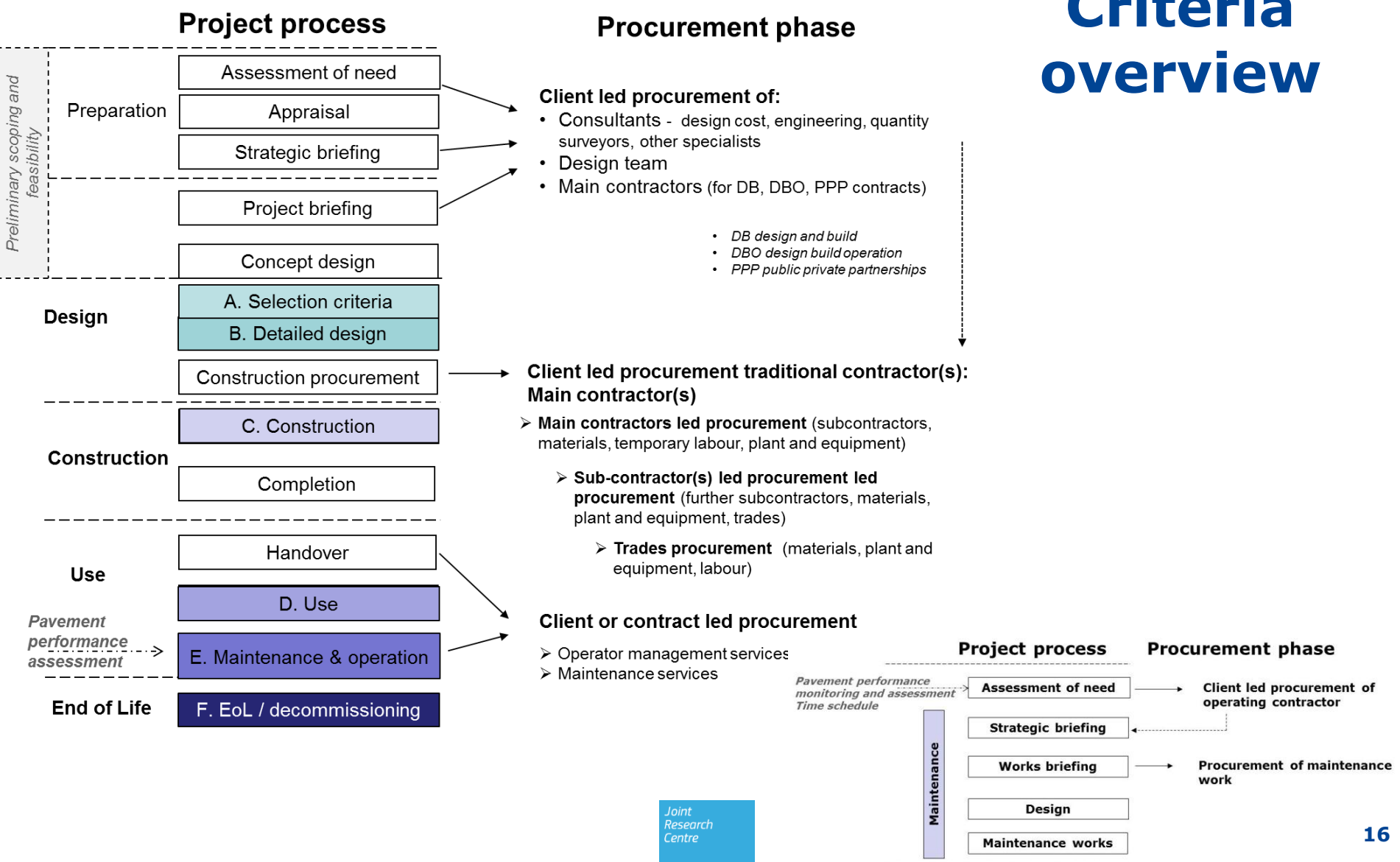
- **Traffic signs,** because of minor importance (Stripple, 2001; SUSCON, 2006; Loijos et al., 2013)

  ⇨ approximate **influence of the traffic signs below 1% of materials production, construction and maintenance**

- **Foundations** or **lighting of traffic signs:** small amounts of energy compared to the energy consumption through the full life cycle (Stripple, 2001; Mroueh et al., 2001)

  - **Road markings** (included in GPP criteria for paints and varnishes)
  - **Street lighting and traffic signals** (dedicated GPP criteria)
  - **Information systems**
  - **Other types of road furniture** (pedestrian walkways, bollards, overhead gantries and central reservations)

Criteria overview



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Criteria overview

GPP criteria grouped by criteria areas *(⇨ order in this presentation)*

Title of the criterion	Proc. phase	Criterion classif.	Criteria type
Competencies of the design team and contractors			
Competencies of the project manager and the design team	A.	Core & Compr.	Selection
Competencies of the lead construction contractor, specialist contractors and/or property developers	A.	Core & Compr.	Selection
Pavement-vehicle interaction criteria			
Rolling resistance			
Performance requirements on traffic fuel consumption due to rolling resistance	B.	Compr.	Award
Quality of the completed road - monitoring of the performance parameters	C.	Compr.	CPC
Resources efficient construction			
Life cycle performance			
LCA performance of the main road elements	B.	Core & Compr.	Award
Commissioning of the road construction	C.	Core & Compr.	General CPC
Commissioning of the road maintenance	E.		
Recycled content			
Minimum recycled content	B.	Core & Compr.	TS
Incorporation of recycled content	B.	Core & Compr.	Award
Incorporation of recycled content	C. E.	Core & Compr.	CPC
Materials transportation			
Performance requirements for CO2e emission from materials transportation	B.	Core & Compr.	Award
Asphalt			
Tar-containing asphalt	E.	Core & Compr.	TS
Low temperature asphalt	B.	Core & Compr.	TS
Monitoring of the low temperature asphalt	C. E.	Core & Compr.	CPC

Depletion of resources, embodied energy

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Title of the criterion	Proc. phase	Criterion classif.	Criteria type
Excavated materials and soils management and waste management			
Excavated materials and soil management plan	B.	Core & Compr.	TS
Commissioning of the excavated materials and soil management plan	C.	Core & Compr.	CPC
Demolition waste audit and management plan	E. F	Core & Compr.	TS
Criteria on water and habitat preservation			
Water pollution control components in drainage system			
Performance requirements for water pollution control components in drainage systems	B.	Core & Compr.	TS
Inspection of water pollution control components in drainage systems	C.	Core & Compr.	CPC
Requirements for water pollution control "soft engineered" components in drainage systems	B.	Core & Compr.	Award
Construction of water pollution control "soft engineered" components in drainage systems	C.	Core & Compr.	CPC
Storm-water retention capacity			
Performance requirements for storm-water retention capacity in drainage systems	B.	Core & Compr.	TS
Requirements for storm-water retention capacity in drainage systems that incorporate "soft engineered" components	B.	Core & Compr.	Award
Inspection of storm-water retention capacity in drainage systems	C.	Core & Compr.	CPC
Inspection of storm-water retention capacity in drainage systems that incorporate "soft engineered" components	C.	Core & Compr.	CPC
Wildlife corridors across the road			
Performance requirements for wildlife corridors across the road	B.	Core & Compr.	Award
Inspection of wildlife corridors across the road and other measures	C.	Core & Compr.	CPC

Title of the criterion	Proc. phase	Criterion classif.	Criteria type
Criteria on noise			
Noise emission during construction and maintenance			
Performance of noise emission during construction and maintenance	B.	Core & Compr.	TS
Monitoring noise emission during construction	C. E.	Core & Compr.	CPC
Low noise pavements			
Minimum requirements for low noise surface pavements	B.	Core & Compr.	TS
Performance of low noise surface pavements	B.	Core & Compr.	Award
Minimum requirements for low-noise pavement	C.	Core & Compr.	Award
Noise barriers			
Noise barrier design and material properties	B.	Core & Compr.	TS
Testing of in-situ constructed noise barrier	C.	Core & Compr.	TS
In-situ performance of the noise barrier	C.	Core & Compr.	CPC
Other environmental criteria			
Lighting			
Performance requirement for lighting installations	B.	Core & Compr.	TS
Criteria on congestion			
Traffic congestion mitigation plan	B.	Core & Compr.	TS
Commissioning of the traffic congestion mitigation plan	C. E.	Core & Compr.	CPC
Maintenance and rehabilitation strategies			
Durability			
Performance requirements for durability of pavement surface and rehabilitation	B.	Core & Compr.	TS
Maintenance and rehabilitation strategy plan			
Maintenance and rehabilitation (M&R) plan	B.	Core & Compr.	TS
Commissioning of the maintenance and rehabilitation (M&R) plan	D. E.	Core & Compr.	TS
Commissioning of the road construction	C.	Core & Compr.	General CPC
Commissioning of the road maintenance	E.		

Optimisation to guarantee desirable performance for RR, durability and noise reduction

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GPP criteria grouped by procurement phases

Core criteria	Comprehensive criteria
A. Selection of the design team and contractors	
SELECTION CRITERIA	
A1. Competencies of the project manager and design team	A1. Competencies of the project manager and design team
A2. Competencies of the main construction contractor	A2. Competencies of the main construction contractor
B. Detailed design and performance requirements	
TECHNICAL SPECIFICATIONS	
B1. Minimum recycled content	B1. Minimum recycled content
B2. Low temperature asphalt	B2. Low temperature asphalt
B3. Excavated materials and soil management plan	B3. Excavated materials and soil management plan
B4. Performance requirements for water pollution control components in drainage systems	B4. Performance requirements for water pollution control components in drainage systems
B5. Performance requirements for storm-water retention capacity in drainage systems	B5. Performance requirements for storm-water retention capacity in drainage systems
B6. Performance of noise emission during construction and maintenance	B6. Performance of noise emission during construction and maintenance
B7. Minimum requirement for low-noise pavement	B7. Minimum requirement for low-noise pavement
B8. Noise barrier design and material properties	B8. Noise barrier design and material properties
B9. Performance requirement for lighting installations	B9. Performance requirement for lighting installations
B10. Traffic congestion mitigation plan	B10. Traffic congestion mitigation plan
B11. Performance requirements for durability of pavement and rehabilitation	B11. Performance requirements for durability of pavement and rehabilitation
B12. Maintenance and rehabilitation (M&R) plan	B12. Maintenance and rehabilitation (M&R) plan
AWARD CRITERIA	
N/A	B13. Performance requirements on traffic fuel consump. due to rolling resist.
B14. LCA performance of the main road elements	B14. LCA performance of the main road elements
B15. Incorporation of recycled content	B15. Incorporation of recycled content
B16. Performance requirements for CO2e emission from materials transportation	B16. Performance requirements for CO2e emission from materials transportation
B17. Requirements for water pollution control "soft engineered" components in drainage systems	B17. Requirements for water pollution control "soft engineered" components in drainage systems
B18. Requirements for storm-water retention capacity in drainage systems that incorporate "soft engineered" components	B18. Requirements for storm-water retention capacity in drainage systems that incorporate "soft engineered" components
B19. Performance requirements for wildlife corridors across the road	B19. Performance requirements for wildlife corridors across the road
B20. Performance of low noise surface pavements	B20. Performance of low noise surface pavements

C. Construction	
TECHNICAL SPECIFICATIONS	
C1. Testing of in-situ constructed noise barrier	C1. Testing of in-situ constructed noise barrier
CONTRACT PERFORMANCE CLAUSE	
C2. Commissioning of the road construction	C2. Commissioning of the road construction
N/A	C3. Quality of the completed road - monitoring of the performance parameters
C4. Incorporation of recycled content	C4. Incorporation of recycled content
C5. Monitoring of the low temperature asphalt	C5. Monitoring of the low temperature asphalt
C6. Commissioning of the excavated materials and soil management plan	C6. Commissioning of the excavated materials and soil management plan
C7. Inspection of water pollution control components in drainage systems	C7. Inspection of water pollution control components in drainage systems
C8. Construction of water pollution control "soft engineered" components in drainage systems	C8. Construction of water pollution control "soft engineered" components in drainage systems
C9. Inspection of storm-water retention capacity in drainage systems	C9. Inspection of storm-water retention capacity in drainage systems
C10. Inspection of storm-water retention capacity in drainage systems that incorporate "soft engineered" components	C10. Inspection of storm-water retention capacity in drainage systems that incorporate "soft engineered" components
C11. Inspection of wildlife corridors across the road and other measures	C11. Inspection of wildlife corridors across the road and other measures
C12. Monitoring noise emission during construction	C12. Monitoring noise emission during construction
C13. Minimum requirements for low-noise pavement	C13. Minimum requirements for low-noise pavement
C14. In-situ performance of the noise barrier	C14. In-situ performance of the noise barrier
C15. Commissioning of the traffic congestion mitigation plan	C15. Commissioning of the traffic congestion mitigation plan
D. Use	
TECHNICAL SPECIFICATIONS	
D1. Commissioning of the maintenance and rehabilitation (M&R) plan	D1. Commissioning of the maintenance and rehabilitation (M&R) plan
E. Maintenance and operation	
TECHNICAL SPECIFICATIONS	
E1. Tar-containing asphalt	E1. Tar-containing asphalt
E2. Demolition waste audit and management plan	E2. Demolition waste audit and management plan
E3. Commissioning of the maintenance and rehabilitation (M&R) plan	E3. Commissioning of the maintenance and rehabilitation (M&R) plan
CONTRACT PERFORMANCE CLAUSES	
E4. Commissioning of the road maintenance	E4. Commissioning of the road maintenance
E5. Incorporation of recycled content	E5. Incorporation of recycled content
E6. Monitoring of the low temperature asphalt	E6. Monitoring of the low temperature asphalt
E7. Monitoring noise emission during maintenance	E7. Monitoring noise emission during maintenance
E8. Commissioning of the traffic congestion mitigation plan	E8. Commissioning of the traffic congestion mitigation plan
F. End of life	
TECHNICAL SPECIFICATIONS	
F1. Demolition waste audit and management plan	F1. Demolition waste audit and management plan

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GPP draft criteria proposal on **pavement-vehicle interaction**

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Pavement-vehicle interaction

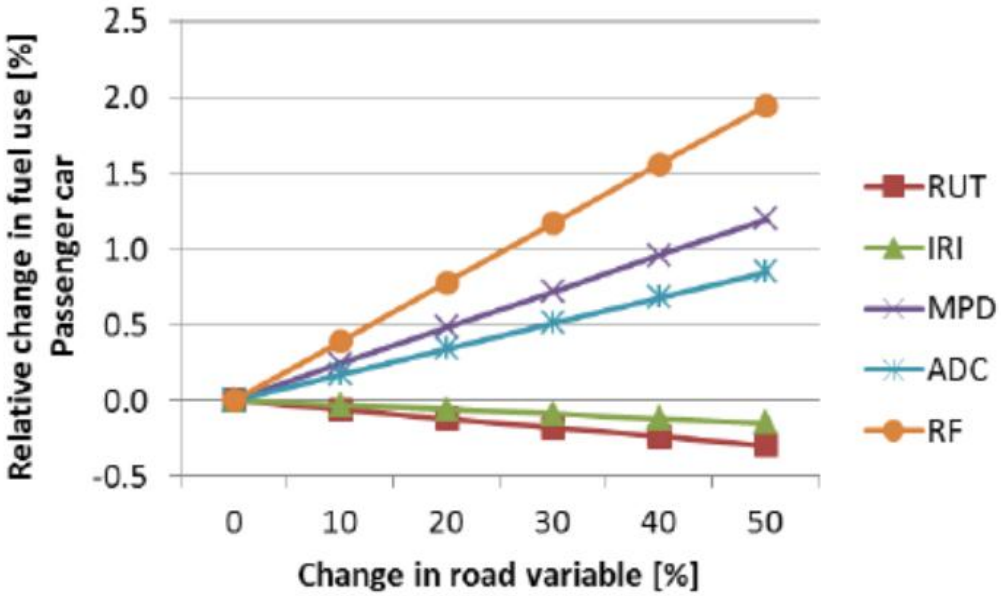
Rationale

- Traffic during the use phase dominates the life cycle impacts of a road with expected **high traffic volume**. The authors referred to studies indicating that a **10% reduction** in the **rolling resistance** can lead to **1-2% improvement in fuel economy** (Wang et al., 2012a)
- Results → very sensitive to traffic flow

- **Rolling resistance** is a function of many performance parameters, mainly **macrotexture**, **unevenness** and **stiffness**
- The **relation** of **fuel consumption (Fc)** and the **change of MPD and IRI** was investigated
- The results show that **RR is very well correlated to MPD**, while the effect of IRI is less apparent.
- Deflection represents 1 – 2% of RR

FUEL CONSUMPTION Fc with (_red) and without an IRI speed effect

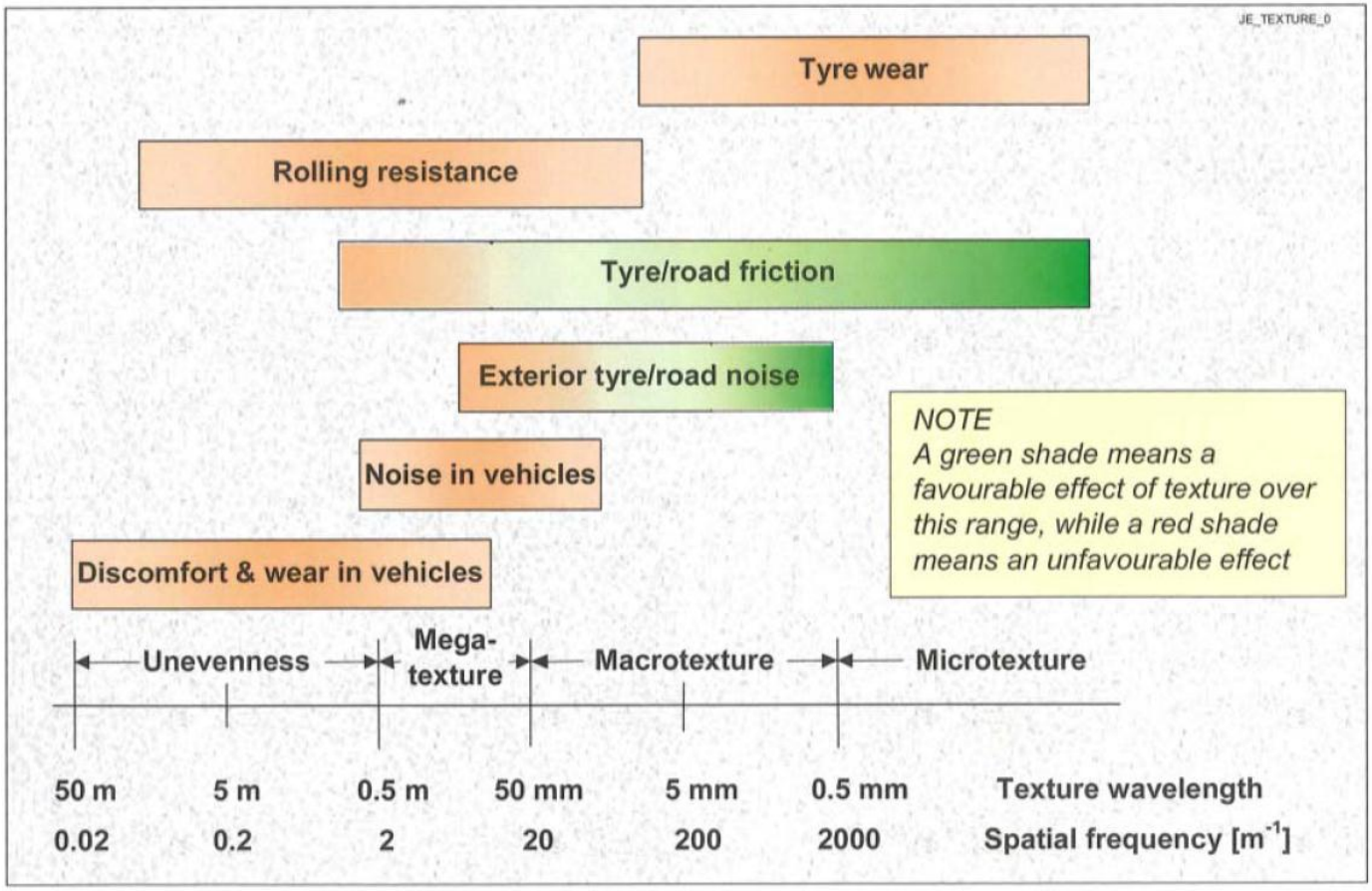
- **MIRIAM and MIRAVEC projects:**
- IRI is not so relevant to save fuel consumption of cars and heavy trucks (potential savings for heavy trucks + trailers) due to speed effect
- Reduction of IRI by 0.5 and MPD by 0.5 is expected to change total Fc by (Hammarström, 2012):
  - 0.0% for just IRI
  - -1.1% for just MPD
  - -1.1% for both IRI and MPD.



Rise and fall (RF), curvature (ADC), macrotexture (MPD), unevenness (IRI) and rutting (RUT)

Carlson, Hammarström, Eriksson, 2013

- An **improvement** on **MPD** to **decrease** the **rolling resistance** of the road surface can **conflict** with safety conditions, particularly **with skid resistance**. **<u>Any criterion on MPD shall therefore be framed within the safety requirements for the road surface</u>**.



(Haider et al, 2012)

			Skid Resistance	Rolling Resistance	Noise Emission
asphalt					
aggregate properties	• shape of aggregates (SI/FI)	↓	+ o[1]	?	+ [2]
	• angularity of aggregates	↑	+	?	o
	• polishing resistance (Polished Stone Value (PSV)/coarse aggregates)	↑	+[2]	?	o [2]
	• polishing resistance (PWS /fine aggregates)	↑	+[3]	?	o [2]
	• hardness	↑	+	?	?
	• aggregate composition and Structure (percent of hard fraction by visual examination and petrographic analysis)	↑	+	?	?
	• abrasion/wear resistance (Micro Deval)	↓	+	?	?
mixture parameters	• maximum aggregate size	↓	+[4]	+	+
	• binder content	↓	+ -	?	?
	• binder type (viscosity)	↑	+	+	+[5]
	• void content (mix design)	↓	- +[6]	+	-

			Skid Resistance	Rolling Resistance	Noise Emission
laying and compacting	• chippings – aggregate size	↓	+	+	+
	• chippings – PSV/PWS	↑	+	?	o
	• degree of compaction	↑	?	?	-
concrete					
aggregate properties	• shape of aggregates (SI/FI)	↓	?	?	+
	• angularity of aggregates	↑	+	?	o
	• polishing resistance (Polished Stone Value (PSV)/coarse aggregates)	↑	+	?	o
	• polishing resistance (PWS /fine aggregates)	↑	+	?	o
	• hardness	↑	?	?	?
	• aggregate composition and structure (percent of hard fraction by visual examination and petrographic analysis)		?	?	?
	• abrasion/wear resistance (Micro Deval)	↓	?	?	?

Interdependency matrix of surface parameters (Tyrosafe project)

Set of parameters used for optimising road surfacing performance

- low aggregate **size**
- **polishing** resistance
- aggregates high **angularity**
- aggregates **cubic shape**
- binder **viscosity**
- a **concave surface** texture

Sharnigg, 2010

Cost 354 "Selection and assessment of individual performance indicators" (COST, 2008)

- Range of 0.75 to 1.5 mm of MPD seems → 'very good' in terms of skid resistance for motorways and other primary roads.
- 0.64 mm is the 'warning limit' in the Czech Republic
- 0.54 mm triggers maintenance measures

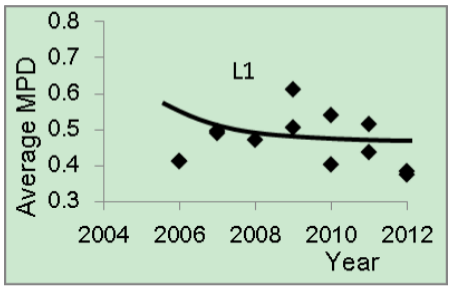
MPD requirements in some EU Countries

COUNTRY	NAME	Performance indicator	THRESHOLD		WARNING		ACCEPTANCE		TARGET	
			TP	INDEX	TP	INDEX	TP	INDEX	TP	INDEX
CZECH REPUBLIC 1	Texture depth MPD	MPD	0,54		0,64					
CZECH REPUBLIC 2	Texture depth MPD	MPD	0,44		0,54					
FRANCE 1	Sand patch value MPD	MPD		40		60				

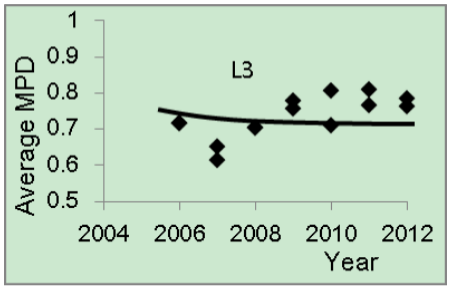
MPD thresholds in Sweden (under consideration)

MDP interval	90 - 110 km/h Motorways and other primary roads	70 km/h Secondary roads
0 - 0,3	Not suitable/very poor	Not suitable/very poor
0,31 - 0,5	Not suitable/very poor	Bad/poor
0,51 - 0,7	Bad/poor	Ok/very good
0,71 - 1,0	Ok/very good	Acceptable/good
1,01 - 1,50	Ok/very good	Bad/poor
1,51 - 2,00	Acceptable/good	Bad/poor
2,01 -	Bad/poor	Not suitable/very poor

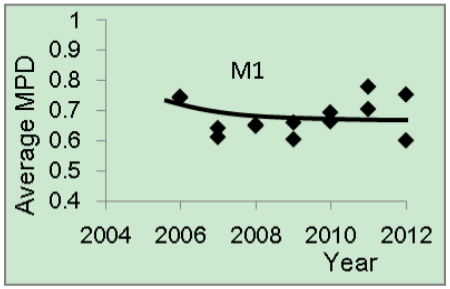
Evolution of MPD over time



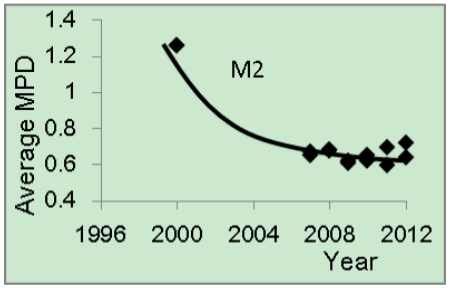
Average MPD—L1



Average MPD—L3



Average MPD—M1



Average MPD—M2

Liang, 2013

MPD is generally prone to decrease with the road aging due to polishing effect of traffic

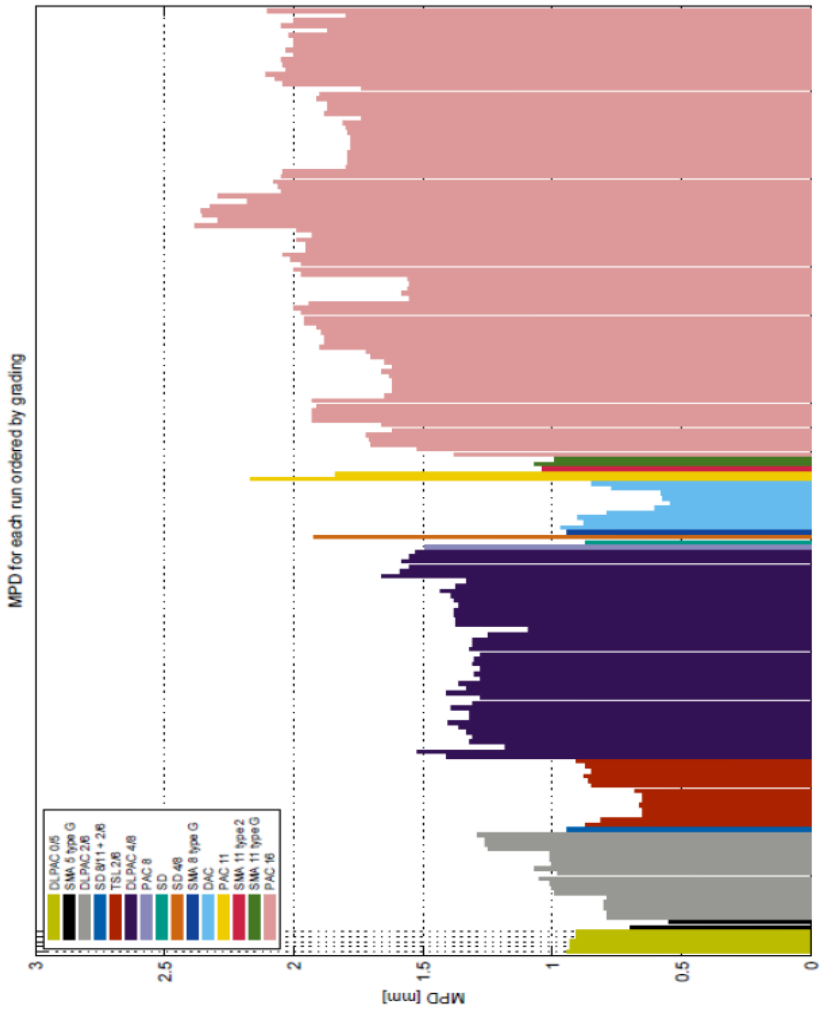
Measurement campaign in the Netherlands (2013): ageing effects more apparent in DAC

Effect of polishing is determining to define a criterion on low MPD → demand **more frequent maintenance** actions

A **holistic approach** based on **LCA** and **LCCA** should be applied (MIRAVEC D4: VTI report, UCPRC report)

MIRAVEC WP3 ⇨ Excel **tool** for estimating fuel consumption associated with a specific route and evaluate the effects of various changes to the road infrastructure

Assessment and verification issue



- Incorporation of MPD as GPP criterion ⇨ **deviations of MPD from the designed valued** in the construction phase
- Texture is depending on the mix design (aggregates, bitumen content)

- Measurement campaign in Netherlands:
  - **MPD deviation** among roads with same surface texture can be large per pavement type, but the average MPD value per pavement type is significantly different from the others
- **Rolling resistance parameter instead or MPD?**
- **Standard test methods**

Pavement-vehicle interaction

Criteria proposal

B13. Performance requirements on traffic fuel consumption due to rolling resistance

For those **motorways** and **highways**, **main roads** or **national roads** designed to bear **high AADT** at steady speed, **points** will be **awarded** to those offers that commit

OPTION 1: to a **lower MPD of the road surface**.

OPTION 2: to a **road surface which will reduce traffic fuel consumption**. The contracting authority will provide the tenderers with the Excel tool including the planning data.

The tenderer shall include the design parameters influencing the fuel consumption declaring those values together with their error margins.

The MPD shall ensure the **compliance** with the **skid resistance** required by national, regional and/or local legislation.

The **MPD declared** shall be **guaranteed along the lifetime** of the road, therefore, the maintenance plan shall include the **monitoring** of **MPD** on a regular basis (at least every **5 years**) and the maintenance works to be implemented.

Verification

OPTION 1 – 2:

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, according to the standard ISO 13473-1. Tests shall be carried out by an **independent laboratory**.

Only in OPTION 2:

The design team, DB tenderer or DBO tenderer shall evaluate the **fuel consumption** by means of the **MIRAVEC tool** or, where existing, other assessment tools including:

- **Fuel consumption model** for **free flow traffic** based on:
  - Vehicle characteristics
  - 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**

C3. Quality of the completed road - monitoring of the performance parameters

The main construction 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 the test results of the monitoring.

Questions to stakeholders

- Is it possible to anticipate in a tender the MPD of the pavement? Which is the range of deviation expected?
- Constraints of verification?
- Is it suitable the use of MIRAVEC Excel tool?

European Commission

Road construction

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

GPP draft criteria proposal
on **resource efficient construction**

Joint Research Centre

Resource efficient construction

The embodied impacts of construction materials production and **transportation** are the second most significant environmental impacts for high traffic roads (the most important for low traffic roads)

The main materials in road construction are **asphalt**, **concrete** and **aggregates**. Main potential environmental savings with:

- **WMA, HWMA, CMA** in substitution of **HMA**
- **Reused/recycled/rcovered materials and by-products**
  - Reclaimed asphalt pavement **RAP**
  - **SCM** supplementary cementitious materials, such as BFS, fly ash
  - **Recycled aggregates from C&DW**
  - **Recycled concrete**
  - **Manufactured aggregates** such as iron and steel slag, coal combustion ashes, MSWI bottom ash, reclaimed rubber from tyres
  - **Excavated materials and soils**

- *Assessment of Scenarios and Options towards a Resource Efficient Europe 2030*
- *Preliminary report*

Holistic performance approach

Stakeholders feedbacks:

- Disagreement on **detailed criteria** on different construction materials. Need of flexible criteria
- Need of an **holistic performance based approach** (evaluation of environmental performance for the whole infrastructure by means of a **LCA/LCC**)
- Support to the **use of recycled materials and by-products**, but **not** for **each material** (holistic and non-prescriptive approach)

New proposal:

⇨ a **LCA performance approach**

⇨ a **recycled content criterion for the total weight of all construction materials**

LCA performance requirements of the main road elements

Rationale

Characterising the different systems used by existing schemes for road and civil works

- **CEN 350** Sustainability of construction works
  - **EN 15804** + **EN15978** standards on buildings
  - **WG6** is developing standards on **civil engineering works** (timeline?)

- *EPD schemes* for road construction materials – **1 PCR** for road

- *Environmental performance assessment schemes for civil works*
  - Existing multi-criteria rating systems: **Invest**, **Greenroads** and **CEEQUAL**
  - **BREEAM-NL** – **Ecolxbel FP7 project** methodology **under development**
  - Several **LCA tools** available

Tools for road construction and materials

Specific materials | CF | LCA tools

Scheme	asPECT[12]	Aggregain	Changer	CO2ladder	Dubocalc[13]	ROAD-RES[14]	Klimatkalkyl[15]	Seve
Assessment method	HA, MPA, RBA and TRL (UK)	TRL and funded by WRAP (UK)	IRF	Rijkwaterstaat (NL)	Rijkwaterstaat (NL)	DTU (DK)	STA (SE)	Usirf (FR)
Life cycle phases	Construction Maintenance End of life (flexible pavem.)	Aggregates used in construction	Construction	Construction Maintenance and operation End of life	Construction Maintenance and operation End of life	Construction Maintenance and operation End of life	Construction Maintenance	Construction Maintenance End of life
Ref. standard	ISO 14044 IPCC2007	ISO 14040	IPCC2007	ISO 14040	ISO 14040	ISO 14040	IPCC2007	
Impact assessment categories	Global warming (GWP)	Global warming (GWP) Eutrophication (EP) Acidification (AP) Photochemical oxidant creation potential (POCP) Human Toxicity Potential (HTP) Freshwater Aquatic Ecotoxicity (FAETP) Ecotoxicity sediments Terrestric Ecotoxicity Potential (TETP) Ozone Depletion potential (ODP)	Global warming (GWP)	Global warming (GWP)	Global warming (GWP) Abiotic depletion potential (ADP) Ozone Depletion potential (ODP) Photochemical oxidant creation potential (POCP) Human Toxicity Potential (HTP) Freshwater Aquatic Ecotoxicity (FAETP) Ecotoxicity sediments Terrestric Ecotoxicity Potential (TETP) Acidification Potential (AP) Over fertilization Depletion of renewable materials	Global Warming (GW) PhotoChemical Ozone Formation (POF) Nutrient enrichment (NE) Acidification (AF) Human toxicity air (HTa) Human toxicity water (HTw) Human toxicity soil (HTs) Ecotoxicity water (ETw) Ecotoxicity soil (ETs) After 100 years Stored ecotoxicity water (SETw) Stored ecotoxicity soil (SETs)	Global warming (GWP) Energy consumption (MJ)	Global warming (GWP) Energy consumption (MJ process) Use of resources - RAP (t) - aggregates (t) Transportation (t*km)

Tools in EU projects

CF

Scheme	CEREAL *ERA Net II program*	Joulesave/ECRPD	LICCER *ERA Net program*	MIRAVEC *ERA Net program*
Assessment method	DHV (NL), KOAC-NPC (NL), DRD (DK)	Waterford County Council (IE) and other partners from CZ, FI, FR, PT, SE and UK	KTH, NTNU, Birgisdottir, Wageningen University, Ecoloop	AIT, TRL, VTI, ZAG, CDV, FEHRL
Reference standard	ISO 14040-14064, EN 15804, CESSM3 Carbon	ISO 14040	ISO 14040	
Life cycle phases	Construction Maintenance and operation *Applicable in all Europe*	Construction Use (traffic) Maintenance and operation	Construction Use (traffic) Maintenance End of life	Use (Fuel consumption model for free flow traffic)
Impact assessment categories	Global warming (GWP)	Cumulative energy consumption (CED)	Global warming (GWP) Cumulative energy demand (CED)	CO2 emissions

traffic

Proposing different methodologies for assessing the environmental performance of a road

- **Option 1**: **Carbon Footprint (CF)** (as Core criterion)
- **Option 2**: **LCA** (as a Comprehensive criterion)

  2.1 Impact Category results: aggregated results for each indicator

  2.2 LCA tool score: A **single score** by using a national/regional LCA tool (as Dubocalc)

Comparability (see Annexes)

- same **LCIA method** and **life cycle inventory** (LCI)
- **LCI quality requirements** (ISO 14067 for CF and ISO 14040-44 for LCA) + verified primary data and supplementary secondary data

The need for expert evaluation of the design assessments

Preparation of the ITT and LCAs critical review (ISO 14044, ISO 14065 and PEF Guide)

The need of considering the project scale and economic value

Defining the road life cycle, boundaries, main road elements and functional unit

- **Boundaries**: **cradle-to-grave**, including **construction** (+materials production and transportation) **maintenance** (and operation) and **EoL**

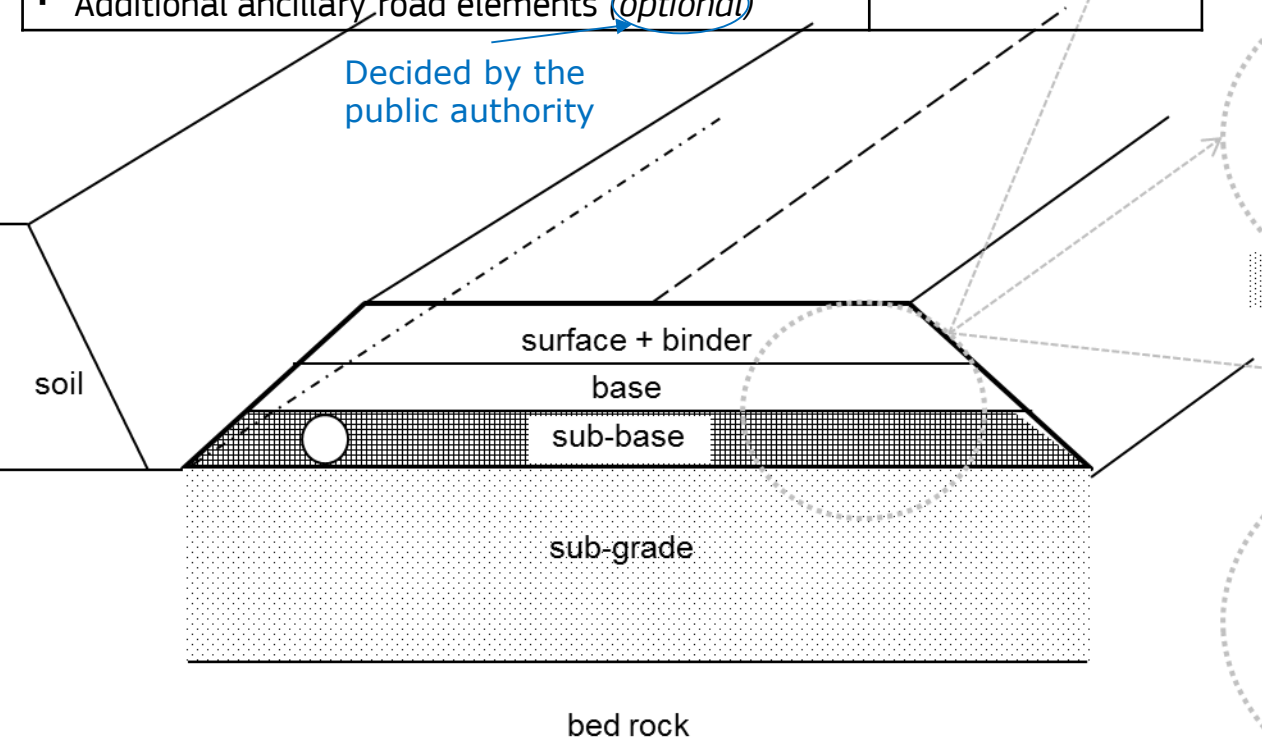
  ⇨ The **pavement-vehicle interaction** during the **use phase** has not been yet taken into consideration (stakeholders commented that it is too **premature**) ⇨ a **specific criterion** on **rolling resistance** is included

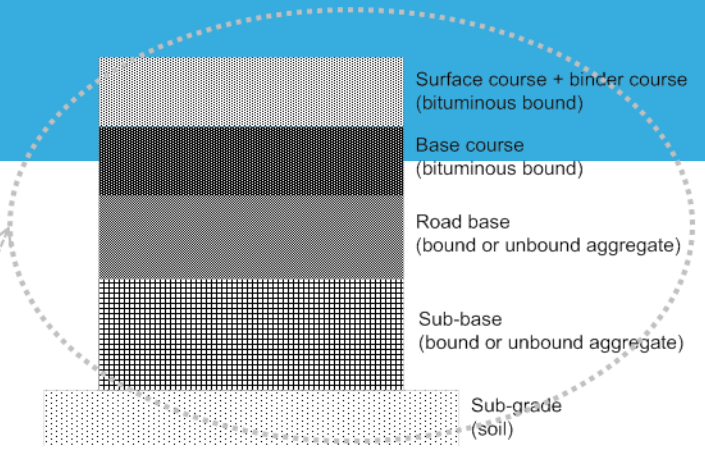
- A **common functional unit** such as **1 km of road** (or lane) and **service life** in years (usually 50 years)

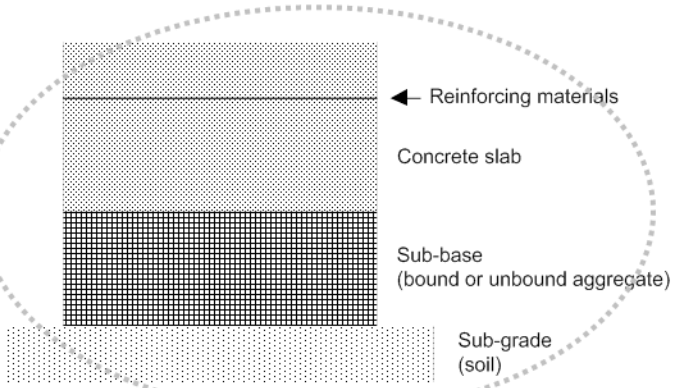
- **Main road elements** at least to be included

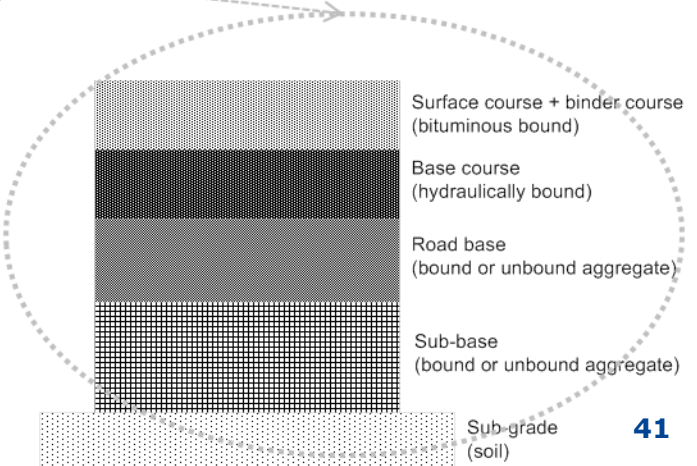
New construction or major extension	Maintenance and rehabilitation
· Sub-grade, including earthworks and ground works · Sub-base · Base, binder and surface *or* concrete slabs · Additional ancillary road elements (*optional*)	· Base, binder and surface *or* concrete slabs

Decided by the public authority



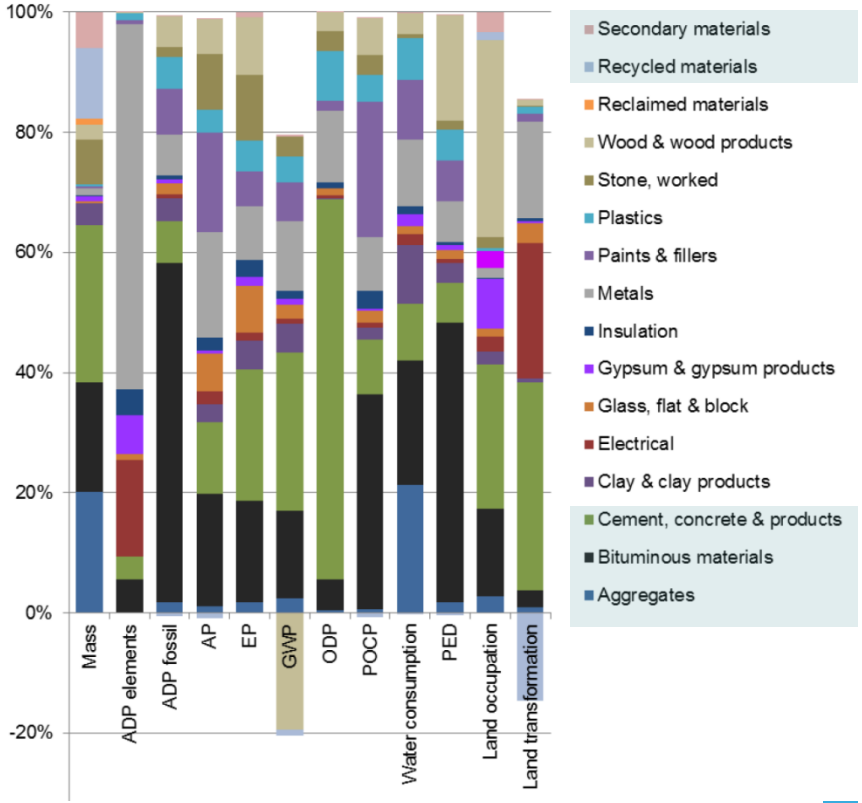






Defining the LCIA Category indicators to be used

- **GWP, ODP, AP, EP** and solid waste generation ⇔ **PED** (primary energy)
- relevant impacts related to NOx and VOCs emissions ⇨ **POCP**
- **ADP** (elements and energy/fossil fuels) and **land use** ⇨ under discussion in the scientific community
- **mass** of **non-renewable** and **secondary resources**



- In Option 1 (**CF**) ⇨ **GWP**
- In Option 2 (**LCA**) ⇨

  PED (non renewable PED-NR and renewable PED-R)
  GWP
  POCP
  secondary resources in mass

- *Assessment of Scenarios and Options towards a Resource Efficient Europe 2030 (UK built Environment)*
- *LCA studies review + PRC of Environdec*

European Commission

LCA performance requirements of the main road elements

Criteria proposal

B14. LCA performance of the main road elements

*This criterion may only be applied where a **Bill of Quantities** 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 (CF option) - Annex B (LCA option)

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

Points will be **awarded** on the base of the improvement of the **carbon footprint (CF) – Life Cycle Assessment performance (LCA)** of the road including at least the **main road elements** listed in Table (c-d) in comparison with a **reference road** *or* other **competing designs**. *The basis for the comparison shall be specified in the ITT.*

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

European Commission

Option 1: Carry out a Carbon footprint (CF)

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**.

Option 2: Carry out a Life Cycle Assessment (LCA)

The performance shall be evaluated by carrying out a **Life Cycle Assessment (LCA)** of the road in accordance with **ISO 14040/14044** or equivalent. 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;

The methodology shall include, as a minimum, the **Lifecycle Impact Category Indicators specified in Annex B**.

Verification

The Design team (*or* DB-DBO) tenderer shall provide a **bill of materials** for the proposed design. The **comparison** with the **reference road** shall be written up in a **concise technical report** that **compares** the **design option(s)** and **calculates** the **improvement potential**.

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.

*The successful tenderer shall prepare a **handover document** including the **assumptions** and **results** with specific regard to:*

- ***earthworks** and groundwork solutions*
- *materials suggested to be used, techniques applied such as **WMA,HWMA,CMA** and **recycled content***
- ***transportation distances** from production site to the worksite (baseline mass haul plan)*
- ***% of recycling, reuse** of **excavated materials** and C&DW on-site and off-site*
- ***Maintenance activities** and **frequencies***

*The **handover document** will be used by the **procurer** for the **future ITT** in case of **separated design** and **built** contracts or will be **updated** and further **improved** by the main construction contractor (or **DB – 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 – DBO tenderer shall prepare the handover document before starting the construction phase.

Recycled content
Rationale

- The use of **materials** with **high recycled content** is one of the practices with the greatest potential to **improve resource efficiency** ⇨ **diverting materials from landfill** and **saving natural resources**
- Case studies undertaken for a broad range of civil works: **most roads** have >**10%w recycled content** using **standard products**

Material		Standard practice (% mass)	Good practice (% mass)	Best practice (% mass)
Aggregates	Coarse aggregates in concrete	0 [c]	20 [a, b, c]	100 [c]
	Coarse aggregate in low strength mass concrete	0 [c]	30 [c]	100 [c]
	Unbound in civil applications	0-50 [c]	25-80 [c]	100 [c]
	Aggregates in hydraulic bound and cement bound materials	0 [c]	60 [c]	100 [c]
	Aggregate in bituminous bound pavements (off-site)	0 [c]	10 [c]	40 [c]
	Aggregate in bituminous bound pavements on-site/off-site cold process	100 [c]	100 [c]	100 [c]
	Aggregates in road sub-base		100 [e]	
	Recycled concrete aggregates	30 [f]		
Asphalt	HMA and/or WMA – RAP hot mix recycling off-site		30-80 [b]	
	HMA and/or WMA – RAP hot mix recycling of off-site		30-50 [b]	
	HMA and/or WMA– RAP cold method in hot mix recycling off-site		10-40 [b]	
	CMA – Cold mix recycling in a stationary plant		90 [b]	
	HMA and/or WMA - on-site hot mix recycling of RAP			100 [b]
	CMA – on-site cold mix recycling of RAP	100 [b, c]	100 [b, c]	100 [b, c]
Concrete	Hydraulic bound material and cement bound material	0 [c]	50 [c] 10-20 [b]	98 [c]
	Cast in situ reinforced structural concrete (max C25-C30)	15-24 [c]	30-32 [c]	44-90 [c]
	Cast in situ reinforced structural concrete (higher than C30)	0 [c]	7 [c]	26 [c]
	Pre-cast reinforced structural concrete	20 [c]	22 [c]	23 [c]
	Trench fill foamed concrete	0 [c]	40 [c]	95 [c]
Inert	Sub-soil	75 [e]	95 [e]	100 [e]

[a] EC JRC 2012 [b] Biois, EC 2011 [c] WRAP 2008b [d] WRAP 2009 [e] ICE Protocol 2008 [f] WBCSD 2009

- By using **cost-neutral good practice** and available construction **products** with higher recycled content: **15-30%w recycled content obtained**

- **Monitoring recycled content: estimation** accurately reported
- **Verification**:
  - ⇨ Under **CPR 305/2011/EU**, several products with recycling potential covered by several **standards** (**product performance**). CEN is now assessing if and how **reliable information on recycled content** could be addressed
  - ⇨ **Annual production average** for a **dedicated production** line is **readily verifiable**
  - ⇨ Proposal of an approach based on a **mass balance for batches** of product **delivered to site** (as **ready mix concrete** or **asphalt** for which **batch is tested prior to dispatch**)
  - ⇨ During the **construction** phase, **collection** of all the **certificates** including **product data sheets**, **batch documentation**, i.e. data from **mix design**, **FPC documentation** and **supporting certificates for recyclates**
  - ⇨ **Verification by means of a third party audit**

European Commission

Recycled content

Criteria proposal

B1 Minimum recycled content

A **minimum recycled content**, reused content and/or by-products of **10%** by **weight** for the **sum** of the **main road elements** in Table (a)

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

- The total number of **ready mixed batches** delivered to site in accordance with standards on
  - aggregates like EN 13242, EN 13285;
  - asphalt pavement like 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 like N 206, EN 12620, EN13877;
  - hydraulically bound granular mixtures like EN 14227 part 1 to 5
  - Stabilised soil like EN 14227 part 10 to 15

- On an **annual basis** for factory-made **slabs** and **elements** with **claimed content levels** in accordance with standards like EN 12620 and EN 206, EN 13877 and national legislation

B15. Incorporation of recycled content

Points will be awarded to tenderers that achieve **greater than** or **equal to 15%** - **30%** by **weight** of **recycled content**, **reused content and/or by-products** for the **sum** of the **main road elements** in Table (e). **Points** will be awarded in **proportion** to the **total percentage reached**

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

the same as in B1

Verification (B1 and B15)

The Design team (*or* DB - DBO tenderer) shall **quantify** 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 **potential supplier(s)** of the construction material.

This information must include the **average mass balance calculations** as described above, supported by **batch documentation** and/or **factory production control documentation**. In each case this shall be verified by a **third party audit**.

C4. – E5. Incorporation of recycled content

When **materials** are **delivered** to the **work site**, **recycled content claims** with **clear traceability** shall be **verified** for **each representative batch/batches of product**.

The main construction contractor (*or* DB - 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 **suppliers**.

Questions to stakeholders

The verification would therefore need to be conducted by auditing of the manufacturer's process control records.

- Is this practical in reality?
- Could you please provide additional information and experience on the verification of these criteria?

Materials transportation
Rationale

- **Transportation** is one of the **main hot-spots**. It is **unique** to the **specific** road **projects**. Significant **GHG emissions** are produced
- Stakeholders disagreement on considering materials transportation distances as a stand-alone criterion ⇨ **holistic LCA approach**
- If criteria on **CF** or **LCA** are not proposed, **CO2e emission / tonne of material transported** can be alternatively evaluated
- **Several in-house or internationally available GHG calculators** can be used (ENCODE Protocol, ICE Demolition Protocol, DEFRA's Guidelines for Company Reporting on Greenhouse Gas Emissions, WRAP's CO2 Estimator Tool, the Flemish "Carbon Free-Ways")
- Sweden: requirements set on **trucks** and **working machines**. **GPS** to measure quantities of excavated and filled soils is used but not mandatory ⇨ costs and benefit

European Commission

Materials transportation

Criteria proposal

B16. Performance requirements for CO2e emission from materials transportation

This criterion shall be applied in cases when the criterion on CF or LCA performance B14 is not applied

Points will be awarded on the base of the **reduction** in the **CO2e emission/tonne** of **transported materials** that are employed as a **minimum in the main road elements** listed in Table (g) in comparison with a **reference road** *or* other **competing designs**.

Methods and tools to evaluate the CO2e emissions of transported materials to be specified in the ITT.

Methods and tools to evaluate the CO2e emissions of transported materials to be specified in the ITT.

*The **BoQ** of materials, the transportation distances from the production site to the work site and the CO2e/tonne of transported material shall be included in a **baseline mass haul plan** that constitutes part of the **handover document** prepared by the successful tenderer. The **mass haul** shall be used by the procurer for the **future ITT** in case of separated design and built contracts or **optimised** by the main construction contractor*

Verification

The Design team (*or* DB - DBO tenderer) shall provide the **CO2e/tonne of transported material** and the **transportation distances** from the production site to the work site and **multiply** this by the relevant quantities as stated in the **BoQ**.

Asphalt

Rationale on tar-containing asphalt

- Analysing the **tar content** in **reclaimed asphalt** is relevant if **coal tar** has been **used** in the **past** (in EU different **age of roads** that might contain tar)
- For **pavements older than X years** (*X shall be fixed by the contracting authority*) that could **possibly contain tar**, the **possible tar content** can be **analysed before reclaiming asphalt** by means of **initial non-destructive tests** (UV-lamp on site), **sampling** and **laboratory analytical tests**.

Limits for tar-containing (reclaimed) asphalt in different MSs

Belgium	Sweden	the Netherlands
< 100 mg	< 70 ppm	< 75 ppm
PAH-10/kg	PAH-16 (appr. PAH-L, PAH-M and PAH-H)	sum of 10-PAH

- If the tar content of reclaimed asphalt **exceeds** the **limit set** by the **national legislation**:
  - ⇨ **restrictions** in the Netherlands
  - ⇨ **best available techniques** that can be used to **treat** or **reuse** reclaimed asphalt
    - **binding RAP containing tar**
    - using only **CMA** and **WMA** techniques

- Stakeholders suggested the definition of an **upper threshold** of **tar content** where the **RAP** could be **reused** and **encapsulated** using a **cold process off-site** and, **above this limit**, then **only on-site cold recycling** should be **used** ⇨ definition related to the **national legislation** and it cannot be generalised for EU-28

European Commission

Asphalt

Criteria proposal

E1. Tar-containing asphalt

(For pavements older than X years that could possibly contain tar according to the public authority)

The **possible tar content** of **surface layers** (surface + binder) shall be **analysed before reclaiming asphalt** by means of **initial non-destructive tests**, **sampling** and **laboratory analytical tests**.
If the **tar content** of reclaimed asphalt **exceeds** the **limit** set by the **national legislation**, **best available techniques** to **treat** or, eventually, **reuse reclaimed asphalt containing tar** shall be **specified** in a **technical report**.

X shall be fixed by the contracting authority according to the knowledge, available database and inventory

European Commission

Verification

The main construction contractor (*or* DB - DBO contractor) shall submit a technical report consisting of:

(i) **results** of the **sampling** and analytical **tests**

(ii) **best available techniques** to treat or, eventually, use 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 reuse, specifying **amount** of materials and identifying the **location** (maps, GIS). **Monitoring data** shall be provided to the contracting authority and to the NRA or local authority.

Questions to stakeholders

A stakeholder underlined that surface dressing using cutbacks containing aromatic oils, such as creosote, have been used fairly recently and will give a positive testing result for tar. Therefore it would be difficult to gauge road age, because any road surface dressed up to the mid '90s could have had tar/tar oils included in the cutback or emulsion

- Do you have any experience in this specific issue? Could you please provide further information?

Asphalt

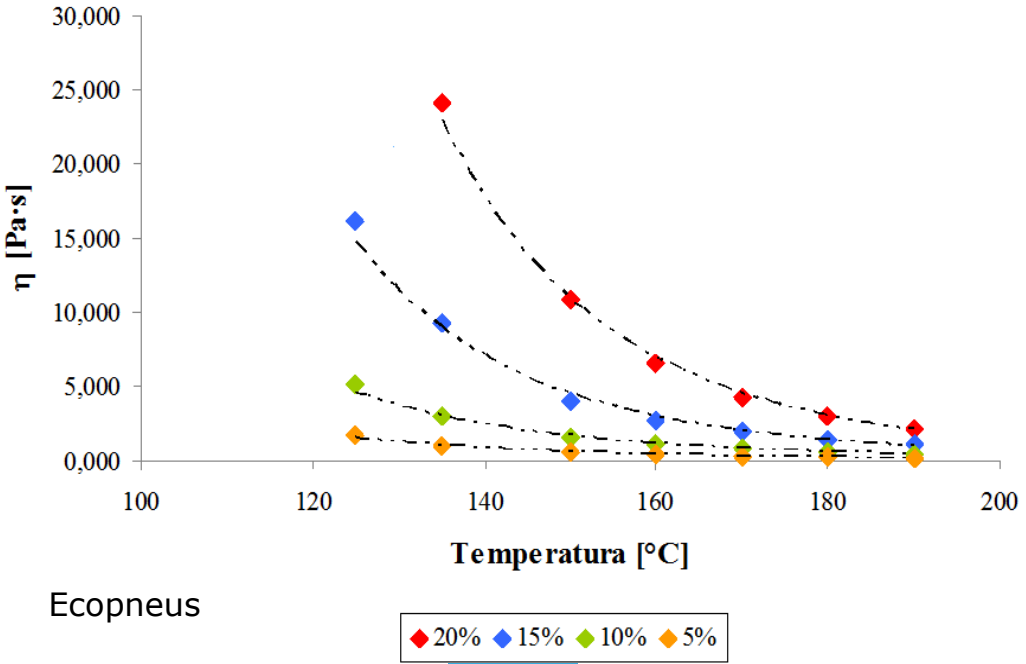
Rationale on low temperature asphalt

- The environmental benefits of using **low temperature asphalt** are now **included** in the **holistic LCA performance approach**. **HMA/WMA/HWMA/CMA** free to be chosen
- **Reduction** of **mixing and laying temperature** ⇨ **decrease VOC**, **PAH**, **CO**, **SO2** and **NOx emissions** ⇨ **significant improvement** of the **health** and **safety conditions** of **workers**

- In some MSs, **technical specifications** on a **maximum laying temperature** for **bituminous mixtures** are proposed (*Italian GPP draft criteria, WMA Task Force of the Flemish Road Authority)*

  ⇨ **120°C -140°C** proposed in the criteria

- Higher temperatures needed in case of **specific performance bituminous mixtures** realized with **special binders with higher viscosity** (such as rubberised asphalt pavements)
- At around **155° C**, **differences** in **viscosity** between the bituminous mixtures with different pulverised rubber contents **decrease** (Santagata et al., 2012 and Ecopneus)



Ecopneus

European Commission

Asphalt

Criteria proposal

B2. Low temperature asphalt

The design team (or DB -DBO tenderer) shall propose **best practice** and **techniques** for **laying bituminous mixtures** in order to **decrease** the **health** and **safety exposure risk of workers**.

The **maximum temperature** for **laying** the **bituminous mixtures** of **surface** and **binder courses** shall **not exceed 140°C** - **120°C**.

Only in cases of **higher viscosity special bituminous mixtures**, laying temperatures up to **greater than 140°C** - **120°C**, but **lower than 155°C**, shall be allowed.

Verification

The design team (or DB -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.

European Commission

C5. Monitoring of the low temperature asphalt - E6. Monitoring of the low temperature asphalt

The **laying temperature** of the **low temperature asphalt** shall be verified for **each representative batch/batches** of **product** at the worksite.

The main construction contractor (*or* DB -DBO contractor) shall provide either:

- an **independent laboratory certification** of the **maximum temperature** of the **asphalt**
- *or* **equivalent documentation** provided by **asphalt supplier**

Questions

- Could this technical specification be applied in all MSs, or is it better to proposed it as an award criterion?
- Could you please provide additional information and experience on the verification of these criteria?

Excavated materials and soil management
Rationale

- In **complex orography**, when **embankments** and **ground works** are needed, the impacts related to **earthworks** can account **up to 30%** of the project's emissions.
- **Environmental impacts** are **evaluated** by means of the **holistic LCA performance approach** (including stabilization and maximum amount of excavated materials reused on site)
- **Aim of an excavated materials and soil management plan** (Code of practice on soil management of DEFRA 2009)

  ⇨ **Optimization of recycling/reuse** of materials and **best practise**

  ⇨ In **greenfield**, the **separate management** of **topsoil**

European Commission

Excavated materials and soil management

Criteria proposal

B3. Excavated materials and soil management plan

Waste production during **excavation**, excluding C&DW, 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 reuse 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 DB-DBO tenderer) shall provide **a excavated materials and topsoil management plan** consisting of:

(i) **A BoQ** 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 **% reused and/or recycled** materials **on site**,

(iv) **Estimates** of the **% reused and/or recycled** materials **off site**,

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

European Commission

C6. Commissioning of the excavated materials and soil management plan

The main construction contractor (*or* DB - 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 reused/recycled on site** and percentages **reused 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** and to the **NRA or local authority** on an agreed **periodic basis**.

Questions to stakeholders

A stakeholder underlined that soil managements plan are mandatory in construction projects.

- Are the performance requirements proposed (such as the estimations of materials diverted from landfill, the % reused and recycled on-site and off-site, the best practices for topsoil) already applied in all road projects?

Waste management

Rationale

- **C&DW** has been identified as a **priority waste stream** in the **WFD** ⇨ **minimum recycling target of 70%** for reuse, recycling and other material recovery of C&DW **by 2020**
- In EU, **average recycling percentage of 46%** of **recycling** and **re-use** of C&DW (2011)

- **Demolition waste management plan** allows defining **project-specific targets** for **total waste arisings** (WRAP)
- **A pre-demolition audit** allows the **identification** of **hazardous waste** (risk assessment), a Demolition **BoQ**, estimates of the **% re-use and recycling potential** and of the **% potential** for other forms of **recovery**

- BIOIS, EC 2011 ⇨ **30-80%** of RAP potentially absorbed by **off-site recycling** , **100%** by **on-site**. **Up to 75%** of **concrete waste** potentially absorbed by **recycled aggregates for road** - **40-50% by recycled aggregates** for **concrete production**
- WRAP, ENCODE and the ICE Demolition Protocol ⇨ at least **80%** of **C&DW** to be **reused/recycled/recovered** (best practice in some MSs)

- **EMAS** Document (EC, JRC, 2012a) ⇨ **backfilling not** considered as **best practice (down cycling)**
- **Backfilling** can be considered in road construction due to the **common practices** of **cut and fill** and **environmental rehabilitation** with the following **limitations**
  - ⇨ **not** be allowed in **greenfield** outside of the roadway
  - ⇨ in **permeable areas** of the roadway (shoulders and embankments) backfilling only realised with (non-hazardous) **excavated materials and soils**

European Commission

Waste management

Criteria proposal

E2. Demolition waste audit and management plan - F1. Demolition waste audit and management plan

A **minimum** of **70%** - **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** outside the roadway. Backfilling in **permeable areas** of the roadway shall be realised only with **excavated materials** and **soils**.

The main construction contractor (*or* DB- 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 BoQ 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 BoQ.

Verification:

The main construction contractor (*or* DB-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**.

Questions

- Could further limitations regarding backfilling conditions (such as the definition a maximum percentage of backfilling that can be accounted as a recovery operation) be defined?

- Could specific limitations regarding leaching limits set by national legislation in specific situations be set?

European Commission

Road construction

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

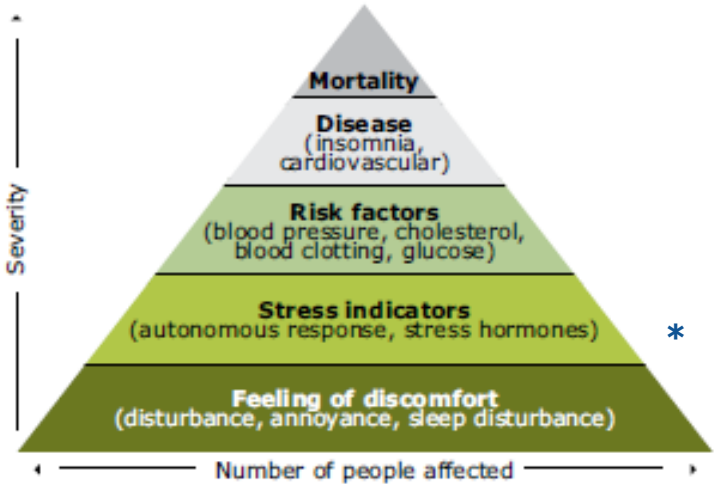
GPP draft criteria proposal on **noise emissions**

Joint Research Centre

Noise emissions – importance of reducing them

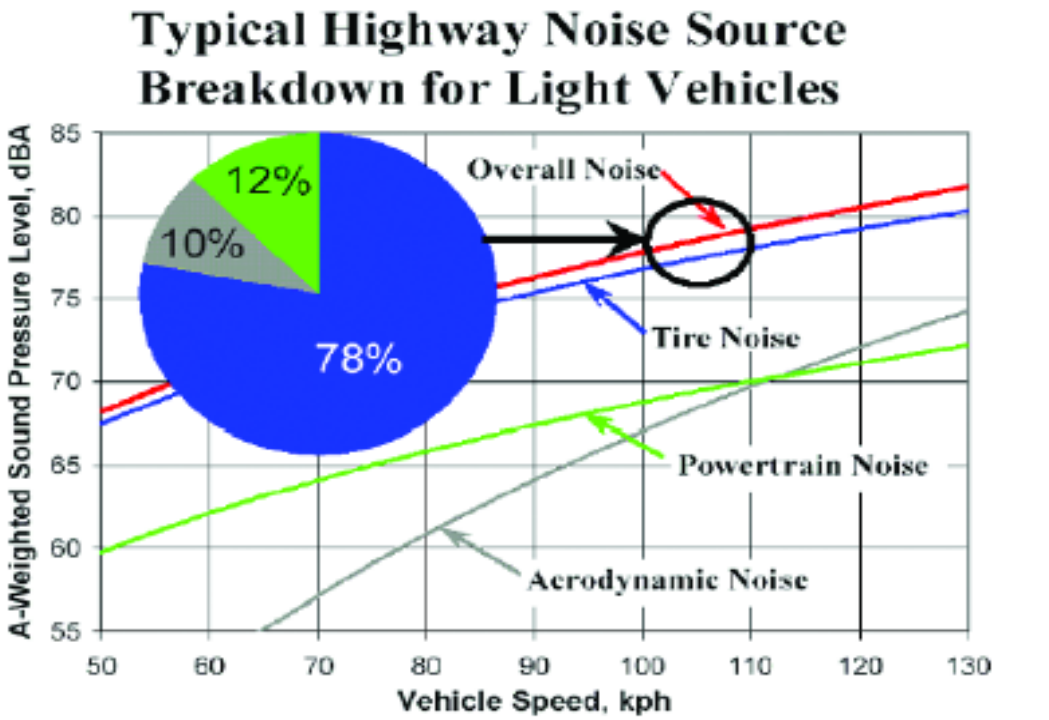
- COM(2011) 321: external costs of noise in EU-27 = **€52 billion**
- Difficult to assume direct costs -> multiple assumptions
  - Reduction in real estate value….. About 1% each dB
  - Annoyance….(>55dB L_{den} = 125 million EU citizens…)*
  - Premature deaths….(30,000 EU citizens per year…)*
  - Hospital admissions…(130,000 EU citizens per year…)*

- Road pavement technology (up to **7dB reduction** in noise
- Just a **3dB reduction** is equivalent to **50% less** to halving the traffic



*From EEA Report No 10/2014 "Noise in Europe"

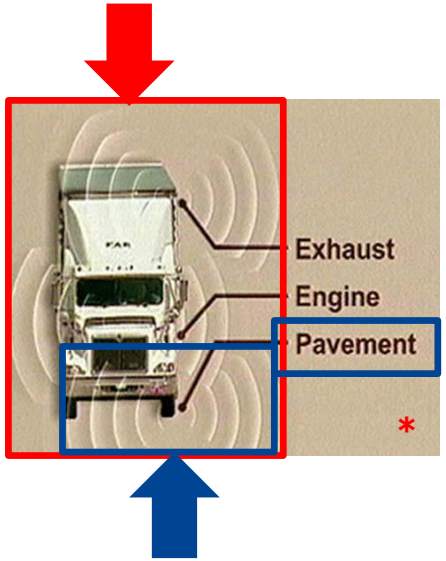
Noise emissions



Effect of speed on vehicle noise

**

Installing **noise barriers** can help reduce all noise (in targeted areas only)



*

The only source directly relevant to road construction. The **dominant source** with cars.

Criterion 1: Low-noise pavements (reduce noise emission)

Criterion 2: Noise barriers (shield receptor from existing noise)

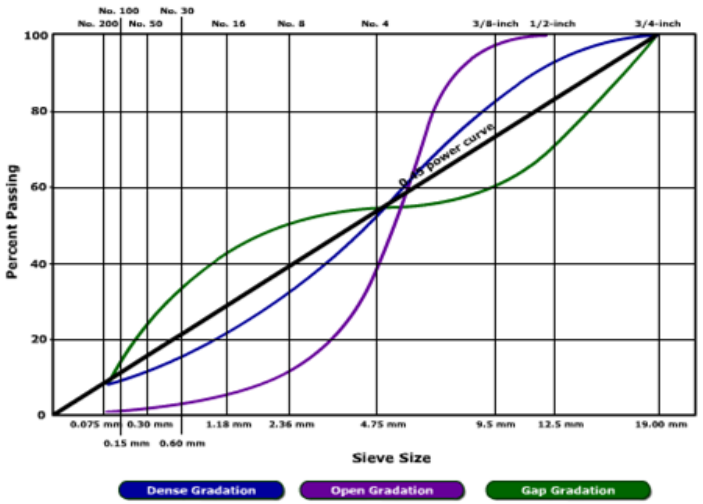
*image from 2009 ACPA report "Transportation Noise and Concrete Pavements"

Joint Research Centre

**image from Donovan, 2003 "Assessment of highway pavements for tire/roadnoise generation

Low-noise pavements – benefits of porosity

- Developed in 1960's-1970's
- Primary concern was safety (water spray)
- Became clear that it was beneficial for noise emissions as well



Design porosity control:

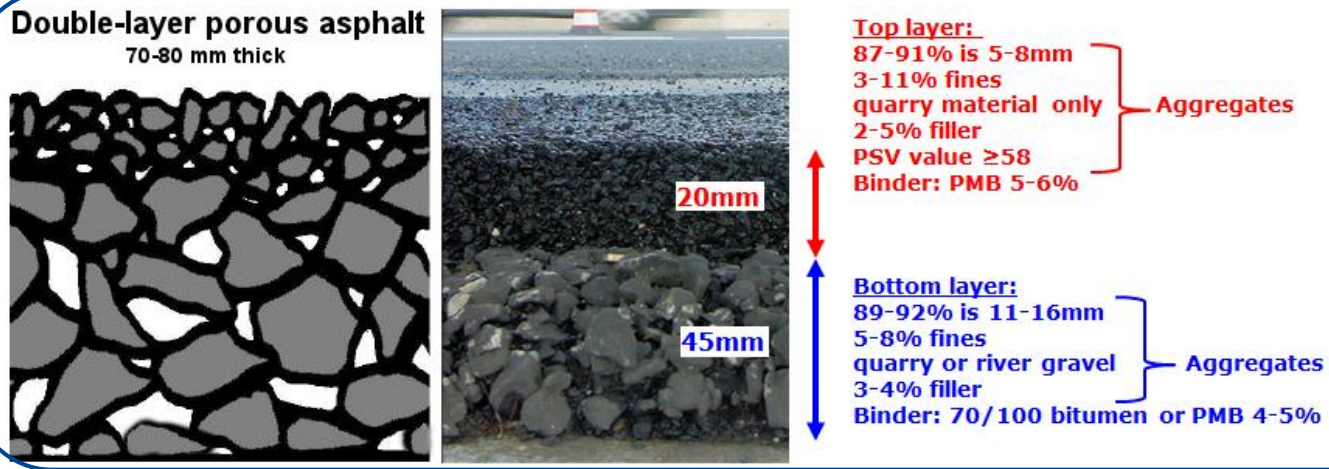
Same basic principles for concrete & asphalt

1) aggregate grading

2) binder content

Example of double porous layer pavements

- Clogging an issue (top layer protects lower layer)
- Further improve noise reduction performance (but also cost?)



Asphalt-based

Well established in the Netherlands

Cement-based

Pre-fabricated slabs

Promising but not yet cost-competitive with DLPA

*image of "Modieslab" cross section

Approaches to low-noise pavements in GPP in different countries

(i) Denmark

- Provide specific guidance to tenderers about how to measure/show compliance.
- Only required in "***priority areas***", i.e. residential and recreational areas where annual average **L_{den} >58dB**
- >30 low-noise pavement contracts up until 2012
- From 2012 onwards ⇨ changed approach
- Now performance is specified **not against a reference pavement**, but against SPB limits as a function of vehicle speed:

Speed (kph)	50	60	70	80	90	100	110
SPB reference* values (dB)	72.0	74.6	76.9	78.9	80.8	82.5	84.1

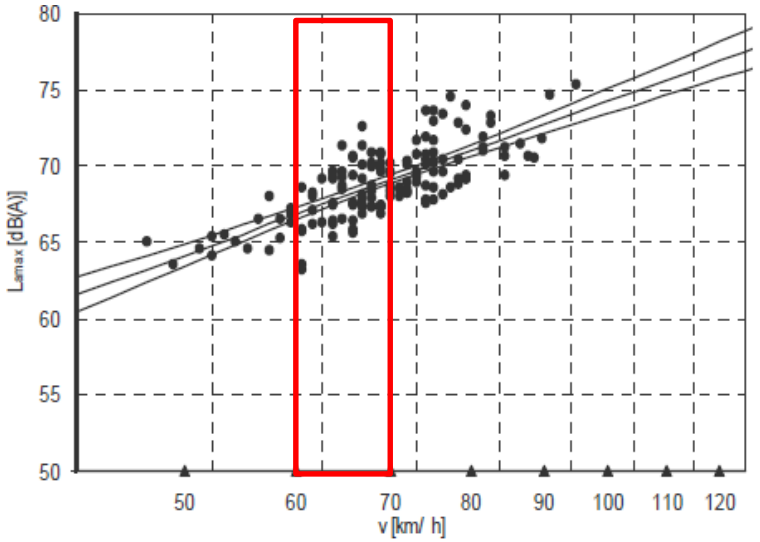
- But, taking SPB measurements is time consuming and only gives spot data
- So, they allow CPX data to be converted to estimated SPB data like this:
- **$*SPB_{ref} = 0.921 \times CPX - 13.68$**
- Not sure about technical basis for equation, but very practical approach.

(ii) The Netherlands

Regulations that push for low-noise road surfaces (primary + non-primary roads)

- Thin-surfacings used if <80kph (PA not suitable in low speed roads)
- SLPA / DLPA used if >80kph
- Uses the concept of **C_{road}** (C_{wegdek}) value.
- Based on SPB measurements of a **new road**
- Compared to **standard DAC 0/16**.
  - At least 100 car measurements
  - At least 50 truck measurements
  - Over at least 5 test sections
  - Temperature corrected (rain?)
  - Plot A-weighted max noise vs speed
  - Data quality (95% CI **≤0.3dB**)
  - Single SPB value from regression line

v [km/h]	$L_{A,max}$ [dB(A)]	95% CI [dB(A)]
40	61,6	1,1
50	64,8	0,7
60	67,5	0,3
70	69,7	0,3
80	71,6	0,5
90	73,4	0,7
100	74,9	0,9



- Examples of some durability requirements
- E.g. Groningen: **4dB(A)** reduction in new road
- Plus **2dB(A)** reduction after 5 years → **penalties/bonuses??**

Noise criteria: minimum tech. spec. or award?

Really depends on individual project, local regulations and procurer. Possible noise barrier vs low noise pavement conflict too. So, approach is to provide minimum technical criteria with the following caveats:

- For noise emissions during construction:

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

- For noise emission reduction performance of the road pavement:

When local or national legislation requires, or when low noise levels from this road are considered a priority

- Distinction between core (3.0dB) and comprehensive (4.5dB) ambition levels.
- Award criteria to encourage higher performance roads.
- Durability of performance requirements introduced (potential big impact)

European Commission

Noise emission in construction/maintenance

Criteria proposal

B6. Performance of noise emission during construction and maintenance
(When planning permission or local/national legislation requires, or when specifically requested by the contracting authority)

The design team (or DB - 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 DB - 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

European Commission

C12. – E7. Monitoring noise emission during construction – maintenance

During construction/maintenance works, the main construction contractor (or DB or 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 invitation to tender. 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

European Commission

Low noise pavements

Criteria proposal

B7. Minimum requirement for low-noise pavement

(When local or national legislation requires, or when low noise levels from this road are considered a priority)

The design team (or DB -DBO tenderer) shall provide basic **technical details** of the **proposed low-noise pavement with claims**, supported by their **own technical data** and any **third party published** reports indicating that:

- **Conformity of production**:

  A **minimum 3.0 dB(A) – 4.5 dB(A) reduction** in noise emission will be achieved in the **new pavement** compared to a **reference dense asphalt** concrete (0/16) surface (or other reference material defined by the contracting authority).

- **Durability of performance**

  A **minimum 2.0 dB(A) – 3.0 dB(A) reduction** in noise emission will be achieved in the pavement during the **first 5 years of service** life compared to a **reference dense asphalt concrete** (0/16) surface or other reference material defined by the contracting authority.

Joint Research Centre

European Commission

Verification

The design team (or DB - 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 **minimum noise reduction** of **at least 3.0 dB(A) or 4.5 dB(A).**

The expected noise reduction performance of the new pavement values shall be based on laboratory and real life measurements of test road sections, either by the tenderer themselves or from peer-reviewed published literature.

The expected noise reduction performance during the **5 year service life** will be estimated based on the tenderers experience and relevant data, where available.
With respect to the **reference surface**, this shall be **defined** by **any national** or **local systems** in place. In the **absence** of such a system, noise reduction should be compared to a "**virtual" reference** road and **corrections applied** for aggregate size where necessary

European Commission

B20. Performance of low noise surface pavements

Points will be awarded if the **pavement design** claims to achieve a **noise reduction performance** that **exceeds** the **minimum technical requirements** (see previous criterion). The allocation of points shall be as follows:

Conformity of production

- That the **new pavement performance** claim is **>1.0dB(A)** better than the minimum technical requirement **(0.25X points)**
- That the **new pavement performance** claim is **>2.0dB(A)** better than the minimum technical requirement **(0.50X points).**

Durability of performance

- That the pavement performance after **5 years** of **service life** is **>1.0dB(A)** than the minimum technical requirement **(0.25X points)**
- That the pavement performance after **5 years** of **service life** is **>2.0dB(A)** than the minimum technical requirement **(0.50X points)**

Verification: *Same as stated in the verification for the previous criterion*

European Commission

C13. Minimum requirements for low-noise pavement

The main construction contractor (or DB - DBO contractor) shall submit to **testing** of **noise emissions** from the road surface and **provide test reports** using **SPB** and **CPX data** gathered according the methodology defined in ISO 11819-1 and ISO/CN 11819-2 respectively.

Where **CPX equipment** is **not available**, certain **other techniques** may be used as proxy measures by following the guidance set out in the **SILVIA Guidance Manual**.

The **initial measurements** shall be taken within **1-3 months after the opening** of the road surface and used to demonstrate **conformity** of **production** with **3.0 dB(A) – 4.5 dB(A)** (or other higher claimed value) of **noise reduction**.
After 4-5 years of service life, the noise emission **measurements** shall be **repeated** on the **same test sections** and ideally under the **similar meteorological conditions** as when the conformity of production test was carried out.

The **noise reduction** performance claims for **low noise pavements** that are made by the design team, DB contractor or DBO contractor at the design stage shall be **used as a benchmark** to determine if any **penalties or bonuses** shall **apply** when the "*conformity of production*" testing of new pavements and "*durability of performance*" testing of **5 year old pavements** is carried out.

The framework for any applicable penalties, bonuses or remedial action shall be clearly stated in the invitation to tender.

Questions to stakeholders

- Should the monitoring of noise emissions be specifically mentioned as being carried out by qualified and independent 3rd parties or may this create a potential conflict if for example, it is measured by a government agency responsible for implementing the Environmental Noise Directive which could be argued as not being completely independent of the National Road Authority which also forms part of the government?

European Commission

Noise barriers

Criteria proposal

B8. Noise barrier design and material properties

(When planning permission or local/national legislation requires, or when low noise levels from this road are considered a priority)

The design team (or DB - DBO tenderer) shall provide basic technical **details** about the **noise barrier placement**, **dimensions** and **material(s)**. For barriers using modular or prefabricated elements, the details shall include as a minimum the performance class according to EN 1793-2 for reflective noise barriers, EN 1793-1 for absorbing noise barriers and the expected durability of performance according to EN 14389-1 for either type of barrier. The tenderer shall also declare a **minimum noise reduction** performance of **X dB(A) - Y dB(A)** across the noise barrier **from** a **fixed point** on the road to a defined receptor area that shall be achieved with their proposed design.

Verification: The tenderer shall provide **design details** of the proposed noise barrier as well as a test report of noise barrier material assessment carried out in accordance with the requirements of **EN 14389-1** and **EN 1793-1** or **EN 1793-2** (or equivalent). The tenderer shall state the minimum claimed noise reduction performance across the noise barrier between defined points.

European Commission

C1. Testing of in-situ constructed noise barrier

During an **agreed period after construction** of a noise barrier, the tenderer shall submit to **conformity** of **production testing** of the noise barrier by an independent body, in accordance with EN 1793-6 or other standard tests specified clearly in the invitation to tender. Results shall comply with the **minimum X dB(A) - Y dB(A) noise reduction requirements** stated in the original proposal.

Verification

A **test report** produced by an **independent body** stating compliance with the **in-situ sound insulation values** (if tested according to EN 1793-6) shall be provided.

C14. In-situ performance of the noise barrier

The contracting authority shall provide plans of the site drawn to scale and with existing features marked and a clearly defined receptor area or areas which should be protected by the noise barrier. **Reference points** shall be marked which shall be used to define where noise measurements should be taken to later measure the in-situ performance of the constructed noise barrier. A minimum required noise reduction performance of **X dB(A) - Y dB(A)** shall also be clearly communicated in the invitation to tender.

After construction, the main construction contractor (or DB - DBO contractor) shall submit to **independent testing** of the **in-situ performance** of the **noise barrier**. Testing may be carried out according to EN 1793-6 or other relevant and equivalent methods that are agreed upon with the contracting authority.

If the noise reduction performance across the noise barrier fails to meet the minimum technical requirements, the main construction contractor (or DB - DBO contractor) shall undertake remedial **action at no additional cost** to the contracting authority.

Questions to stakeholders

Considering possible criteria on noise barrier material embodied energy would you support:

A. A minimum technical specification? If so, how would you propose to set it?

B. Only as an award criterion? If so, how would you propose to set it?

C. As a combination of a minimum technical specification and award criterion? Again if so how would you propose to set it?

D. No criterion on this subject would be preferred? If so, any supporting reasons for this opinion?

European Commission

Road construction

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

GPP draft criteria proposal
on **water and habitat preservation**

Joint Research Centre

Water and habitat preservation

Why are combined sewers relevant?

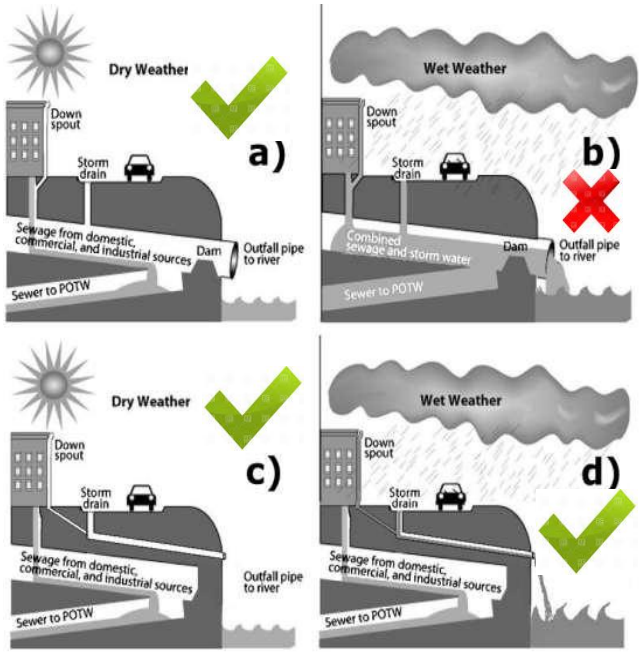
- Road and drainage networks = key infrastructure → linked together
- Huge impermeable areas = Huge quantities of stormwater
- If drainage → combined sewers

  e.g. complicates WWTP design/operation

  e.g. overflow of raw-sewage → rivers

  e.g. backflow of raw sewage → streets
- But if drainage → natural watercourses

  Need to consider:
  - Transport of sediments & pollutants
  - Rapid run-off → decreased flood risk on but increased flood risk downstream.



Water and habitat preservation

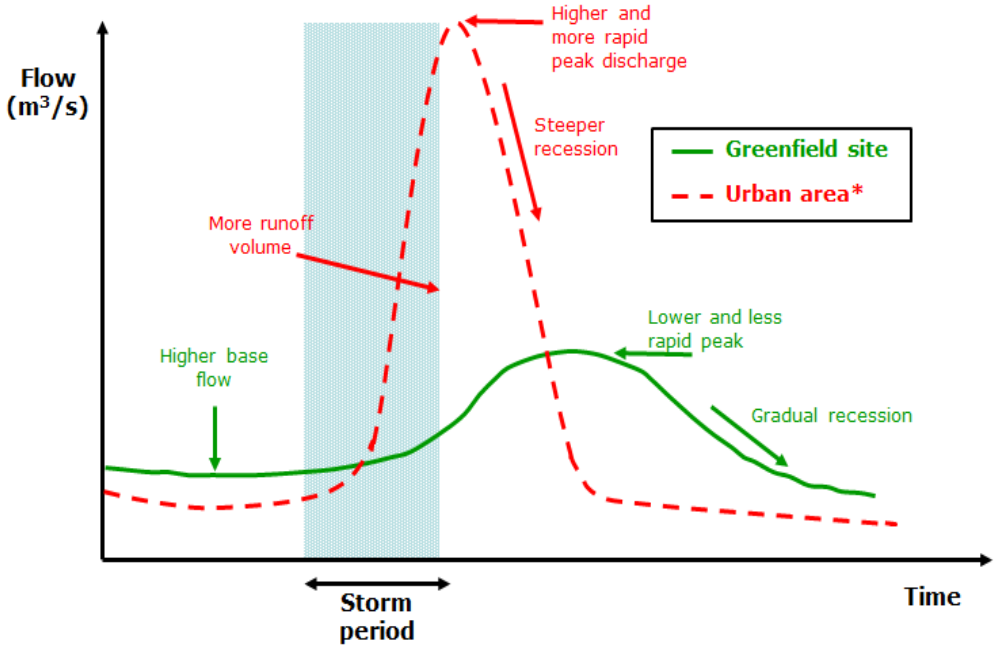
Why is drainage system design relevant-1:habitat

- Big infrastructure = big impact on natural land and land use
  e.g. habitat loss, fragmentation, wildlife road deaths
- Road drainage infrastructure → should be designed for:
  Pollutant removal from stormwater
  Flood risk management (retention capacity)
- Can achieve by traditional or **green** designs:
  - i.e. SuDS → potential **habitat creation**

Water and habitat preservation

Why is drainage system design relevant-2:flood risk

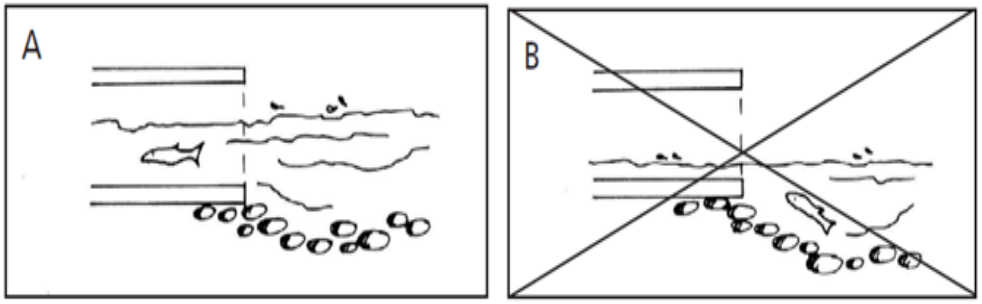
- Flooding a major concern in certain parts of EU
- In period 1998-2009: insured losses due to flooding = €52 billion
- EU Floods Directive 2007/60/EC
- Flood risk maps
- Impermeable areas
- Climate change uncertainty
- **Traditional** drainage inadequate
- **Green** drainage – mimics nature
  - i.e. retention on or near site
  - i.e. restricted runoff rates

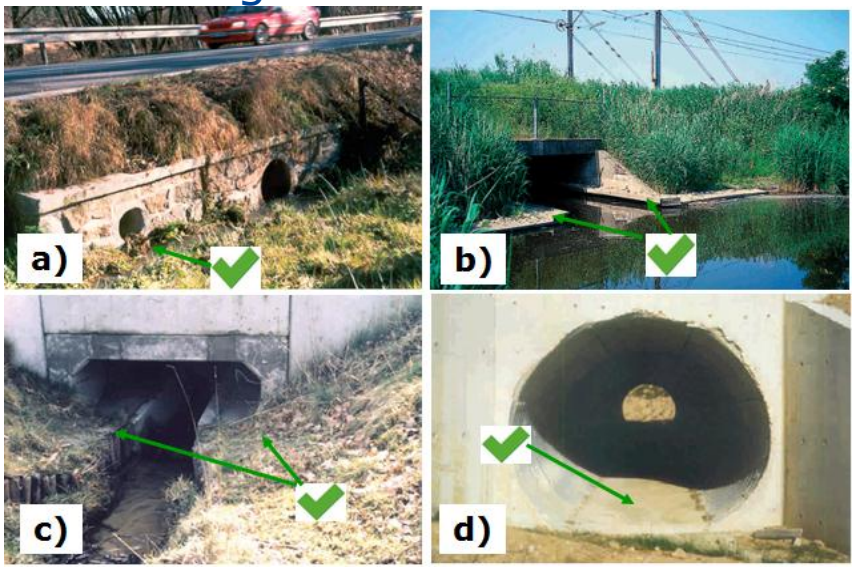


Water and habitat preservation

Why is drainage system design relevant-3: link to wildlife corridor

- Roads fragment habitat
- Wildlife mortality, especially with small mammals and frogs
- Special concern in areas of high conservation value
- Over-land passes out of scope (like bridges), but not low-kerbs
- Underpasses can be included if linked with drainage culverts
- Key is to ensure safe passage
- Dry paths (for mammals)
- Minimum water depth (for fish)





Water & habitat criteria: min. tech. spec. or award?

- Really depends on site-specific constraints, local regulations and procurer..
- Higher priorities in areas of high watercourse quality.
- Higher priority in areas of high flood risk

So the approach is to provide minimum technical criteria with the following caveats:

For preventing connections to combined sewers:

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

For drainage designs that incorporate stormwater drainage capacity:

"When local or national legislation requires, or when specifically requested by the contracting authority"

Green drainage system solutions are subject to award points in all cases

European Commission

Introducing water pollution control components in drainage systems

Criteria proposal

B4. Performance requirements for water pollution control components in drainage systems

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

a) **Road drainage** systems shall **not** be **connected to mains sewers**.

b) The drainage system shall also contain **drainage components** that aid the **removal** of **any sediment** and **solid particles from storm-water**.

Verification: The design team (or DB - 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.

European Commission

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

Points shall be awarded for drainage systems that incorporate "**soft engineered**" components that incorporate storm-water pollutant load removal, improved aesthetics and potential habitat creation in drainage infrastructure as follows:

- **Filter trenches** with low 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**)

…..

Verification:

The design team (or DB -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

C7. Inspection of water pollution control components in drainage systems

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 NRA or local authority based upon an agreed timetable.

C8. Construction of water pollution control "soft engineered" components in drainage systems

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.

European Commission

Introducing storm-water retention capacity in drainage systems

Criteria proposal

B5. Performance requirements for storm-water retention capacity in drainage systems

(When local or national legislation requires, or when specifically requested by the contracting authority)

The **drainage system** shall be designed so as to be **capable of**:

- **retaining** the **rainfall from a design storm** 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 procuring authority in the invitation to tender.

European Commission

Verification

The design team (or DB - DBO tenderer) shall be provided with the appropriate **rainfall data** for the **design storm** by the procuring authority. Using this data, they shall run a hydraulic simulation using appropriate modelling software. 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 procuring authority.

European Commission

B18. Requirements for storm-water retention capacity in drainage systems that incorporate "soft engineered" components

Points shall be **awarded** for **drainage systems** that incorporate **"soft engineered" components** (often referred to as **SuDS**) that incorporate **storm-water 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**)

....

Verification: The design team, DB tenderer or 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

C9. Inspection of storm-water retention capacity in drainage systems

The main construction contractor (or DB - 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.

C10. Inspection of storm-water retention capacity in drainage systems that incorporate "soft engineered" components

The main construction contractor (or DB - DBO contractor) shall be **responsible** for carrying 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.

European Commission

Introducing wildlife corridors across the road and other measures to reduce the likelihood of wildlife fatalities on the road

Criteria proposal

B19. Performance requirements for wildlife corridors across the road

Points shall be **awarded** for **drainage infrastructure** (culverts or underpasses) that aids the **safe passage** of **small fau**na 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 60%** of **all culverts** 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 procuring authority.

Verification

the design team (or DB -DBO tenderer) shall highlight the **details** of any **filter trenches** or **culverts** that meet the award criteria in the road drainage design and comparison shall make to the best practice guidelines

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

The main construction contractor (or DB - 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**.

European Commission

Road construction

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January2015

GPP draft criteria proposal on **congestion**

Joint Research Centre

Congestion
Rationale

- **Congestion** is caused by **lane** and **road closures** necessary for road construction and/or maintenance. It can **greatly influence vehicle fuel consumption** due to queues and associated slowdown
  - ⇨ **low traffic rural and local roads:** impacts are **negligible**
  - ⇨ **motorways** and **highways**: extra fuel consumption is prominent

- **Effective traffic management** (lane closure, traffic diversion) and **phasing** of the roadwork **into off-peak hours** (night shifts) reduce the environmental impacts of road maintenance works

- Planning the **use of hard shoulders** during **peak-hours** could be beneficial

- Specific design requirements: **tidal flow lanes** and devices to support the Intelligent Traffic Systems (**ITS**) of the Traffic Management Authorities

European Commission

Congestion

Criteria proposal

B10. Traffic congestion mitigation plan

A **traffic congestion mitigation plan** shall be presented including:

- **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 DB -DBO tenderer) includes congestion solutions based on **tidal flow lane**s or **hard shoulders** to be used as lanes, they shall present a **LCC analysis**, including user cost **externalities** due to congestion.

For those roads where **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 DB - DBO tenderer) shall provide the **detailed traffic congestion mitigation plan**, the LCCA in accordance with **ISO 15686-5** (if required) and the descriptions of the ITS devices (if required).

Joint Research Centre

C15. – E8. Commissioning of the traffic congestion mitigation plan

The main construction contractor (*or* DB -DBO contractor) shall provide documentary **evidence** of the correct implementation of the congestion mitigation plan.

The **Road 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)

European Commission

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

GPP draft criteria proposal on **maintenance and rehabilitation strategies**

Joint Research Centre

Durability
Rationale

- Materials **deterioration rate**, dependent on their mechanical and chemical properties, and the **appropriate design** and **construction** of the road ⇨ biggest influence on the **service life** of the road and its **needs for maintenance**

- **Most durable materials** might entail larger construction **costs**, but those expenses could be **offset** by **less demand** of **maintenance**

- **Ageing effects** can be monitored during operation, but **ex-ante criteria** aimed at selecting the most **appropriate design** in terms of **durability** would lead to an **optimized maintenance strategy**

Procurement guidance:
Examples of **expected maintenance frequencies** on rigid, semi-rigid and flexible pavements ⇨ **dependant** on type of material, road and proportion of truck traffic borne by the road (in flexible pavements)

Draft Italian GPP criteria: **minimum serviceability** of **surface course** (**5 years**), **binder course** (**10 years**) and **base course** (**40 years**)
Perpetual pavements (APA, 2000) designed to last longer than **50 years**; periodic resurfacing within **20 years**. Superpave (US projects)

⇨ A common **minimum durability** for the surface (applicable to **asphalt surface** on rigid and flexible pavements) and for the **binder course**
⇨ For the **base:** relevant **differences** between **rigid** and **flexible pavements**

Durability

Criteria proposal

B11. Performance requirements for durability of pavement surface and rehabilitation

The road pavement road shall comply with the following minimum durability:

- **5 years** for the **surface course**
- **10 years** for the **binder course** (excluding the surface)
- **40 years** for the **base course**

Verification

The Design team (or DB - DBO tenderer) shall provide a **technical report** specifying the **minimum durability** (service life) of the surface, binder and base courses. The report shall include the evaluation of the **bearing capacity** and the **fatigue resistance**, the **viscoplastic** and **fracture strains** of the road pavement layers and materials. The report shall include appropriate **data** and information, specifically related to **materials** physical-mechanical **performances**, construction **technologies** and **process**, design activities **workplan**

Questions to stakeholders

- Do you think that is feasible to include the durability of pavement surface and rehabilitation as a technical specification?

- Could you please provide durability data for rigid and semi-rigid pavements in order to set a similar criteria proposal?

Maintenance and rehabilitation plan

Rationale

- It is widely agreed that the **maintenance** of road network is a **relevant part** of the **road management** ⇨ proposed criteria on **rolling resistance, noise, congestion, durability** are related to this phase
- The results of the maintenance effort must be measured to assess to **what degree** the **objectives are achieved** and also to assess the **effectiveness** of **maintenance**
- **Maintenance activities** should be **planned** and **scheduled in time** so **congestion** can be **minimized**
- The **maintenance strategy** needs to be **structured** by means of
  - ⇨ **a monitoring plan** covering **target** and **thresholds values** of the **performance parameters**
  - ⇨ **A maintenance plan** describing the **actions to be taken along the service life** of the road

- Definition of the **main parameters** and of the proper **monitoring**, **data acquisition method** and **threshold values**

Performance parameter	Monitoring frequency	Acceptance threshold	Warning threshold	Action threshold	Maintenance action
Unevenness					
Rutting					
Other structural defects (ravelling, bleeding, etc.)					
Bearing capacity					
Texture (optional)					
Noise (optional)					

- The **maintenance actions**, **defining methods**, **frequency**, **amount** and **cost** of the **maintenance** and **rehabilitation**, for each section of road
- The **maintenance plan** consistently linked to the **performance parameters** and the **congestion mitigation plan**

	Cost	First year	Frequency	Performance parameters affected	Congestion mitigation plan
Routine maintenance					
Periodic					
Rehabilitation					

Maintenance and rehabilitation plan

Criteria proposal

B12. Maintenance and rehabilitation (M&R) plan

The design team (or DB - DBO tenderer) shall include in the detailed design a **maintenance plan**. For each section of road specifically characterised by specific construction methods, materials, environmental conditions, meteorological conditions and use, the tenderer shall define **as a minimum** the following aspects:

a) **Monitoring plan**:

- Including **performance parameters** to be monitored, **frequency of monitoring**, **data acquisition method**, **threshold values**, and the **maintenance actions** triggered by the thresholds values.
- Including also; **safety, service quality** and **durability parameters** and their respective frequency:

  (to be defined by the Road Authority)
- The monitored parameters shall include **MPD** and **noise**, if the respective award criteria on rolling resistance and noise apply

b) **Maintenance and rehabilitation (M&R) plan**

- Including **routine**, **periodic** and **rehabilitation** actions
- Optimizing the **cost-benefit ratio** of the maintenance works
- Aligning with the environmental performance of the main road element (carbon footprint **CF** - **LCA** if applicable).
- **Including the cost**, the **first year** after the construction, **frequency**, the **congestion mitigation plan** and the **waste management plan** for each action.

Verification:

The Design team (*or* DB - DBO tenderer) shall provide a **technical report** including appropriate data and information and the design activities workplan

D1. Commissioning of the maintenance and rehabilitation (M&R) plan

The main construction contractor (*or* DB - DBO contractor) shall **commit** to **monitor** the **road performance parameters** according to the monitoring plan presented in the design phase. Any update/improvement of this plan shall be previously discussed with the contracting authority and the NRA/local authority.

Verification:

Provide a **report** with the **results of the monitoring** for all the performance parameters, and the maintenance activities carried out

E3. Commissioning of the maintenance and rehabilitation (M&R) plan

The main construction contractor (*or* DB - DBO contractor) shall **commit** to **maintain** the road according to the **M&R plan** presented in the design phase...

Verification:

Provide a **technical report** including appropriate data and information and the activities workplan

European Commission

Road construction

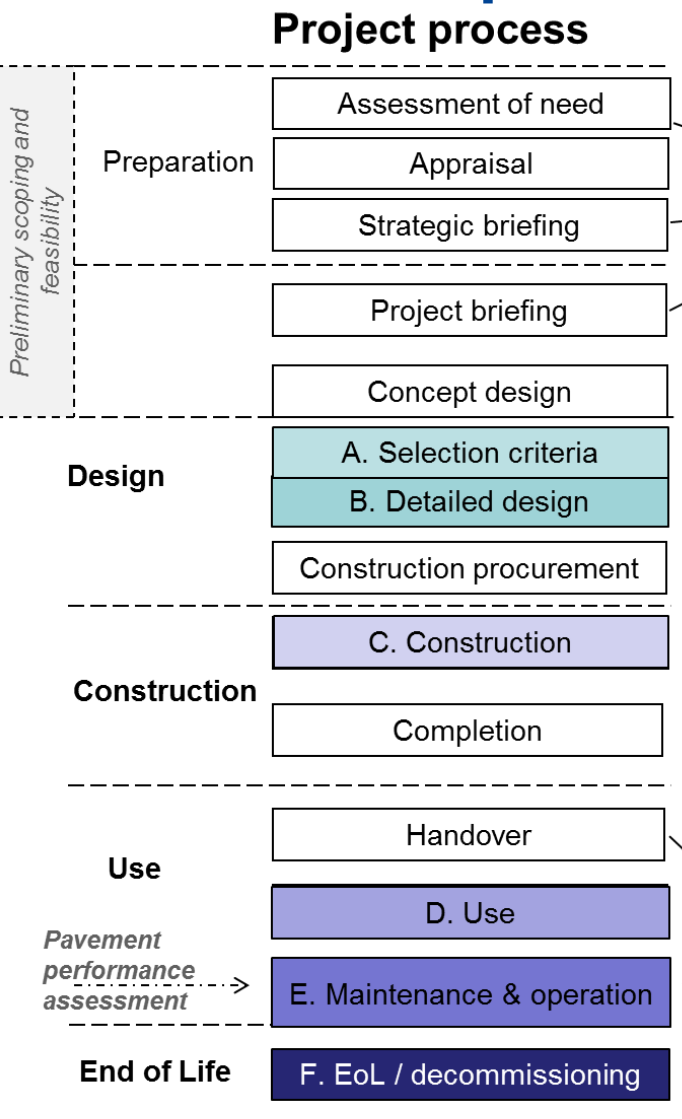
2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

Developing **guidance** for the **procurement** of **road construction - LCC**

Joint Research Centre

Indicative sequence of procurement activities



Procurement phase

According to SCI guide

Client led procurement of:

- Consultants - design cost, engineering, quantity surveyors, other specialists
- Design team
- Main contractors (for DB, DBO, PPP contracts)

SEA/EIA

- *DB design and build*
- *DBO design build operation*
- *PPP public private partnerships*

Delivery consortia/partners
Aliancing
Framework contract

Client led procurement traditional contractor(s): Main contractor(s)

- **Main contractors led procurement** (subcontractors, materials, temporary labour, plant and equipment)
  - **Sub-contractor(s) led procurement led procurement** (further subcontractors, materials, plant and equipment, trades)
    - **Trades procurement** (materials, plant and equipment, labour)

Client or contract led procurement

- Operator management services
- Maintenance services

PPP contracts are widely used in road construction

ECI Early Contractor Involvement when there is significant scope for input from the supply chain

Joint Research Centre

Questions to stakeholders

A stakeholder suggested that NRAs and local authorities should compare and select alternative types of pavement structure and materials through the use of **alternate bids** (process developed by the FHWA,US)

- Could you please provide further information on alternate bids, providing specific examples of application in Europe?

Detailed design

Putting the team together ⇨ reform of the **Public Procurement Directives** (published in the OJ 28.03.2014 and requiring transposition by MSs 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 can be a **criterion** for **awarding** a contract

A1. Selection criteria on the competency of the project manager and the design team

Verification: This shall be supported by CVs for personnel who will work on the project.

A2. Selection criteria on the competency of the construction/maintenance/rehabilitation contractors

Verification: Evidence in the form of information and references related to relevant contracts in the last 3 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 and their relevant project experience.

LCC

Total cost of infrastructure in EU - IMPACT study (Doll and van Hessen, 2008)

Externalities - Handbook on external costs estimation (Maibach et al., 2008 + Ricardo AEA, 2014)

Life Cycle Cost Analysis (LCCA)

LCC to support the development of GPP criteria for road construction

Several **examples** of road construction and maintenance costs data collected from different LCC analyses for the following scenarios:

1. **Motorway and/or highway (with 2 lanes per carriageway)**
2. **Secondary or regional road**
3. **Local road (urban and rural)**

Collection of cost data of highways and motorways (OECD, 2005)

Collection of additional cost data for road construction and maintenance

Cost adapted from [€/km-lane]	Course	Thickness (mm)	HMA	WMA*	CMA*
ARA (2011) [a]	Surface	40 40	Motorway/highway High: 33,000 Medium: 29,000-31,000 Low: 29,000 Secondary/regional High: 30,000 Medium: 26,000-29,000 Low: 26,000	Motorway/highway High:30,000-33,000 Medium: 26,000-31,000 Low: 26,000-30,000 Secondary/regional High: 26,000-30,000 Medium: 23,000-29,000 Low: 23,000-26,000	Motorway/highway CMA not used Secondary/regional High: 29,500 Medium:26,000-29,000 Low: 26,000
	Binder	100-140 80-100	Motorway/highway High: 90,000 Medium: 70,000-83,000 Low: 64,000 Secondary/regional High: 60,000 Medium: 48,000-50,000 Low: 48,000	Motorway/highway High: 81,000-90,000 Medium: 63,000-83,000 Low: 58,000-64,000 Secondary/regional High: 54,000-60,000 Medium: 43,000-49,000 Low: 43,000- 48,000	Motorway/highway CMA not used Secondary/regional CMA not used
	Base	150-200 80-100	Motorway/highway High: 18,000 Medium: 16,000-18,000 Low: 16,000 Secondary/regional High: 17,000 Medium: 16,000 Low: 16,000	Motorway/highway High: 16,000-18,000 Medium: 15,000-18,000 Low: 15,000-17,000 Secondary/regional High: 15,000-17,000 Medium: 15,000-17,000 Low: 15,000-17,000	Motorway/highway CMA not used Secondary/regional CMA not used
COWI (2014) [b]	Surface	35 35 25	Motorway/highway 67,000 Secondary/regional 67,000 Local road 55,000	Motorway/highway 60,000-67,000 Secondary/regional 60,000-67,000 Local 50,000-55,000	Motorway/highway CMA not used Secondary/regional 67,000 Local 55,000
	Binder	56 56	Motorway/highway 70,000 Secondary/regional 70,000 Local road (0mm) No binder	Motorway/highway 63,000-70,000 Secondary/regional 63,000-70,000 Local road (0mm) No binder	Motorway/highway CMA not used Secondary/regional CMA not used Local road (0mm) No binder
	Base	144 60 70	Motorway/highway 140,000 Secondary/regional 60,000 Local 82,000	Motorway/highway 126,000-140,000 Secondary/regional 54,000-60,000 Local road 74,000-82,000	Motorway/highway CMA not used Secondary/regional 60,000 Local road 82,000
Federbeton (2010)	Surface	200	Motorway/highway 18,000	n.a.	n.a.
	Binder	260	Motorway/highway 47,000-59,000	n.a.	n.a.
	Base	300	Motorway/highway 16,000-18,000	n.a.	n.a.

Motorway/highway (2 lane per carriageway):
High: AADTT 10000 Medium: AADTT 5000-7000 Low: AADTT 2500

Secondary/regional roads (1 lane per carriageway):
High: AADTT 1500 Medium: AADTT 500-1000 Low: AADTT 250
A lane width of 3.5-3.75 meters

[a] Converted from CAD – 1.4781 exchange rate (July 2014)
[b] Converted from DKK - 7.4557 exchange rate (July 2014)
*calculated based on information received on HMA and CMA from Norway and Sweden (COWI, 2014)

Cost of road construction

Cost of earth works, ground works, soil preparation and stabilization

Cost of surface, binder and base courses

Cost for rigid and semi-rigid pavements

Cost of maintenance

Cost of routine maintenance
Cost of periodic maintenance
Cost of rehabilitation

European Commission

Road construction

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

Conclusions

Joint Research Centre

Conclusions

GPP criteria application in different scenarios

GPP criteria	Scenario where	
	Little or no potential benefits	**Large potential benefit**
Pavement-vehicle interaction Macrotexture	Low traffic flow. Low heavy traffic	High traffic flow. High heavy traffic
Materials	Pavements with low structural demands (e.g., low AADTT, temperate climate) that require less material High availability of recycled materials and by-products in local area.	Pavements with high structural demands (e.g., high AADTT, extreme climate) that require more material. Under development market for recycled materials and by-products in local area.
Transportation	Low overall material demand. Locally available materials, especially aggregates. Use of on site recycling strategies. Any long-distance travel utilizes efficient transportation modes (i.e. by train)	High overall material demand. Materials need to be shipped over long distances, especially aggregates. Long-distance travel using inefficient modes. Use of virgin materials for each process.
Noise – low noise pavement and noise barriers	Roads remote from populated areas. In low traffic roads. In low speed limit roads (<50km/h).	Roads from densed populated areas and/or high speed roads. In medium-high speed roads (>50km/h) of freely flowing traffic.
Drainage -flooding	In arid or rural areas with no previous history of flooding.	In river basins with identified flood risks. In areas with high urban development.
Drainage - water pollution	In arid areas with little rainfall. In areas remote from sensitive water bodies. In low traffic flow roads.	In areas near sensitive water bodies. In high traffic flow roads.
Congestion	Pavement sections with low traffic or where capacity is much higher than demand. Sections with readily available detours. Use of lane closures during off-peak traffic periods	Pavement sections with high traffic or where capacity is comparable to demand. Sections where detours are not readily available. Lane closures occur during peak traffic periods

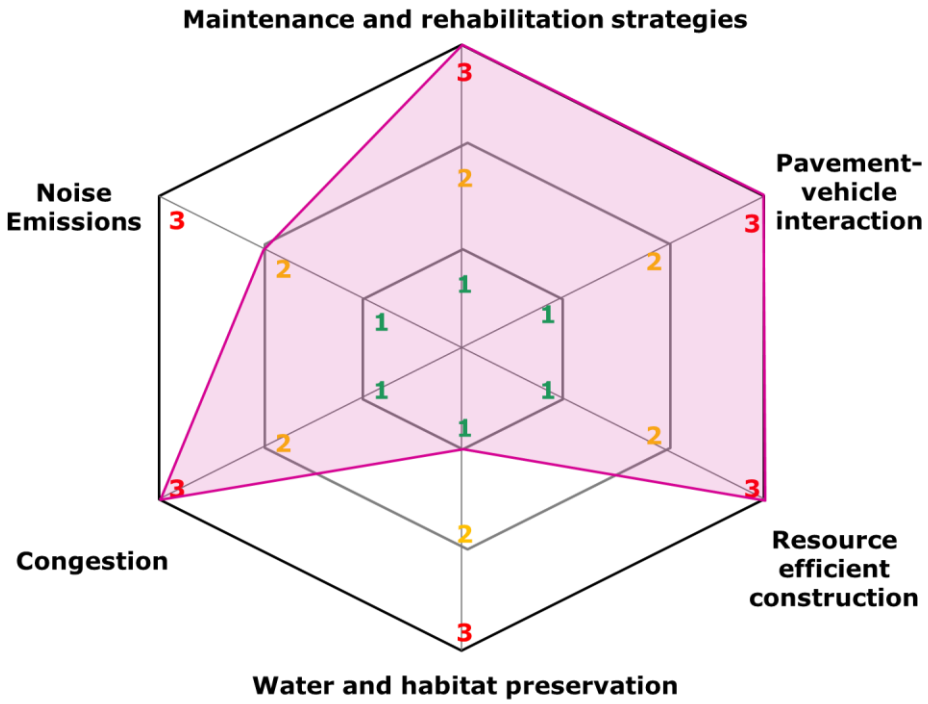
Scenarios	Pavement-vehicle interaction	Congestion	Resource efficient construction			Water and habitat preservation		Noise emissions		and
			Construction materials	Soils	Materials Transportation	Drainage - flooding	Drainage water pollution	Noise – low noise pavements	Noise barriers	Maintenance rehabilitation
Low traffic flow										
High traffic flow										
Freely flowing										
Not freely flowing										
Low speed road (<50km/h)										
Medium-high speed road (>50km/h)										
Rural road near populated area										
Rural road remote from populated area										
Urban road										
Within river catchment with known flooding risk										
Within arid area with no previous flooding risk										
Road area with unsuitable subgrade soil										

* green the criterion is not important for the scenario stated

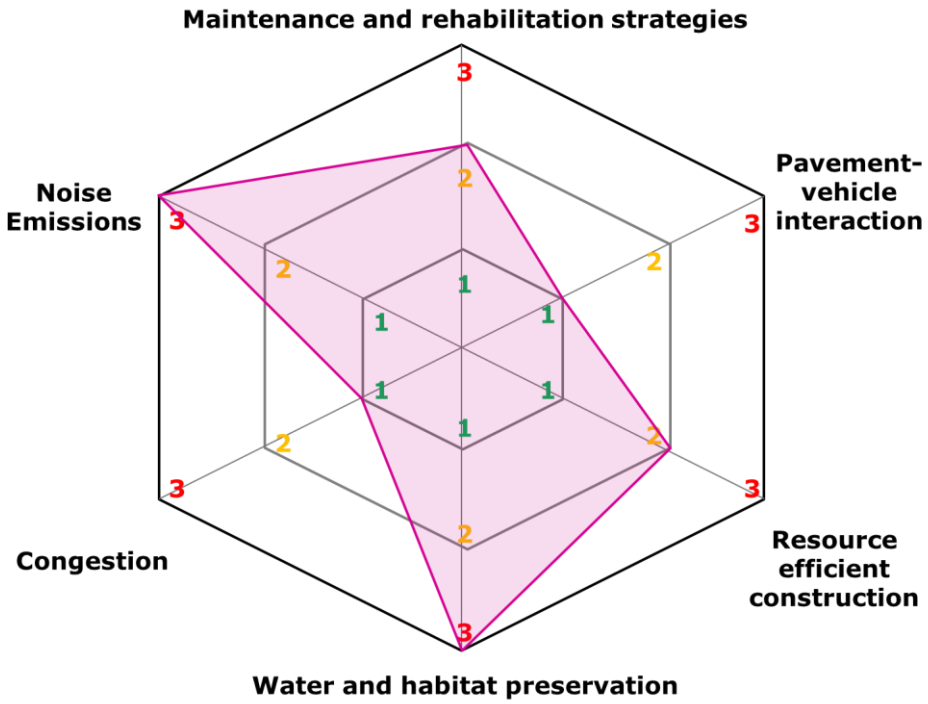
**yellow indicates that the criterion may be important but it would depend on other information.

*** red indicates that the criterion is important under that particular scenario.

Criteria selection web



Example of criteria selection web for a high traffic rural road close to populated areas with congestion problem



Example of criteria selection web for a low traffic rural road close to populated areas or in urban areas with flooding risk

European Commission

2nd Ad Hoc Working Group Meeting for the revision of the Green Public Procurement criteria

28th January 2015

Next steps and closure

Joint Research Centre

GPP criteria process development

Product Group Identification (GPP AG)

Preparatory work

Preliminary Report

Technical report (draft criteria areas and guidance on procurement) 1

12.03.2014

1st AHWG

Translate criteria areas into criteria

Today
28.01.2015

2nd AHWG

Technical report (draft criteria and guidance on procurement) 2

Final Draft Criteria

Final Draft GPP Criteria

Written Consultation (optional)

GPP Advisory Group

Inter-service consultation

Final GPP Criteria

EC website – ENV GPP
http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Next steps

1. **Minutes** and **presentations** of the meeting will be sent in the coming weeks

2. Stakeholders can provide comments on working document until **22.02.2015**

3. Comments need to be transmitted in BATIS. Using the BATIS system (HTML + folder)

4. Comments will be used to prepare the **final draft GPP criteria.** *If needed a further written consultation will be carried out*

Thanks for your attention

Contact Elena Garbarino, Rocio Rodriguez Quintero, Shane Donatello, Miguel Gama Caldas, Oliver Wolf

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