BISON

BIODIVERSITY AND INFRASTRUCTURE SYNERGIES AND OPPORTUNITIES FOR EUROPEAN TRANSPORT NETWORKS

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Deliverable D4.1

Research and Innovation Needs Expressed by Stakeholder

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EXECUTIVE SUMMARY

The BISON project is led by a consortium of 39 European members and associated countries. It aims to tackle the integration of biodiversity with the development of infrastructure, including roads, railways, waterways, airports, harbours, or energy transport networks.

The BISON project will meet the above aim through the following objectives:

- Identify future research and innovation needs for a better integration of biodiversity with infrastructure.
- Identify the construction, maintenance and inspection methods and materials which are long-lasting and resilient and can be used by different transport modes to mitigate pressure on biodiversity.
- Support European Member States to fulfil their international commitments by engaging all stakeholders into biodiversity mainstreaming for infrastructure planning and development.
- Strengthen European Member States' leadership in sustainability, by showing the way to other countries, including developing countries.

This deliverable is produced in the context of WP4 – Towards a Research Agenda for Europe. The objective of WP4 is to produce the research side of the Strategic Research and Deployment Agenda (SRDA) that can be endorsed and successfully rolled out by the national transport infrastructure authorities and the public innovation programme owners, representing the environmental and social needs and requirements for infrastructure innovation with a particular focus on biodiversity. In order to pave the way towards future relevant innovative solutions and developing alternatives for more biodiversity-friendly transport infrastructures, WP4 methodology builds notably on inputs from industry stakeholders, transport authorities, the research community as well as environmental agencies.

Deliverable D4.1 - Research and innovation needs expressed by stakeholder, constitutes the base for the construction of the strategic research agenda (SRA) for a better integration of biodiversity with infrastructure in Europe. It presents the census of expectations (needs, requirements) and proposals of new/future possible solutions, expressed by all types of stakeholders in view of more biodiversity-friendly transport infrastructures and modes. Those inputs have been collected from an online consultation of relevant institutions and experts (47 contributors), as well as through the survey of documents published by stakeholder national, European and international organisations during the last decade (80 documents). Each input has been assessed according to its direct or indirect match with the topic and classified in a main thematic among A – Planning and strategy; B – Planning and environmental impact assessment; C – Implementation and management; D – Education, awareness, consultation and communication). This leads to a series of 375 well-focused inputs (183 expectations and 192 proposals) and 215 broader issue inputs (110 expectations and 105 proposals). The different types of infrastructures are addressed in 95% to 19% of the inputs, depending on expectations and proposals and their origin: consultation or publications. In a general way this decreases from roads and railways to pipelines, through waterways, airports, power lines and

harbours. However inputs from the consultation (expectations and proposals) tend to integrate a wider diversity of infrastructures than those from stakeholders' organisation publications.

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TABLE OF ACRONYMS

Abbreviation	Meaning
ACARE	Advisory Council for Aviation Research and Innovation in Europe
ACI Europe	Airports Council International Europe
ACLIE - EWT	African Conference for Linear Infrastructure and Ecology – Endangered Wildlife Trust
AIVP	*Association Internationale des Villes Portuaires* / The worldwide network of port cities
ANET	Australasian Network for Ecology and Transportation
AMPHI	Amphi International ApS, Denmark
ASFA	*Association des Sociétés Françaises d'Autoroute, France* / Association of French Motorway Companies
BISON	Biodiversity and Infrastructure Synergies and Opportunities for European transport Network
CAU	*Christian-Albrechts-Universität zu Kiel, Germany* / Christian-Albrechts University of Kiel
CBD	Convention of Biological Diversity, United Nations
CDV	*Centrum Dopravniho Vyzkumu, Czech Republic* / Transport Research Centre
CEDR	Conference of European Directors of Roads
CER	Community of European Railway and infrastructure companies
CESE	*Conseil Economique Social et Environnemental, France* / Economic, Social and Environmental Council
CILB	*Club Infrastructures Linéaires et Biodiversité, France* / Linear Infrastructures and Biodiversity Club
CSA	Coordination and Support Action
DGAC	*Direction Générale de l'Aviation Civile, France* / General Directorate of Civil Aviation
EBA	European Boating Association
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEA	European Environment Agency
EFIP	European Federation of Inland Ports
EGIS	*Egis Structures et Environment, France* / Structures and Environment
EIA	Environmental Impact Assessment

Abbreviation	Meaning
EIB	European Investment Bank
EIM	European rail Infrastructure Managers
ENTSO-E	European Network of Transmission System Operators - Electricity
ERA	European Railway Association
ERRAC	European Rail Research Advisory Council
ESPO	European Sea Ports Association
EU	European Union
FEHRL	Forum of European Highway Research Laboratories
FNE	*France Nature Environnement, France* / France Nature Environment
FPPE	Fauna Passage Poland - Environment, Poland
G20	Group of 20 countries with the world's biggest economies
GEF	Global Environment Facility
GIB	Global Infrastructure Basel, Switzerland
ICOET	International Conference on Ecology and Transportation
IDRRIM	*Institut des Routes, des Rues et des Infrastructures pour la Mobilité, France* / Institute of Roads, Streets and Infrastructures for Mobility
IENE	Infrastructure and Ecology Network Europe
IISD	International Institute for Sustainable Development
IFSTTAR	*Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux, France* / French institute of science and technology for transport, development and networks
IHMA	International Harbour Masters Association
IMO	International Marine Organization
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IRSTEA	*Institut national de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture, France* / National Institute of Research in Science and Technology for the Environment and Agriculture
ISO/TC 331	International Standard Organisation / Technical Committee Biodiversity
IUCN	International Union for Conservation of Nature
NCA CR	*Agentura ochrany přírody a krajiny, ČR* / Nature Conservation Agency of the Czech Republic
MDV (MINDOP)	*Ministerstvo dopravy a výstavby, SR* / Ministry of Transport and Construction of the Slovak Republic
MIRRI	*Ministerstvo investícií, regionálneho rozvoja a informatizácie, Slovakia* / Ministry of Investment, Regional Development

Abbreviation	Meaning
MTES	*Ministère de la Transition Ecologique et Solidaire, France* / Ministry of Ecological and Solidarity Transition
MŽP	*Ministerstvo životného prostredia, SR* / Ministry of Environment of the Slovak Republic
OECD	Organisation for Economic Co-operation and Development
OFB	*Office Français de la Biodiversité, France* / French Office for Biodiversity
PIANC	Permanent International Association of Navigation Congresses
PIARC	Permanent International Association of Road Congresses
SBSTTA	Scientific, Technical and Technological Advice
SEA	Strategic Environmental Assessment
SEA-Europe	Shipyards' and Maritime Equipment Association of Europe
SNCF	*Société Nationale des Chemins de fer Français, France* / National Railway Company
ŠOP	*Štátna ochrana prírody, SR* /State Nature Conservancy of the Slovak Republic
SR	Slovak Republic
SRA	Strategic Research Agenda
SRDA	Strategic Research and Deployment Agenda
ST	Subtask
STUBA	Slovak Technical University in Bratislava (Spectra), SR
T20	Think 20 (network of think tanks from G20 countries)
TII	Transport Infrastructure Ireland
TRB	Transportation Research Board
TRL	Technology Readiness Level
UAF&FA	*Union des Aéroports Français et Francophones Associés, France* / Union of French and associated French-speaking airports
UGE	Université Gustave-Eiffel, France
UIC	*Union Internationale des Chemins de fer* / International union of railways
UKF	*Univerzita Konštantina Filozofa v Nitre, SR* / Constantine the Philosopher University in Nitra
UN WPSP	United Nations World Ports Sustainability Program
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

Abbreviation	Meaning
UNEP - SIP	UNEP - Sustainable Infrastructure Partnership
UPGE	*Union Professionnelle du Génie Ecologique, France* / Professional Union of Ecological Engineering
WB	World Bank
WP	Work Package
WPSP	World Ports Sustainability Program
WWF	World Wide Fund for Nature

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1. INTRODUCTION

1.1. Objectives of the BISON project

Through topic MG-2-10-2020, the Call 2018-2020 Mobility for Growth is the first one issued by the EC on the topic of transport that directly integrates biodiversity issues. As part of the last call of calls under H2020, the BISON project is an opportunity to set the ground and upscale research on these topics in the next European research framework programme 2021-2027 (HORIZON EUROPE). Whilst the Green Deal aims at improving the transversal approach of topics and sectoral policies, the BISON project aims to address the mainstreaming of biodiversity with infrastructure development (which includes energy production and distribution), while addressing also pollution and/or climate change interactions with the overall biodiversity decline concern. Lastly, as a Coordination and Support Action (CSA), the BISON project aims to facilitate and enhance pan-European cooperation between:

(i) Member States (such as governments, national research centres, infrastructure operators and civil society) which are expected to be long-lasting and further strengthened beyond the timeline of the project

and

(ii) All forms of infrastructure (including roads, railways, waterways, airports, ports or energy transport networks) by creating synergies, identifying common needs for research and innovation, and sharing good practices to avoid and mitigate impacts on biodiversity.

By providing a forum for sharing solutions and lessons learnt, as well as identifying common issues, the BISON project aims to contribute to breaking the borders between the fields of biodiversity preservation and infrastructure planning and maintenance. It aims also to make research and innovation more efficient through mutualisation of existing knowledge.

The BISON project aims to achieve the above through the following specific objectives:

● To identify future research and innovation needs for a better integration of biodiversity with infrastructure planning, construction, operation and decommissioning. The project aims to develop a Strategic Research and Deployment Agenda (SRDA) which can be deployed at multiple scales, within the EU research framework programme, or by other regional, national or local programmes, in order to improve the knowledge-base on infrastructure and biodiversity.

● To make linear infrastructure more high performing and reliable while taking into account the specific needs of Western (e.g. need to adapt existing long-lived infrastructure to environmental changes, to support declining native species…) and Eastern (e.g. need to mitigate land-use change and habitat fragmentation due to the surge in infrastructure developments that are threatening the local very often endemic biodiversity) Europe. The project will identify the construction, maintenance and inspection methods and materials which are long-lasting and resilient and can be used by different transport modes to mitigate pressure on biodiversity.

● To support European Member States to fulfil their international commitments by engaging all stakeholders into biodiversity mainstreaming for infrastructure planning and development. The project will do so by providing recommendations to minimise the impacts of infrastructure on biodiversity through supporting existing and developing projects.

● To support European Member States to become political leaders through collaboration and support of European research institutions and infrastructure operators, and providing more sustainability at the international level through jointly addressing biodiversity and infrastructure challenges.

1.2. Objective and method of BISON WP4

The Strategic Research and Deployment Agenda aims to define the vision, overall goals, main priorities, investment areas and a research and deployment roadmap for all types of European stakeholders[1]. In the framework of the BISON project, the specific objective of BISON Work Package 4 (Towards a Research Agenda for Europe) is to elaborate the research side of the SRDA, namely the Strategic Research Agenda (SRA).

WP4 is about implementing a methodology to identify and classify research needs, aiming at producing a SRA for more biodiversity-friendly transport infrastructures and modes in Europe. The methodology is composed of 3 steps, corresponding to the 3 tasks of WP4:

- Task 4.1 (Stakeholders' vision on societal and environmental needs and requirements for infrastructure innovation) aiming to collect expectations and proposals from stakeholders;

- Task 4.2 (Identification of innovation paths in view of Changing demand, Social changes, Climate, Biodiversity, Technology and Digitalisation) aiming to analyse and classify all identified issues;

- Task 4.3 (Prioritization of research issues and initiatives for European agenda) aiming to prioritise research actions according to their environmental importance and the gap with the current state of knowledge.

In the aim of building a relevant and applicable SRA, it's most important to be aware of the points of view of all type of stakeholders regarding the situation, their expectations and their possible proposals, as well as to consider their points of view on the prioritization of future research initiatives. That's why, in its first step, the methodology has been designed to take input from stakeholders on their expectations and proposals. That's also why, in the third step, the methodology is designed to get their feedback on research initiatives and their schedule (external review of the SRA before validation). Figure 1 presents the general articulation of the method steps. Stakeholders are notably environmental agencies (Env. Agencies), research institutions (Research), transport management and infrastructure construction enterprises (Industry), non-governmental organisations (NGOs), transport authorities... Deliverable 4.1

[1] From Ideal-IST, https://www.ideal-ist.eu/spotlight/strategic-research-innovation-and-deployment-agenda-srida

(D 4.1) is the document that results from the first step of the method and it will be an important basis for the development of the following step. The broad detailed overview of research needs that will result from the second step (Milestone MS 4.1) will then be the basis for the construction of the SRA.

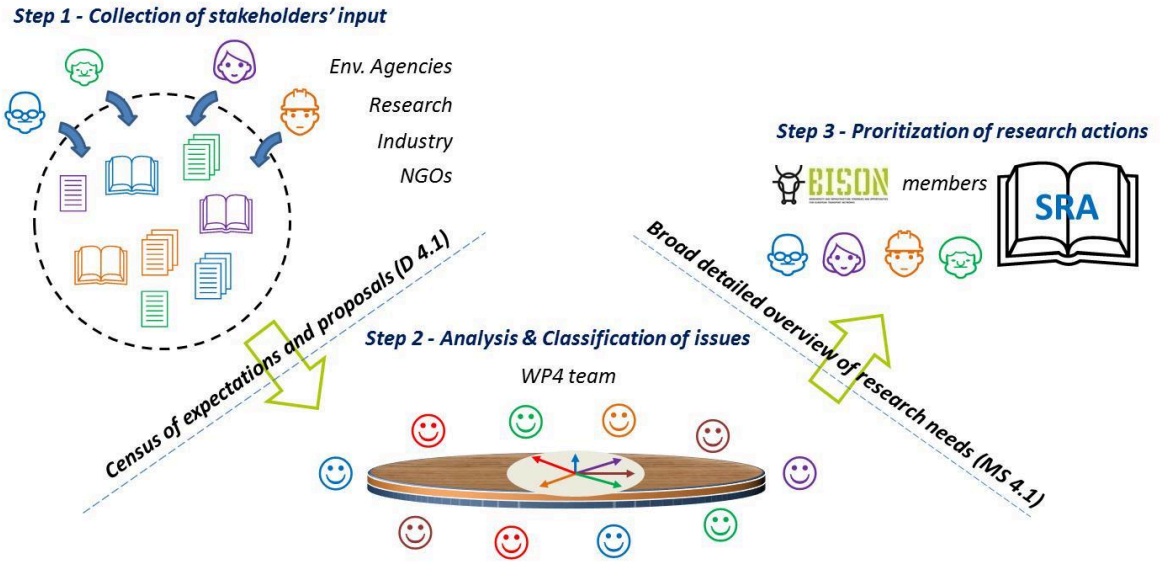

Figure 1. Articulation of WP4 steps (tasks)

2. AIM OF DELIVERABLE 4.1

2.1. What is Deliverable 4.1?

In the original version of the BISON project, the status of the document reporting on the expectations and possible proposals from all kinds of stakeholder was that of a milestone (MS) on the way to the SRA development. The reviewing process of the project has turned it into a deliverable. However, its objective and date of submission remained unchanged. At an early stage of the project, it creates first basis for more ambitious deliverables that will be developed later within WP4 and in close interaction with other work packages (Task 3.3 and Task 5.3).

The peculiarity of the document is to report on point of views expressed by various stakeholders to the broad question on their expectations related to more biodiversity-friendly transport infrastructures, and to their possible proposals to progress in this way. This questioning was integrated in a broader consultation organised for the whole BISON project and its various tasks. The finalisation of the general online BISON questionnaire, slowed down by the remote working conditions has led to a late opening of consultation (26/04/2021) with respect to the document submission deadline.

In order to optimize the consultation period with respect to the production of the document, WP4 partners disseminated the questionnaire to a great number of addressees and several reminders were sent. The period of collection of inputs was extended as long as possible. Moreover, the processing of answers as they come was implemented in the aim of minimizing the time necessary for the final treatment of the whole inputs before drafting.

For the benefit of the whole BISON project, the general consultation was extended to the 7/07/2021, i.e. plus 14 days with respect to the last contributions compiled in the document (59 days of consultation). Hence the document doesn't contain the possible late contributions to the questions on expectations and proposals. Nevertheless, despite not edited, such inputs will also be taken into account in the analysis and classification of inputs during Task 4.2.

As a result, as regards the voluntary contribution of stakeholders (see Section 3.1), the present deliverable provides a useful glance of their expectations and proposals today. In the next step of the WP4 process, all inputs (both those that have been edited and those that are late) will be considered, as well as documents indicated by some contributors. For the present time and for the purpose of Task 4.1, the consultation is very efficiently complemented by the document survey (see Section 3.2).

The long list of inputs is presented in full in appendices A and B of the document, for use in the following steps. At that stage of the process, the results (Section 4) are about the characteristics and effectiveness of the information collection process, described from several angles. Section 3 of the document presents the methodology that was adopted to collect information.

2.2. A base for the Strategic Research Agenda for Europe

2.2.1. Multi-dimensional scope

Deliverable 4.1 is expected to constitute an important base for the construction of the SRA for more biodiversity-friendly transport infrastructures and modes in Europe. In this aim, the objective of Deliverable 4.1 is to report in an extensive way on all expectations and proposals expressed by all types of relevant stakeholders. Stakeholders (individuals and institutions) include industry or the service sector, research, transport authorities, environmental agencies, NGOs... The considered infrastructures include roads, railways, waterways, power lines, pipelines, airports, harbours...

Considering the great diversity of stakeholders, infrastructures and disciplines involved (environmentalists, engineers, managers, policy makers, lawyers, sociologists, psychologists, economists...), the variety of experiences and points of view, at the institutional as well as individual level, is huge. This mass of information is worth being considered in view of finding new practices, tools, methods or approaches aimed to solve efficiently problems encountered by biodiversity because of transport infrastructure today. It can also serve to prevent these problems thanks to what transport infrastructure could be tomorrow. Its cross analysis under a variety of scientific angles will be used (Task 4.2) to identify relevant research issues that can hardly be highlighted and developed by the fragmented sectoral approach that has prevailed until now.

By the way, this approach echoes an expectation of the call topic MG-2-10-2020 for the provision of a SRDA: "… a Strategic Research and Deployment Agenda (SRDA) endorsed by the national transport infrastructure authorities and the public innovation programme owners, representing the societal and environmental needs and requirements for infrastructure innovation. The agenda will take input from the relevant industry stakeholders, in close cooperation with the research community as well as environmental agencies which will supply innovative solutions…".

Hence, for step 1 of the methodology and for Deliverable 4.1, input from stakeholders has been searched on two aspects: one regarding their expectations (needs, requirements) to reach more biodiversity-friendly transport infrastructures and modes; the other one regarding the concrete proposals they may have to implement more biodiversity-friendly solutions for transport infrastructures and modes.

2.2.2. Expectations and proposals of stakeholders

Because most often statements of good intentions are impaired by numerous constraints, hardship, adverse forces and limitations, the first question is about the conditions that must be met (all the prerequisites) in the aim of creating a general context consistent with the goal of biodiversity-friendly transport infrastructures and modes. The identification and clarification of inconsistencies and requirements is likely to raise many research questions. Furthermore, the solutions that may have been devised and/or tested by stakeholders deserve to be studied as such: innovative solutions that are more or less effective on different biodiversity issues; that

have been developed more or less empirically and raising and/or requiring further cognitive studies with a view to their possible generalisation. But the proposed solutions are also worth being studied as an indicator of the biodiversity problem they are supposed to solve (need analysis): What is the original problem? Was it correctly analysed? Doesn't it contain hidden unsolved questions? May the solution generate downstream or collateral problems?

It's worth getting such answers from institutions representative of large groups of stakeholders in order to assess how far their policy and strategy can or could converge with the objective of more-biodiversity transport infrastructures and modes. The information can be found notably in documents of strategic and policy nature published by such institutions, at national or international level. As awareness may be recent in some institutions, the position and perspectives of the latter can also be reported by their representatives. As unfortunately the situation of biodiversity degrades faster than the policy of several stakeholder institutions can evolve, it's also worth to take the opportunity to get points of view of individuals who, observing the gap increase with respect with what should be done, are able to express original expectations and proposals. These persons can be independent experts but also members of institutions (detection of weak signals). It is well known that the COVID-19 pandemic episode experienced while the BISON project was in the set-up and start-up phase was conducive to a lot of individual questioning on the current environmental issues. Not all of these will be fully or quickly incorporated into the policies and strategies of stakeholder institutions, but if some of these reflections can be collected, it is quite appropriate to do so, particularly in the aim of feeding the reflection on breakthrough approaches and solutions.

The question (Q1) asked to stakeholders regarding their expectations is: "In view to innovate in order to achieve more biodiversity-friendly transport modes and transport systems, according to your experience you may have identified some specific or general needs and/or requirements on the environmental as well as the societal field. Of course, these societal and environmental issues are not disconnected from the political, juridical, economical and technical dimensions, so your comments can integrate, and possibly mix, all these dimensions too. Can you specify, and possibly develop, 1 to 5 of these expectations ?".

The question (Q2) asked to stakeholders regarding their proposals is: "According to your experience, you may have some ideas of innovative solutions that could be potentially interesting to achieve more biodiversity-friendly transport modes and transport systems, or at least interesting to answer to some needs and requirements mentioned above (Q1). Those proposals can result from your own experience, be theoretical or have been applied or experimented somewhere. They can consist of innovative practices, tools, methods, approaches. Can you indicate 1 to 5 of these proposals? ".

The comprehensive title of Deliverable 4.1 is "Census of environmental and societal needs and requirements for transport infrastructure innovation according to all stakeholders. Census of proposals of solution by stakeholders".

2.3. A source of data for the construction of the SRDA

The information collected during step 1 of the WP4 methodology and compiled in Deliverable 4.1 will constitute a mass of raw material for the second step (Task 4.2) of the process towards the research agenda construction. But it will also be a source of data for Task 3.3 (Emerging trends and future challenges) and Task 5.3 (The future: plausible scenarios, relevant EU funding sources and proposals for future cross-thematic funding) of the BISON project to feed the collective construction of the SRDA.

Concerning their expectations as well as their proposals, stakeholders are asked (Q1 and Q2) to explain the situation that gave rise to them. Such contextualisation which describes the diverse situations actors are facing is a source of first-hand information that can be useful to improve and enriched the understanding of the emerging trends and ongoing changes that are analysed in Task 3.3. This will contribute to strengthen the realism of a set of future scenarios under which innovative solutions could be deployed in Europe. This will also contribute to strengthen the realism of a set of future scenarios under which innovative solutions could be efficiently deployed in Europe (Task 5.3) to meet stakeholder expectations. Some proposals of technical solutions indicated by stakeholders can present high level of TRL, hence be close to become operational innovation. The analysis of the feasibility and relevance of the last steps of development falls under the expertise of Task 5.3, while the retrospective need analysis can be carried out under Task 4.2 (see Section 2.2).

3. METHOD FOR THE COMPILATION OF INFORMATION

In the aim of maximising the compilation of information, two collection methods were used. One is the direct consultation of stakeholders (Subtask 4.1.1). The other one is the review of documents published by stakeholder organisations (Subtask 4.1.2).

3.1. Online consultation of stakeholders

The two questions specified in Section 2.1 were implemented in the online questionnaire[2] organised for the whole BISON project under the coordination of WP2. They were grouped under Question 1.5 – Expectations and proposals of for more biodiversity-friendly transports, as part of section "Strategic and planning aspects" of the questionnaire. Contributors to the question were asked to specify when a proposal of solution was related to a given expectation. Figure 2 presents the two parts of Question 1.5 online. Participants in the consultation were asked to specify whether they were contributing on behalf of their organisation, as individuals, or both.

Lists of addressees among international, European, national and sub-national institutions representative and relevant for the different kinds of stakeholders were drawn up for the dissemination of the questionnaire. All BISON members were asked to contribute to these lists by providing contacts (representatives of institutions, experts) in their country and professional networks.

The BISON online questionnaire was made available from 26 April 2021. BISON members were charged to disseminate the information among their contacts and were asked to contribute as soon as possible to the consultation. Regarding the preparation of Deliverable 4.1, hence answers to its Question 1.5, contributions were considered until 23 June 2021 (i.e. 6 weeks opened to consultation). Monitoring of answer collection to Question 1.5 and classification of expectations and proposals provided by participants were achieved by Peter Mederly (UKF).

[2] https://bison-transport.eu/bison-questionnaire/

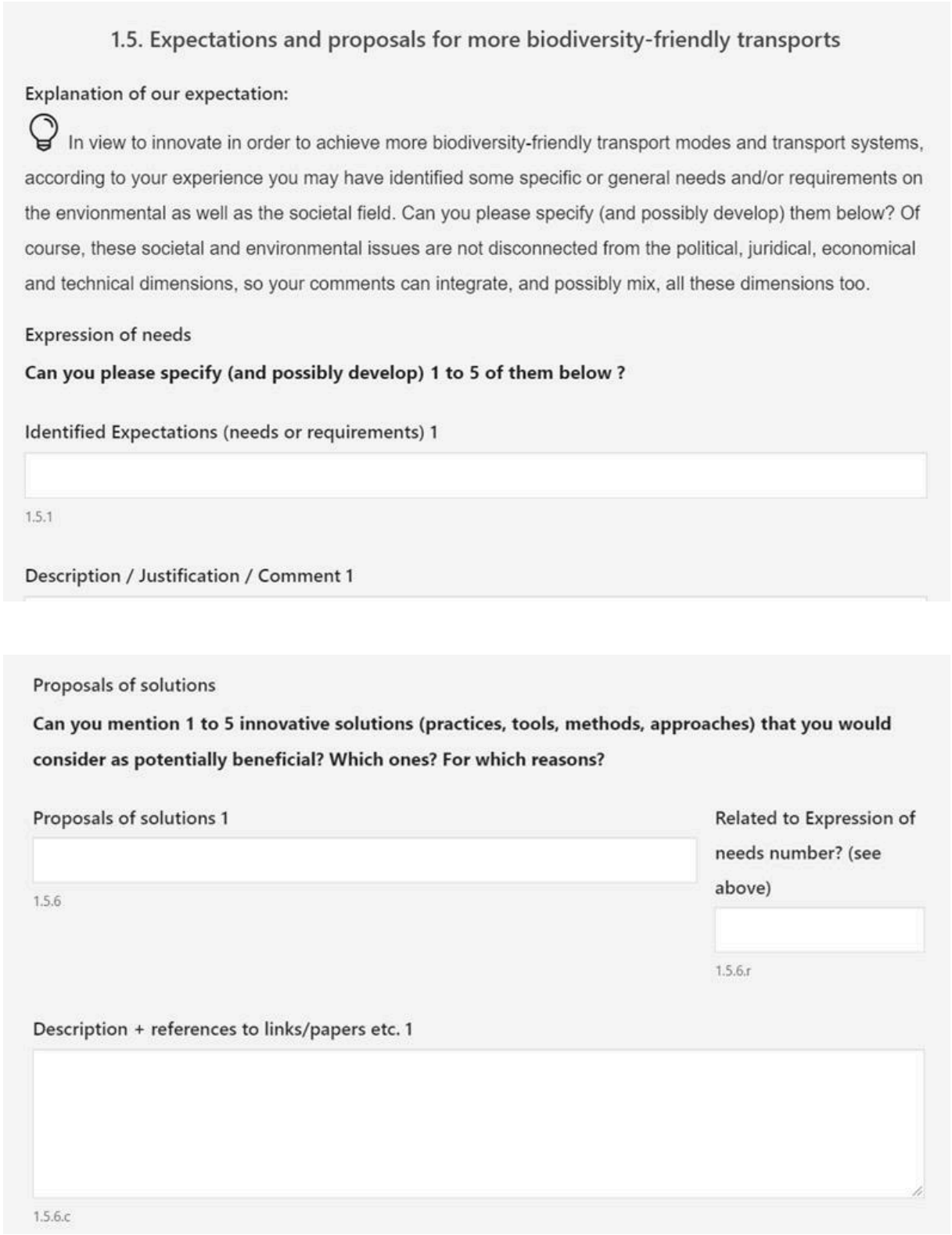

Figure 2. Question 1.5 of the BISON online questionnaire

3.2. Document survey among stakeholder organisations

This subtask (ST 4.1.2) echoes to the online consultation with the same questions (expectations and proposals), but investigated in that case across the documents published by the diverse stakeholders' organisations acting at national, European and international levels. It complements and contextualises the inputs of online voluntary contributions. The most relevant documents to find such information are those of strategic or policy nature (e.g. multi-annual plans, strategic agendas…), position or visionary papers, analyses of gaps, innovative methodologies… The documents produced in the last decade have been looked with priority.

Document information:

Title:

Language:

Short description of document (up to 100 words on aim and legal binding):

Originator of document:

Full bibliographic reference in APA style:

Download link to online version (if available):

 # Issue 1: Expression of expectations (needs, requirements) for improving infrastructures in view of more biodiversity-friendly transport modes and transport systems. These expectations may regard the environmental and societal dimensions but also political, juridical, economical and technical dimensions.

Identified Expectations (needs and requirements):

Text	References (page or chapter in document)	Thematic (A/B/C/D)	roads	railways	waterways	power lines	pipelines	airports	harbours

 # Issue 2: Expression of possible innovation solutions or paths for more biodiversity-friendly transport modes and transport systems. They may regard practices, tools, methods, approach of the problems. Proposals can result from experience feedback or can be purely theoretical at that stage, born from observation and reflection.

Proposed solutions:

Text	References (page or chapter in document)	Thematic (A/B/C/D)	roads	railways	waterways	power lines	pipelines	airports	harbours

Explanation:

Full bibliographic reference: use APA style; free online tool is available from https://www.scribbr.com/apa-citation-generator/

Thematic: A= Policy and strategies; B=Planning and environmental impact assessment; C= Implementation and management; D= Education, awareness, consultation and communication. If other than A/B/C/D, specify.

Modes of transport: mark with "X" all relevant modes

Figure 3. Document information form

First, WP4 members have been asked to analyse documents from their own institution, country and also from the international/European organisations they could be member. A document information form, intended to report on the expression of expectations and proposals in those documents (following Q1 and Q2) has been developed and made available to WP4 members. The structure of the document information form in reproduced in Figure 3. Readers of documents were asked to rank the identified expectations and proposals according to four thematics: Policy and strategies; Planning and environmental impact assessment; Implementation and management; Education, awareness, consultation and communication, otherwise, to specify.

In a second iteration, WP4 members were asked to contribute to the search and to the analysis of documents from a series of stakeholder institutions at European and international level. The search for relevant documents from these organisations and their analysis were shared between several WP4 partners (Amphi-FFPE, CDV, Egis, OFB, STUBA, TII, UIC, UGE, UKF and UPGE). Table 1 presents the institutions that have been investigated at international and European level by WP4 partners. Through WP2 (Charlotte Navarro, Yannick Autret), some volunteer members of the Advisory Group (so-called "involved" members) towards this aspect of the BISON project were asked to provide relevant documents from their institution. This happened notably (see Table 1) towards the representatives of CER (Community of European Railway and infrastructure companies), EIM (European rail Infrastructure Managers), UNEP-SIP (United Nations Environment Programme – Sustainable Infrastructure Partnership), WWF-US (World Wildlife Fund - United States) and ACLIE-EWT (African Conference for Linear Infrastructure and Ecology - Endangered Wildlife Trust).

The same document information form was used (Figure 3). The monitoring of document information form collection and the classification of expectations and proposals identified in the documents were achieved by Ivo Dostál (CDV).

Table 1. Typology of major international and European institutions identified for the document survey

Institutions relevant in…		**… at international level**	**… at European level**
Transport sectors	Roads	PIARC ; GIB Foundation	CEDR
	Railways	UIC	ERA ; CER ; ERRAC
	Waterways	PIANC	EBA
	Power lines	-	ENTSO-E
	Airports	-	ACARE ; ACI Europe
	Harbours	IHMA ; IMO ; UN WPSP ; AIVP	ESPO ; EFIP ; SEA Europe
	Various	OECD ; WB ; ISO/TC331	EC ; EIB ; EBRD ; T20
Environment protection		IUCN ; WWF ; IPBES ; UNEP(-SI) ; CBD	EEA ; WWF Europe ; UNEP(Carpathian Convention) ; HARMON
Research		ICOET ; TRB ; ACLIE-EWT ; ANET	IENE ; FEHRL

Overall, the collection of document information forms ran from 10 March 2021 to 28 June 2021. Analysed documents are gathered in a specific sub-folder of the BISON shared space. Their bibliographic references are compiled in section References of Deliverable 4.1.

3.3. Classification of all inputs from stakeholders

The information obtained through the online consultation and the document survey, as expectations and proposals, has been classified under a single set of complementary themes. The range of thematics is the same as the one adopted in the HARMON project (Mot et al., 2019) from strategic level to implementation, including cross-sectoral education and communication. The aim and approach of this European Union Interreg project (i.e. A Strategic Approach for Harmonization of Green and Grey Infrastructure in four Danube Region countries) are thematically close to the BISON project. It comprises four thematics:

A - Policy and strategies;
B - Planning and environmental impact assessment;
C - Implementation and management;
D - Education, awareness, consultation and communication.

Thematic A covers the field of international and national policies, the definition of strategies of public institutions and private organizations (e.g. lobby groups), the definition of great objectives and priorities related to biodiversity and transport. It is the field of decision-makers.

Thematic B is about how to design projects that concretely achieve the objectives and priorities, despite various difficulties and constraints (e.g. from other policies and strategies). The selection implies to assess and compare different options with respect to their environmental impact, hence to have suitable tools for this. It is the field of planners and project designers.

Thematic C is about the concrete implementation of projects, so that the achieved operational device (grey and green infrastructure, equipment) allows the designed goals to be reached. This concerns the construction of the devices, their exploitation and management. This implies tools to measure and monitor the actual effects obtained. This is the field of engineers and infrastructure managers.

Thematic D is about the general raise of the knowledge level among all the stakeholders involved and their better mutual understanding. Hence, it spans from decision-makers to engineers but extends to the general public and teaching. All means of improvement, for a given project or in general, are considered.

In order to easily retrieve information for future analysis (Task 4.2), to make comparisons, to transmit it to other WPs (Task 3.3 and Task 5.3 notably), each individual input has been given a specific codification. The structure of the code is as follows:

- For an expectation provided through consultation: EXP_Con_ProviderNumber.InputNumber;

- For an expectation provided through publication: EXP_Pub_ProviderNumber.InputNumber;

- For a proposal provided through consultation: PRO_Con_ProviderNumber.InputNumber;

- For a proposal provided through publication: PRO_Pub_ProviderNumber.InputNumber.

For following analyses (Task 4.2) it is important to distinguish between information endorsed by institutions (which includes published information) and information provided by individual contributors (which may be more original and even in break with common vision and understanding). Institutional points of view can be both expressed through publications and the consultation (see Section 3.1). In the latter case, institution could just repeat published documents (e.g. doctrine), or provide recent evolution elements. The indication of provider (of the input) will serve to cross such information, but in a more general way it will serve to take into account "from where" the point of view is expressed, and possibly to come back to the provider in case additional information is necessary for the analysis. Each provider can provide several expectations and proposals (n°).

The structure of the tables where inputs from stakeholders are compiled is presented below.

For expectations expressed during the consultation, and for each thematic, see Table 2. The original description of the expectation reproduced. The type of stakeholder provider of the given input is indicated and the concerned infrastructures are ticked.

Table 2. Structure of tables for expectations expressed during consultation

Input code **EXP_Con_Provider.n°**	Description of the expectation	Stakeholder type	roads	railways	waterways	power lines	pipelines	airports	harbours

For expectations expressed in published documents and for each thematic, see Table 3. Reference of the source publication is provided (reproduced in References of Deliverable 4.1).

Table 3. Structure of tables for expectations identified in published documents

Input code **EXP_Pub_Provider.n°**	Description of the expectation	Reference of the publication	roads	railways	waterways	power lines	pipelines	airports	harbours

For proposals expressed during the consultation, and for each thematic, see Table 4.

Table 4. Structure of tables for proposals expressed during consultation

Input code **PRO_Con_Provider.n°**	Description of the proposal	Stakeholder type	roads	railways	waterways	power lines	pipelines	airports	harbours

For proposals expressed in published documents and for each thematic, see Table 5.

Table 5. Structure of tables for proposals identified in published documents

Input code **PRO_Pub_Provider.n°**	Description of the proposal	Reference of the publication	roads	railways	waterways	power lines	pipelines	airports	harbours

As an initial step of analysis of inputs in the general process for the construction of the SRA, all inputs have also been assessed with respect to their direct or indirect match with the topic (i.e. more biodiversity-friendly transport modes and transport systems). For such, three degrees of accuracy have been defined:

- Input well focused on the topic of Biodiversity-friendly transport modes and transport systems;
- Input on a broader issue but with direct relation to the topic;
- Input with indirect or distant relation to the topic.

Within each thematic, inputs have been grouped according to these degrees (see appendices A and B). Regarding the consultation results, the three degrees have been used to keep all original contributions in view of further analysis of all types of research needs. Regarding the analysis of documents, in order to avoid dispersion of efforts, only the top two degrees were considered.

4. RESULTS

4.1. Online consultation

4.1.1. General overview of contributions

In view of Deliverable 4.1, the period of data collection through the online consultation was extended as long as possible, i.e. until 23 June 2021. Till this date, a total of 73 contributions to BISON questionnaire were provided. On the period (59 days), this represents an average rhythm of 1.25 contribution/day (see Figure 4). From this amount, 47 respondents from different range of stakeholders answered at least one of the questions relevant for Deliverable 4.1 (i.e. questions Q1.5 or Q1.6, see Section 3.1).

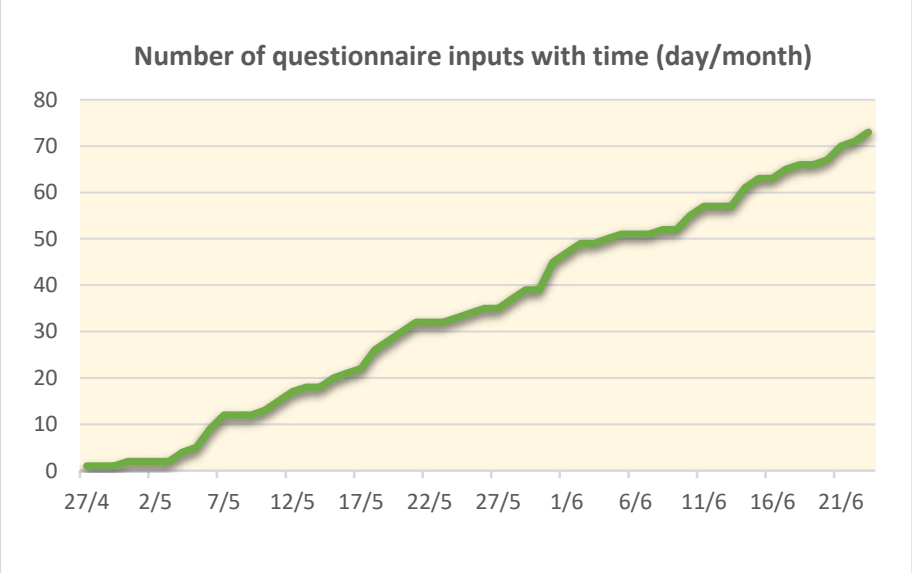

Figure 4. Timeline of online contributions

Of the 73 contributors to the BISON questionnaire, 45 provided input on expectations, with a majority (n = 31) totally relevant to the question. Fewer (n = 30) provided input on proposals, and also with a majority of them (n = 21) totally relevant to the question. A total of 46 respondents provided document references. Overall, 62% of the respondents (46/73) contributed to the expression of expectations, 41% to the expression of proposals and 63% to the provision of documents as sources of information for the next step of WP4. Figure 5 presents the share of the different level of answers to Expectations, Proposals (Q1.5) and Documents (Q1.6) questions.

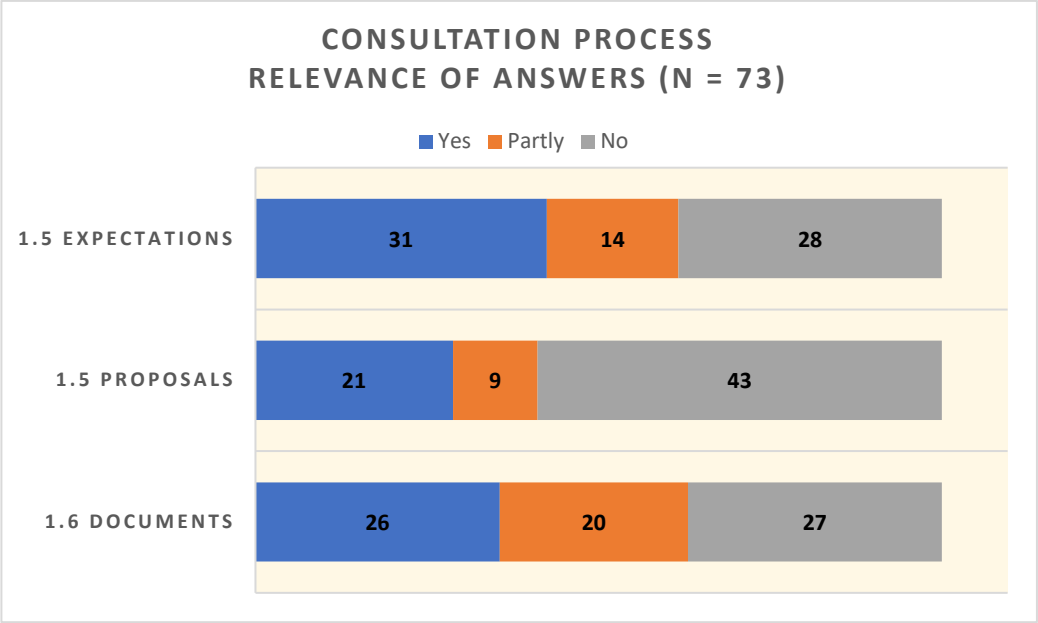

Figure 5. Basic quantitative results of consultation process

Each respondent to the BISON questionnaire was invited to declare to which main group of stakeholder he belongs. The 47 contributors to questions Q1.5 and Q1.6 belong to 7 main stakeholder groups. Figure 6 shows the diversity and representativeness of these contributors. Universities and research institutions are the most represented stakeholders (14 contributors). Relatively well represented are also transport infrastructure companies (n = 7), public agencies (n = 7), environmental administrations (n = 6), environmental consultancies (n = 6) and transport administrations (n = 5). NGOs and associations are represented by only 2 contributors. Majority of contributors states the inclusion of their institution to the national level (n = 42, i.e. 89%). While 3 respondents (7%) belong to international institutions and only 2 (4%) declared local level.

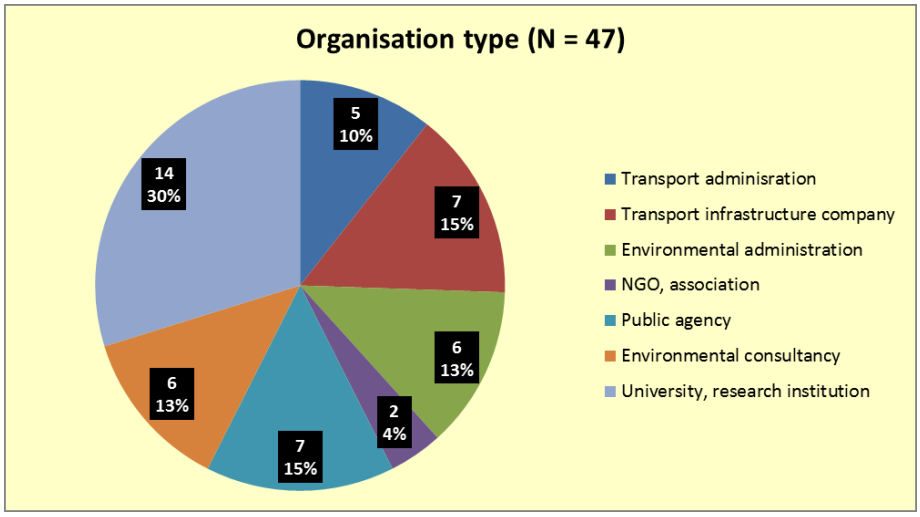

Figure 6. Representativeness of contributors – Type of organisation

The 47 contributors to questions Q1.5 and Q1.6 cover all transports modes relevant to the BISON project (see Figure 7). Most of them declare their expertise for roads and railways (n = 37 respondents for both, i.e. transport modes 79% covered by contributors). They are followed by airports (n = 23) and waterways (n = 22), i.e. 47-49% covered by contributors. The least represented are power lines (n = 16), ports (n = 15) and especially pipelines (n = 10), i.e. 34% to 21% covered by respondents.

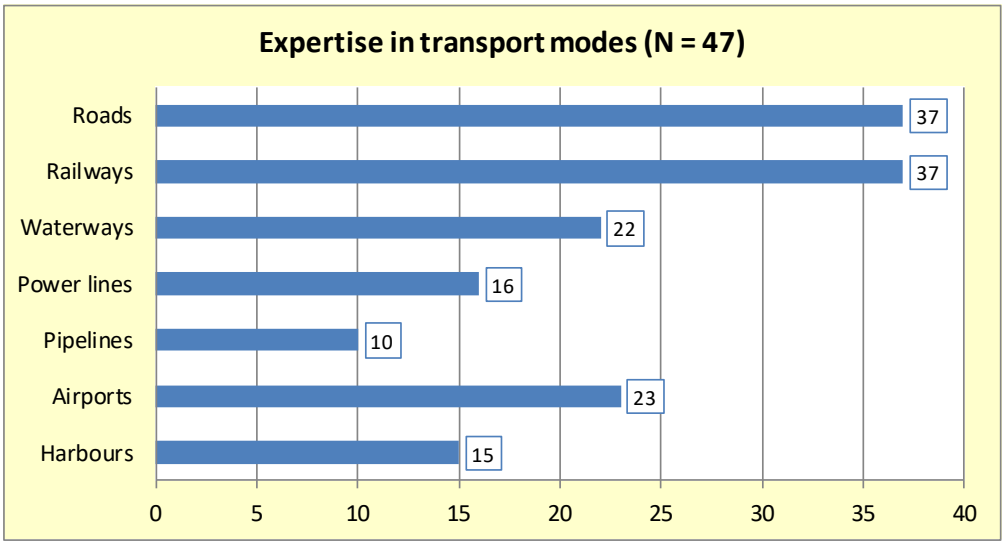

Figure 7. Representativeness of contributors – Transport mode

The majority of the 47 contributors to questions Q1.5 and Q1.6 belong to Slovakia (n = 12) and France (n = 11). Poland, Spain and Germany are represented by 3-4 respondents. Overall, 14 countries are contributing by at least one respondent, including too Romania, the Czech Republic, Greece, Israel, the Netherlands, Sweden, Switzerland, UK and Australia. In addition, 3 organisations with a transnational cover also contributed (UIC, Amphi-FPPE and Egis, both partners of BISON and WP4).

4.1.2. Expectations expressed through consultation

As a whole, 135 expectations were provided by the 45 contributors who specifically answered to this part of question Q1.5 (see above Figure 5), hence an average of 3 expectations expressed by contributor. The proportion of inputs related to the four thematics (A to D) is relatively balanced – with the highest share of expectations related to thematic C Implementation and management (33%) and the lowest share of thematic D Education, awareness, consultation and communication (16%) – see Figure 8.

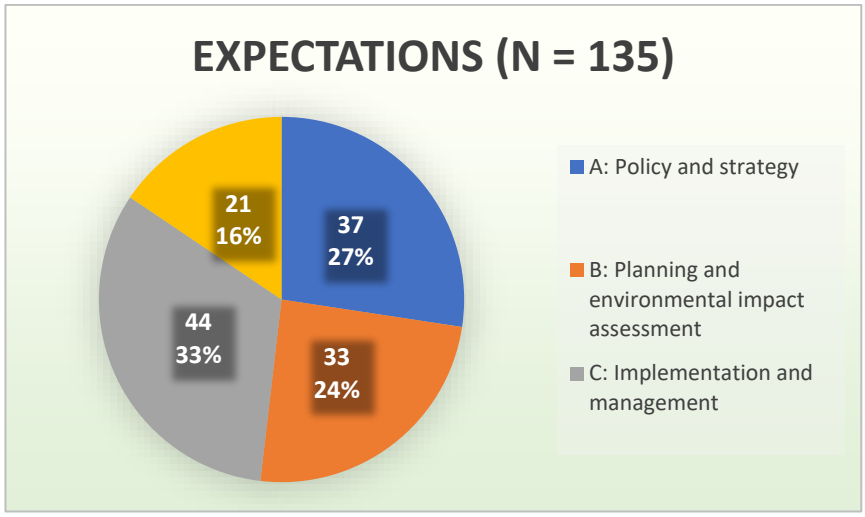

Figure 8. Distribution of expectations among thematics - Consultation

All the delivered expectations (EXP) were assessed according to their direct or indirect match with the subject of the survey (see Section 3.1). Half of expressed expectations are well-focused on the topic of Biodiversity-friendly transport modes and transport systems (Figure 9). The second half is evenly divided between expectations on a broader issue but with direct relation to the topic (26%) and expectations on an issue indirectly or remotely related to the topic (24%).

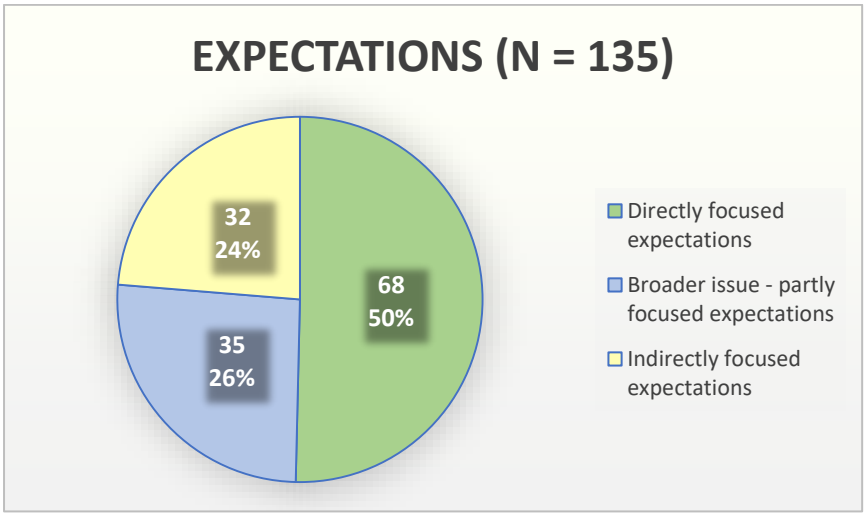

Figure 9. Distribution of expectations according to their degree of match with the question - Overall assessment - Consultation

As shown on Figure 10, the number of expectations amounts 37 in the field of Policy and strategy (Thematic A), 33 in the field of Planning and environmental impact assessment (Thematic B), 44 in the field of Implementation and management (Thematic C) and 21 in the field of Education, awareness, consultation and communication (Thematic D). It appears that it is for the most addressed thematic (C) that the share of well-focused expectations with the topic is the highest (n = 38, i.e. 86%). This portion reduces to just 8% (n = 3) for thematic A. In the latter case, most expressed expectations (73%) have indirect or distant relation to the question. For thematics B and D, the share of these weakly targeted expectations is very low (6% and 10% respectively).

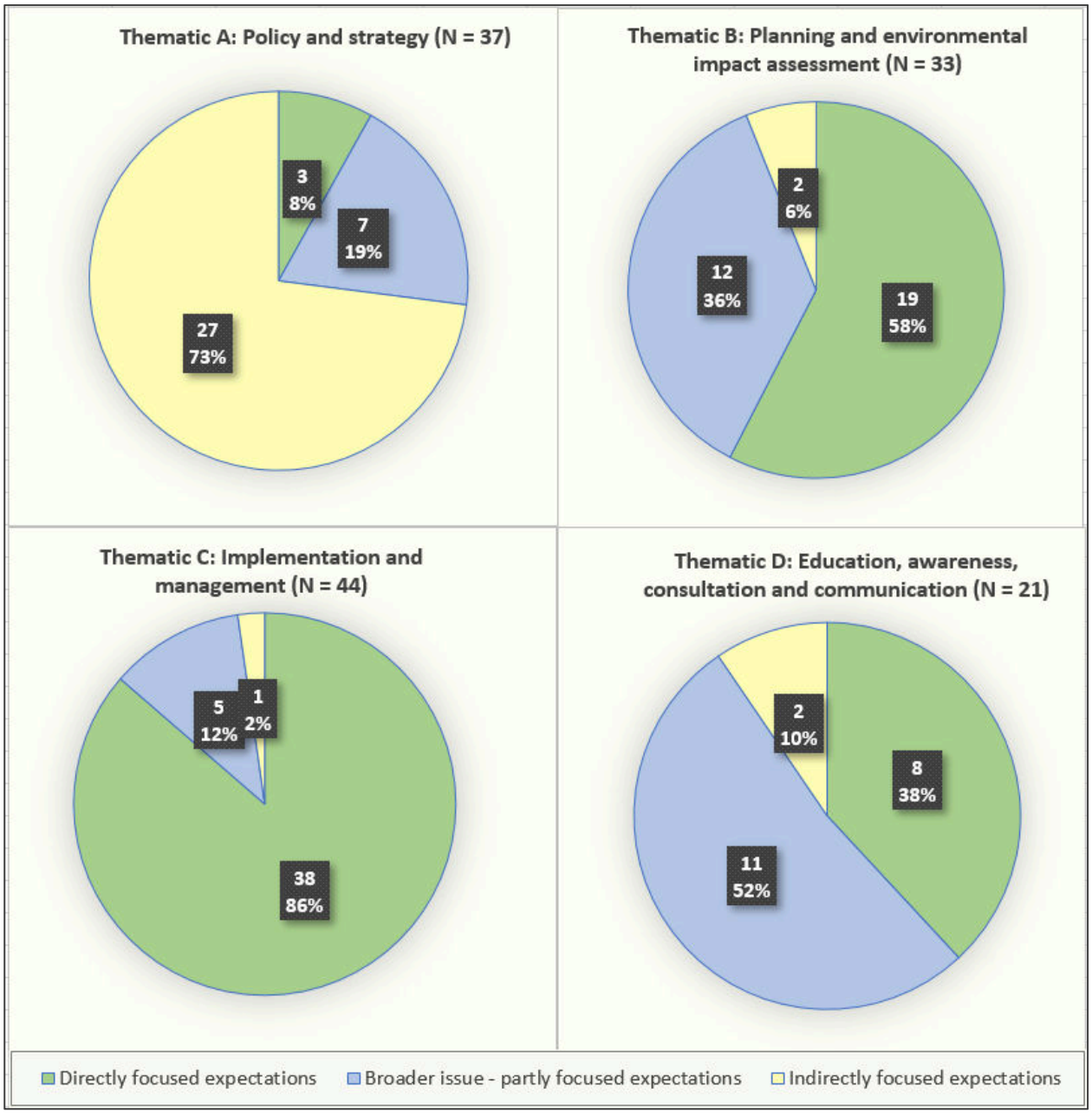

Figure 10. Distribution of expectations according to their degree of match with the question – By thematic - Consultation

4.1.3. Proposals expressed through consultation

As a whole, 83 proposals were provided by the 30 contributors who specifically answered to this part of question Q1.5 (see Figure 5), hence an average of almost 3 (i.e. 2.8) proposals expressed by contributor. The proportion of inputs related to the four thematics (A to D) is not as balanced as it is for expectations. Mainly because the highest share of inputs, related to thematic C Implementation and management is higher (35%) and the lowest share, related to thematic D Education, awareness, consultation and communication is lower (12%) – see Figure 11.

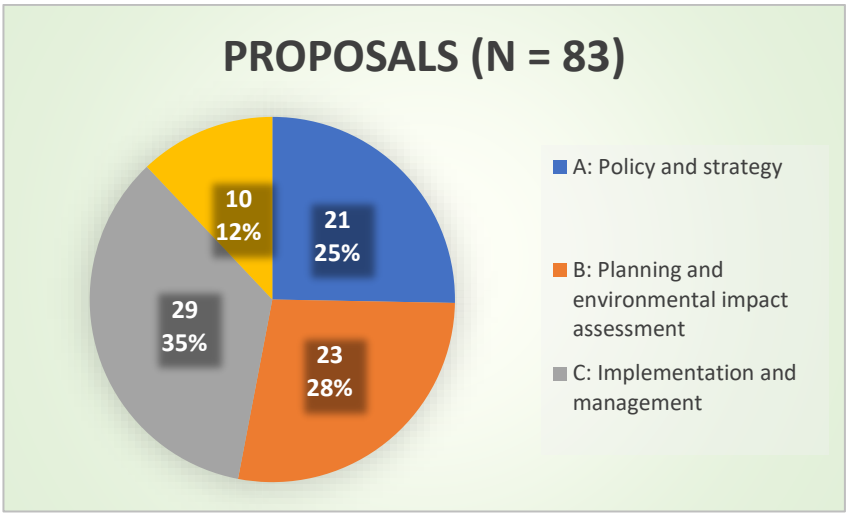

Figure 11. Distribution of proposals among thematics - Consultation

All the delivered proposals (PRO) were assessed according to their direct or indirect match with the subject of the survey (see Section 3.1). Almost half of proposals (47%) are well-focused on the topic of Biodiversity-friendly transport modes and transport systems (Figure 12). One third of the proposals addresses a broader issue but with direct relation to the topic. Finally, 20% of the proposals are on an issue indirectly or remotely related to the topic.

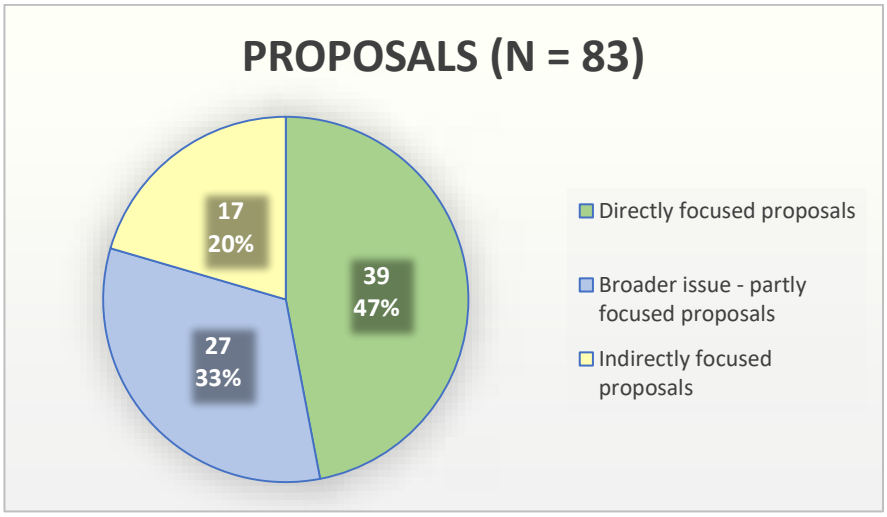

Figure 12. Distribution of proposals according to their degree of match with the question - Overall assessment - Consultation

As shown on Figure 13, the number of proposals amounts 21 in the field of Policy and strategy (Thematic A), 23 in the field of Planning and environmental impact assessment (Thematic B), 29 in the field of Implementation and management (Thematic C) and 10 in the field of Education, awareness, consultation and communication (Thematic D). It appears that it is for the most addressed thematic (C) that the share of well-focused expectations with the topic is the highest (n = 25, i.e. 86%). This is similar to what is observed for expectations (see above Figure 10). Also like expectations, this portion reduces to just 9% (n = 2) for thematic A. In the latter case, most expressed expectations (62%) have indirect or distant relation to the question.

For thematics B and D, the share of these weakly targeted expectations is very low (9% and 10% respectively).

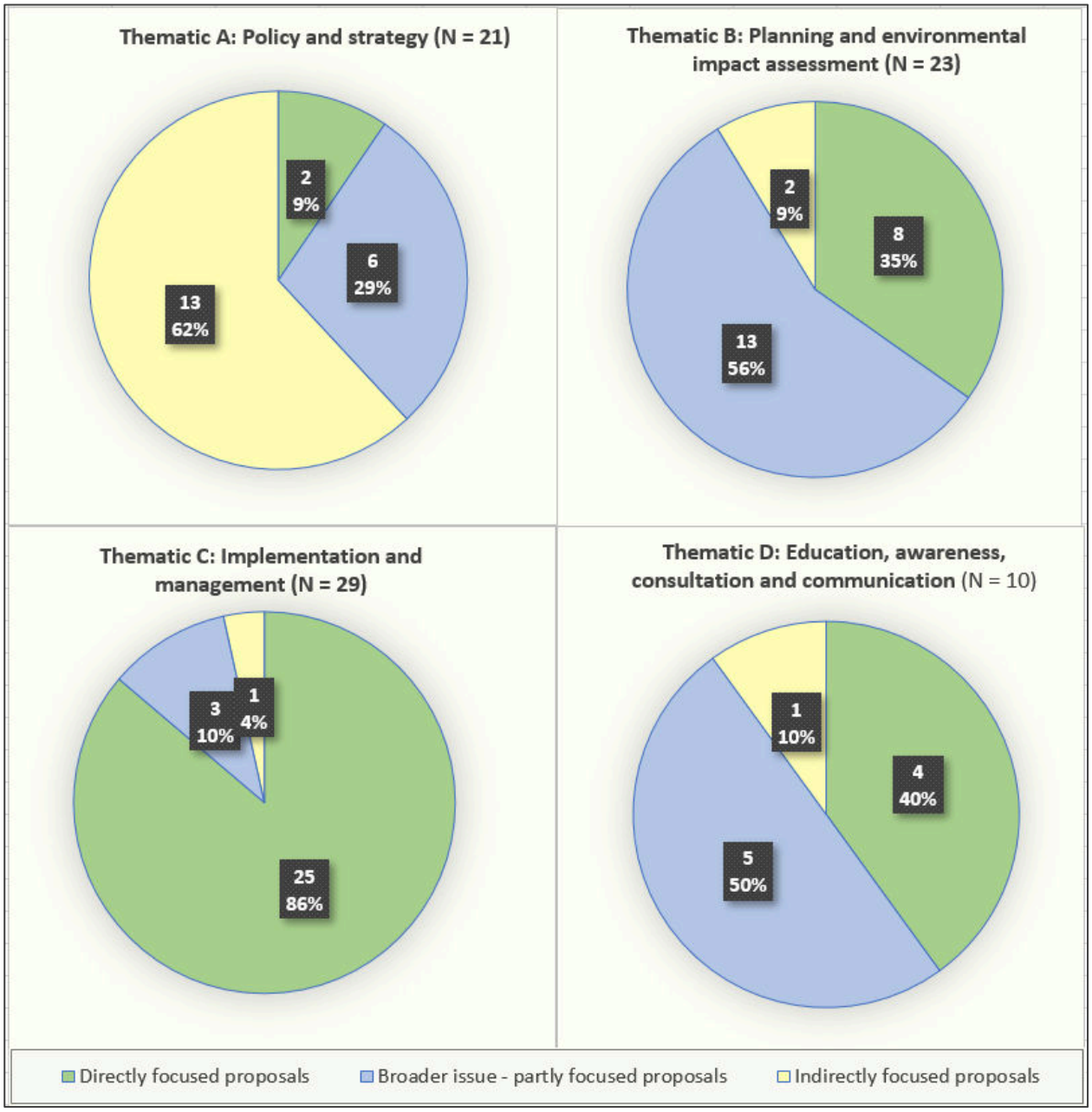

Figure 13. Distribution of proposals according to their degree of match with the question – By thematic - Consultation

4.2. Document survey

4.2.1. General overview of inputs

A total of 80 documents published by stakeholder organisations have been analysed. Figure 14 shows the diversity and representativeness of the organisations author of these documents. The most important part of the documents originates from NGOs and associations (including

international professional associations, n = 34). Almost a quarter originated from public agencies (n = 18), then 11% from universities and research institutions (n = 9). The five other type of stakeholder organisations are, by decreasing order: transport companies (n = 6), general administrations (n = 5), environmental administrations (n = 4), transport administrations (n = 3) and environmental consultancy (n = 1).

It's worth noting that the important documentation among NGOs and associations publications considerably counterbalances their low contribution (2 %) to the consultation (see Section 4.1).

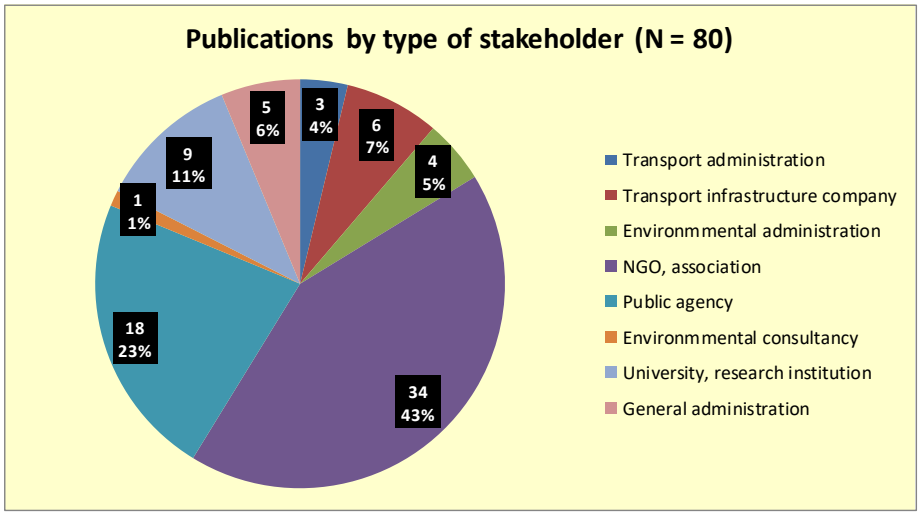

Figure 14. Representativeness of analysed publications – Type of organisation

The document analysis provides 421 inputs, with 190 identified as expectations and 231 identified as proposals (see Figure 15).

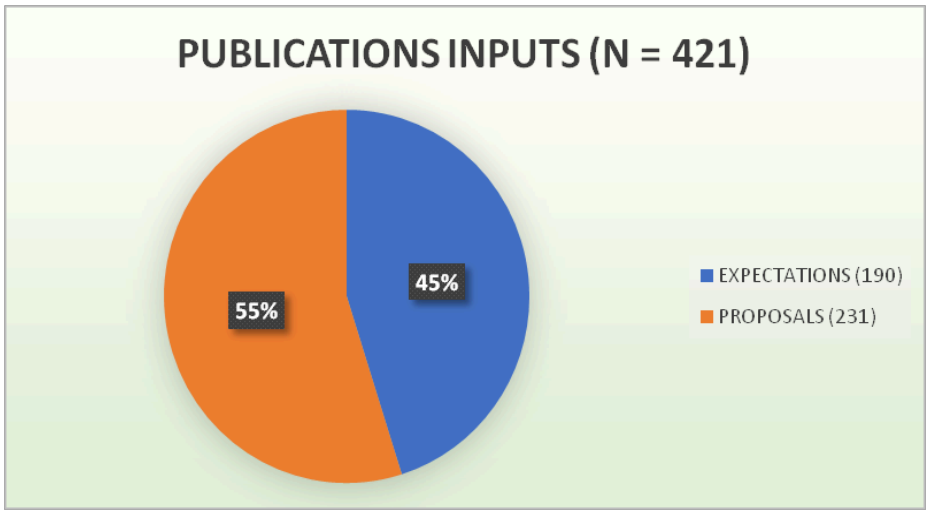

Figure 15. Share of expectations and proposals identified through the document survey

These inputs predominantly belong to the thematic Planning and environmental impact assessment (37%) and Implementation and management (34%). The least addressed thematic is Education, awareness, consultation and communication (14 % - see Figure 16).

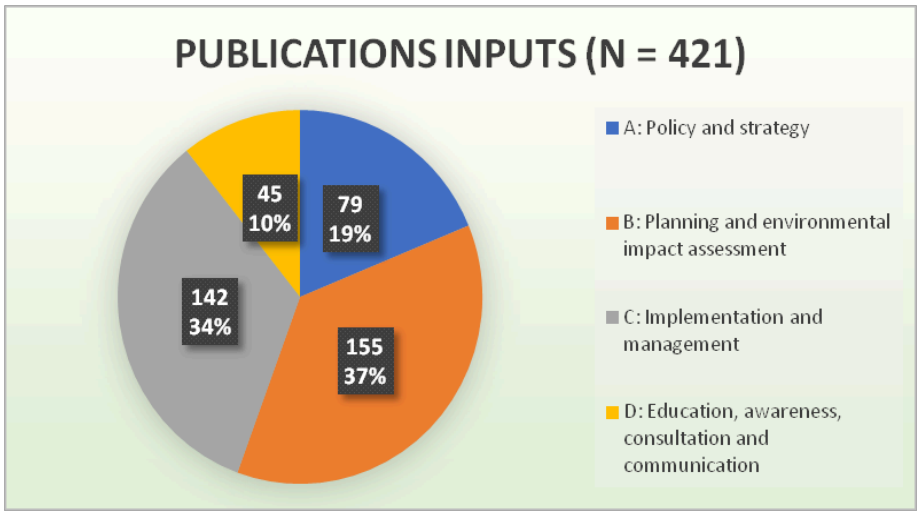

Figure 16. Distribution of inputs according to the four thematics

4.2.2. Expectations identified in published documents

As a whole a series of 190 expectations was identified through the analysis of published documents. The proportion of inputs related to thematics A to C is relatively balanced (31%, 35% and 24% respectively – see Figure 17), while the share of thematic D Education, awareness, consultation and communication is low (10%).

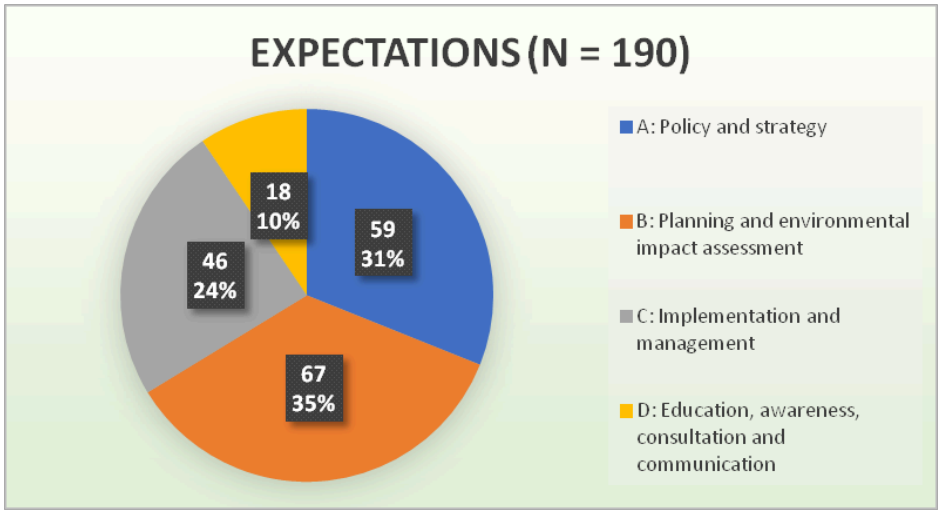

Figure 17.Distribution of expectation among thematics - Publications

All the expectations (EXP) identified in the published documents were assessed according to their degree of match with the subject of the survey (see Section 3.2). Most expectations (61%) are directly focused to the topic (see Figure 18). The remaining 39% are with direct relation to the topic but from broader issues.

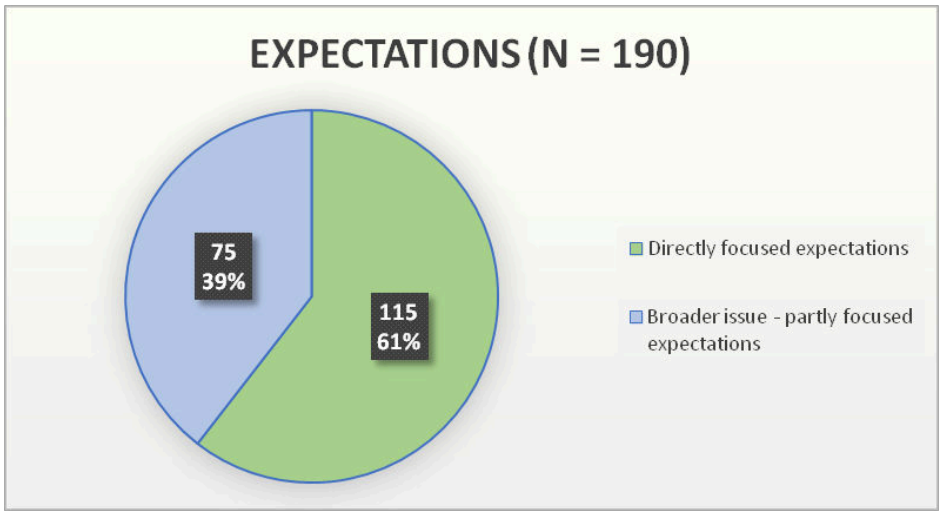

Figure 18. Distribution of expectations according to their degree of match with the question - Overall assessment - Publications

As shown on Figure 19, the number of expectations amounts 59 in the field of Policy and strategy (Thematic A), 67 in the field of Planning and environmental impact assessment (Thematic B), 46 in the field of Implementation and management (Thematic C) and 18 in the field of Education, awareness, consultation and communication (Thematic D). It is obvious that it is for the least addressed thematic (D) that the share of well-focused expectations with the topic is the highest (n = 14, i.e. 78%). This portion reduces to 41% (n = 24) for thematic A. This is the single case where broader issues outnumber well-focused expectations. This phenomenon is similar to expectations expressed through consultation (see above Section 4.1).

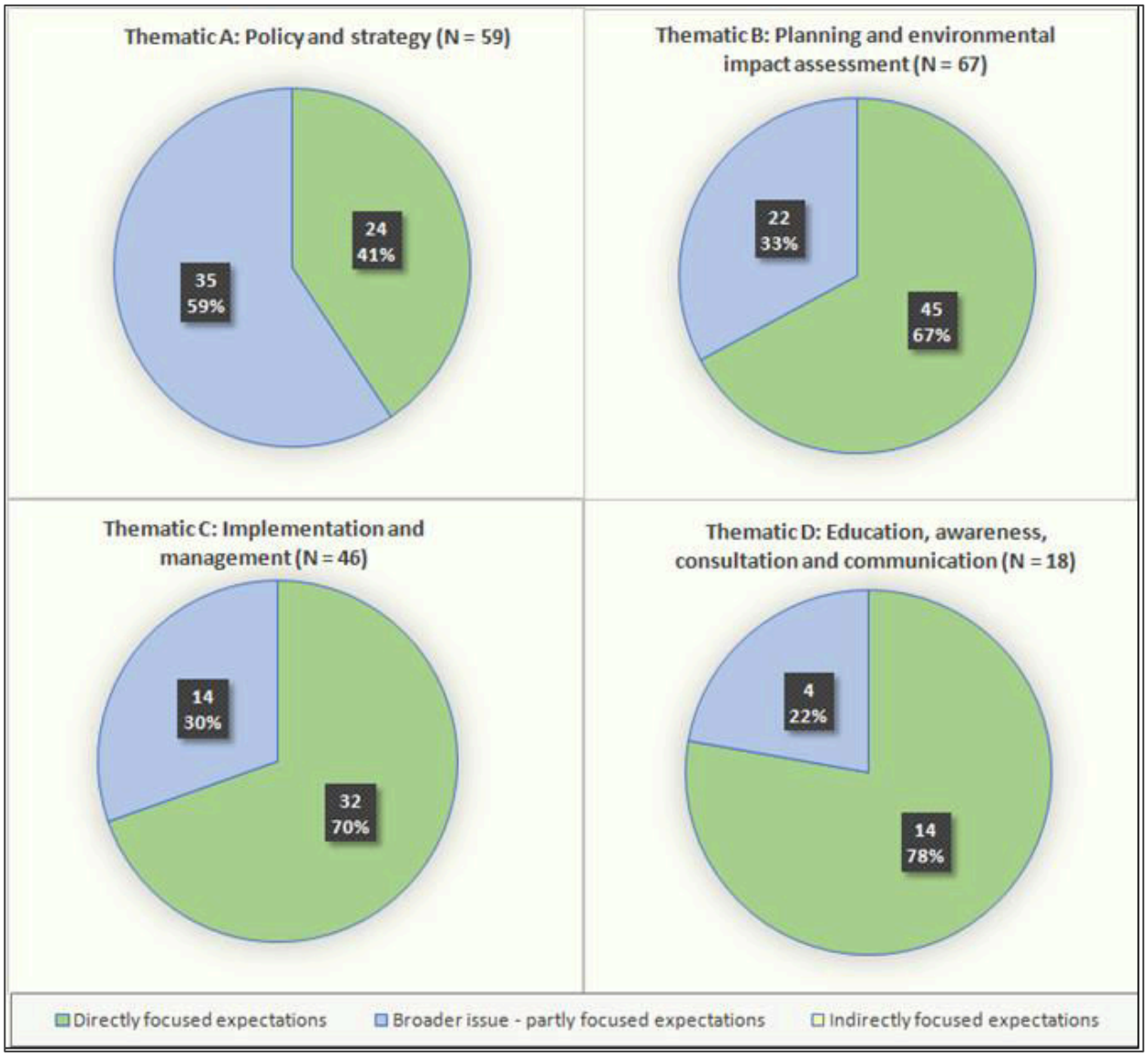

Figure 19. Distribution of expectations according to their degree of match with the question – By thematic - Publications

4.2.3. Proposals identified in published documents

As a whole a series of 231 proposals was identified through the analysis of published documents (see Figure 20). The proportion of inputs related to thematics A to D is relatively imbalanced in comparison with expectations. On one hand the most represented thematics (B = 38%; C = 41%) are balanced, while the two other thematics are too but at a far lower level (A = 9%; D = 12%). There are a lot of expectations for thematic A (Policy and strategy) but a few proposals: n = 59 EXP (i.e. 31%) vs. n = 20 PRO (i.e. 9%).

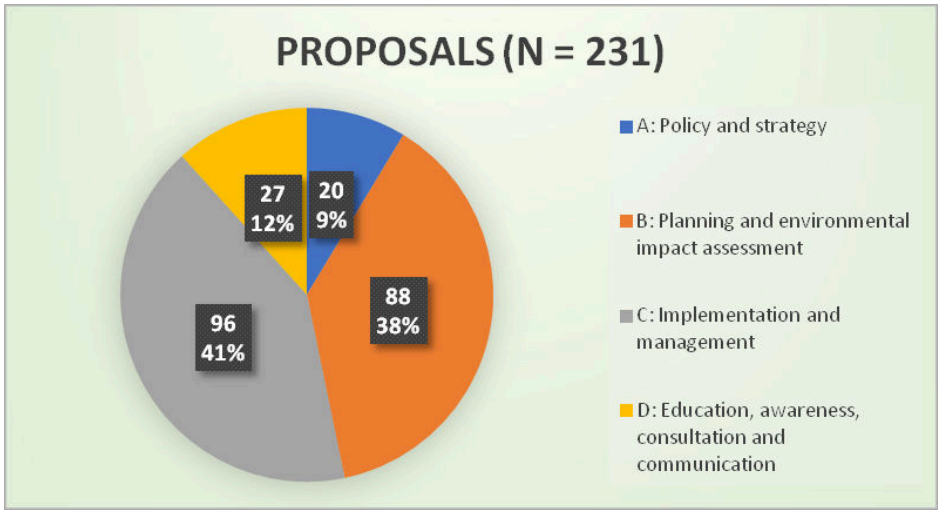

Figure 20. Distribution of proposals among thematics - Publications

All the proposals (PRO) identified in the published documents were assessed according to their degree of match with the subject of the survey (see Section3.2). The majority of proposals (66%) are directly focused to the topic (see Figure 21). The remaining 34% are with direct relation to the topic but from broader issues.

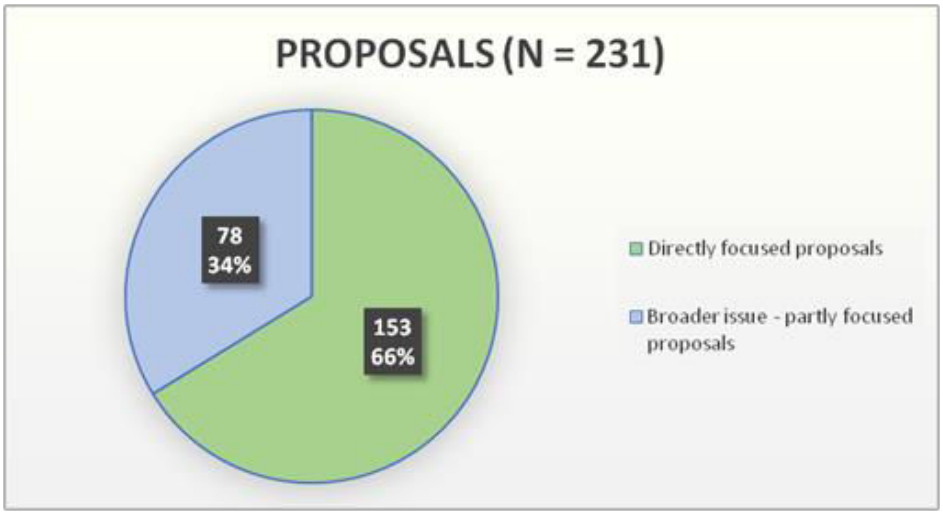

Figure 21. Distribution of proposals according to their degree of match with the question - Overall assessment - Publications

As shown on Figure 22, the number of proposals amounts 20 in the field of Policy and strategy (Thematic A), 88 in the field of Planning and environmental impact assessment (Thematic B), 96 in the field of Implementation and management (Thematic C) and 27 in the field of Education, awareness, consultation and communication (Thematic D). It appears that it is for the most addressed thematic (C) that the share of well-focused expectations with the topic is the highest (n = 81, i.e. 84%). This portion reduces to just 10% (n = 2) for thematic A, which is the least addressed thematic. For thematics B and D, the share of well-focused proposals is predominant (58% and 70% respectively).

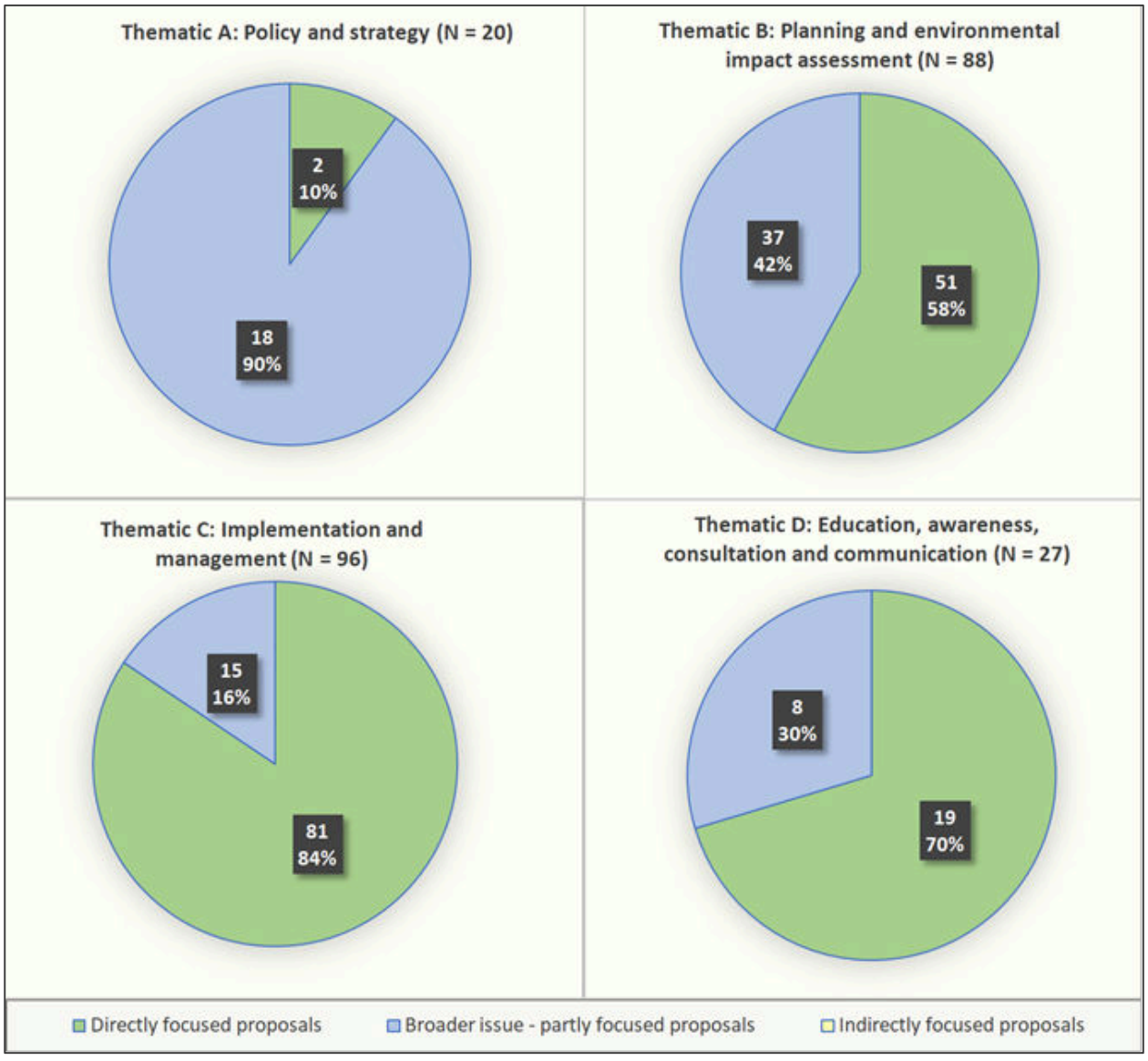

Figure 22. Distribution of proposals according to their degree of match with the question – By thematic - Publications

4.3. Summary of input quantitative results

4.3.1. Well focused inputs

The detailed count of all the inputs related to expectations and proposals that are well focused on the topic of Biodiversity-friendly transport modes and transport systems, whether they come from the consultation (see Section 4.1) or from publications (see Section 4.2), is presented in Figure 23. The total of these inputs amounts 375. The square tables indicate the number of inputs per thematic A to D.

The general breakdown shows that contributors to the consultation predominantly expressed expectations related to Implementation and management (Thematic C), as well as proposals (n = 38 and 25 respectively). Through published documents, thematic C also regards most of

the proposals (n = 81). On the opposite, expectations identified in the published documents mainly regard thematic Planning and environmental impact assessment (n = 45). As a whole, the number of well-focused inputs is well balanced between expectations and proposals (n = 183 and 192 respectively).

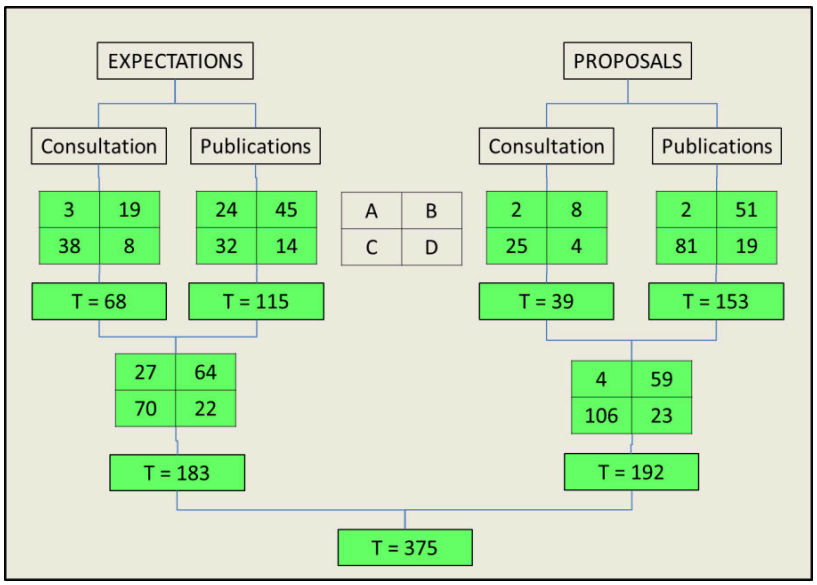

Figure 23. Quantitative breakdown of well-focused inputs

4.3.2. Broader issue inputs

The detailed count of all the inputs related to expectations and proposals that regard broader issues in relation with the topic of Biodiversity-friendly transport modes and transport systems, whether they come from the consultation (see Section 4.1) or from publications (see Section 4.2), is presented in Figure 24.

The total of these inputs amounts 215. Their general breakdown shows that contributors to the consultation mainly expressed that kind of expectations regarding thematics B and D (Planning and environmental impact assessment; Education, awareness, consultation and communication). Their proposals predominantly concern Implementation and management (Thematic B). This point is consistent with the proposals identified in published documents (n = 37). Lastly, expectations identified in published documents mostly concern the thematic Policy and strategy (n = 35). As a whole, the number of inputs related to broader issues is well balanced between expectations and proposals (n = 110 and 105 respectively).

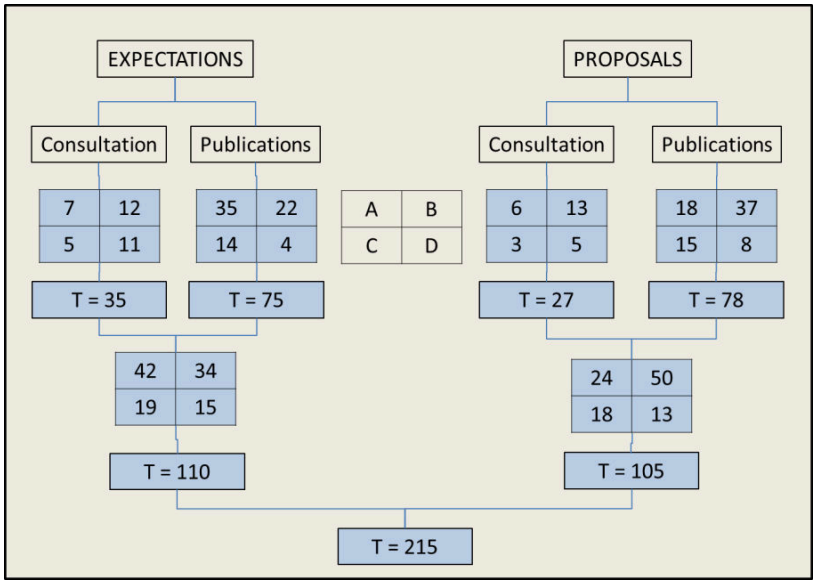

Figure 24. Quantitative breakdown of broader issue inputs

4.4. Types of infrastructures considered in inputs

Each input gained from the online consultation and from the document survey has been marked with the type of infrastructure it addresses (see Section 3.1 and 3.2). Details are provided in appendices. The amount of inputs ticked as relevant for one to seven types of infrastructures have been calculated for the set of data collected and the diversity of concerned infrastructures have been analysed.

The next steps and deliverables of the BISON project will allow a more comprehensive and detailed analysis of the whole set of contributions including the latest answers to the questionnaire. However, from the contributions and publications gathered to this point, results allow for the identification of several avenues of understanding of the topic across the different type of infrastructures.

4.4.1. Number of infrastructures related to inputs

The first lesson is the great specialisation of most publications, which overwhelmingly deal specifically with a limited number of infrastructures in proposals (see Figure 28: proposals for one to two infrastructure = 68.2%). It is slightly less for expectations (see Figure 27: expectations for one to two infrastructure = 46.1%), even though multi-infrastructure expectations (expectations for five to seven infrastructures) may represent an almost equivalent share (43.9%) due to the high generality of some publications (7 infrastructures alone = 38.7%).

These rates change significantly, however, in the online consultation inputs already analysed, where the expectations and proposals collected are each time predominantly oriented towards a broad approach: 61.6% of expectations concern five or more infrastructures and this is the case for 61.4% of proposals (see Figures 25 and 26).

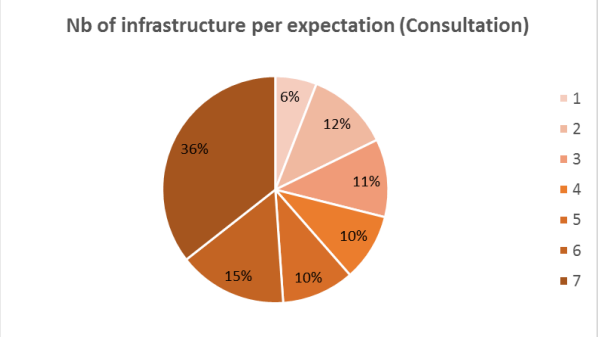

Figure 25. Share of expectations made for 1 to 7 infrastructure types - Consultation

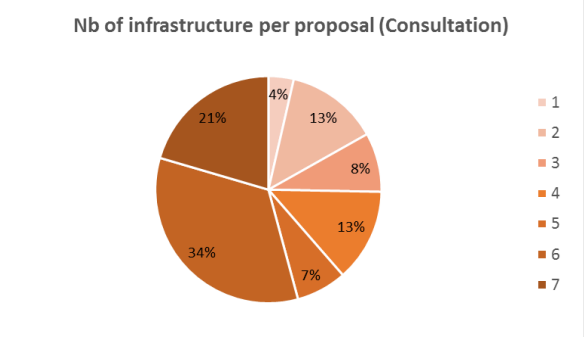

Figure 26. Share of proposals made for 1 to 7 infrastructure types - Consultation

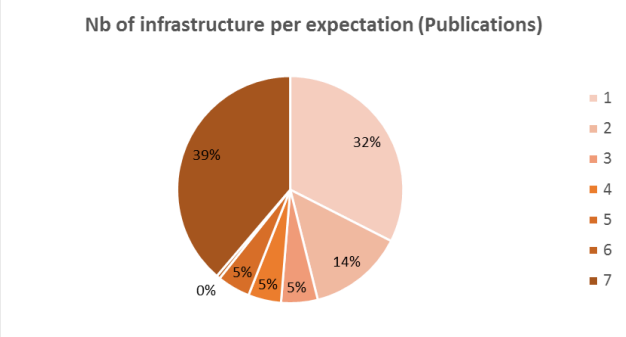

Figure 27. Share of expectations made for 1 to 7 infrastructure types - Publications

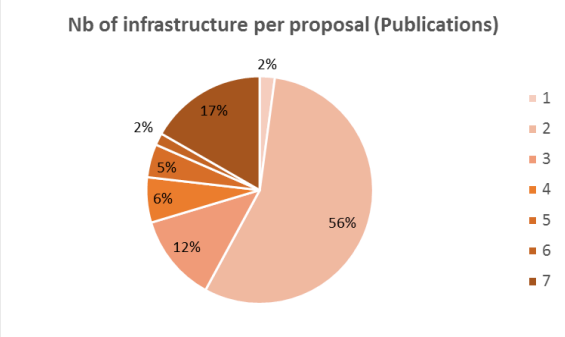

Figure 28. Share of proposals made for 1 to 7 infrastructure types - Publications

4.4.2. Infrastructures in the consultation inputs

The analysis of the types of infrastructures mentioned in expectations (N = 135, see Section 4.1) and proposals (N = 83) in the consultation shows the preponderance of roads and railways (93% to 95% of inputs), followed by waterways, airports and harbours (from 59% to 72% for expectations and 52% to 60% for proposals – see Table 6). Energy transport networks seem to be treated differently depending on whether they are electricity networks, which are well taken into account (71% for expectations and 70% for proposals) or pipelines (38% and 25% respectively).

Table 6. Occurrence of infrastructure types in inputs - Consultation

Infrastructure		**Roads**	**Railways**	**Waterways**	**Harbours**	**Airports**	**Power lines**	**Pipelines**
Expectations	n	128	125	92	80	97	96	51
(N = 135)	%	*95*	*93*	*68*	*59*	*72*	*71*	*38*
Proposals	n	79	79	60	58	52	58	21
(N = 83)	%	*95*	*95*	*72*	*70*	*63*	*70*	*25*
Mean	%	*95*	*94*	*70*	*61*	*71*	*71*	*33*

The results of a sharper analysis are presented in Figures 29 and 30. They present the share of infrastructures occurrence in the inputs (expectations and proposals respectively) with respect to the four thematics and with respect to the degree of match of inputs with the question.

Total amounts of mentioned infrastructures logically follow the general breakdown of inputs (see expectations/Consultation in Figures 23 and 24 above), hence most occurrences are in thematic C – Implementation and management, for directly focused expectations, then thematic B – Planning and environmental impact assessment (Figure 29). Within thematics, the breakdown between the different types of infrastructures is generally rather balanced, with the exception of pipelines less considered in some cases. A particularly important amount of infrastructure is mentioned for thematic A – Policy and strategy in indirectly focused expectations. Regarding proposals (Figure 30), the general breakdown is rather similar to that of expectations.

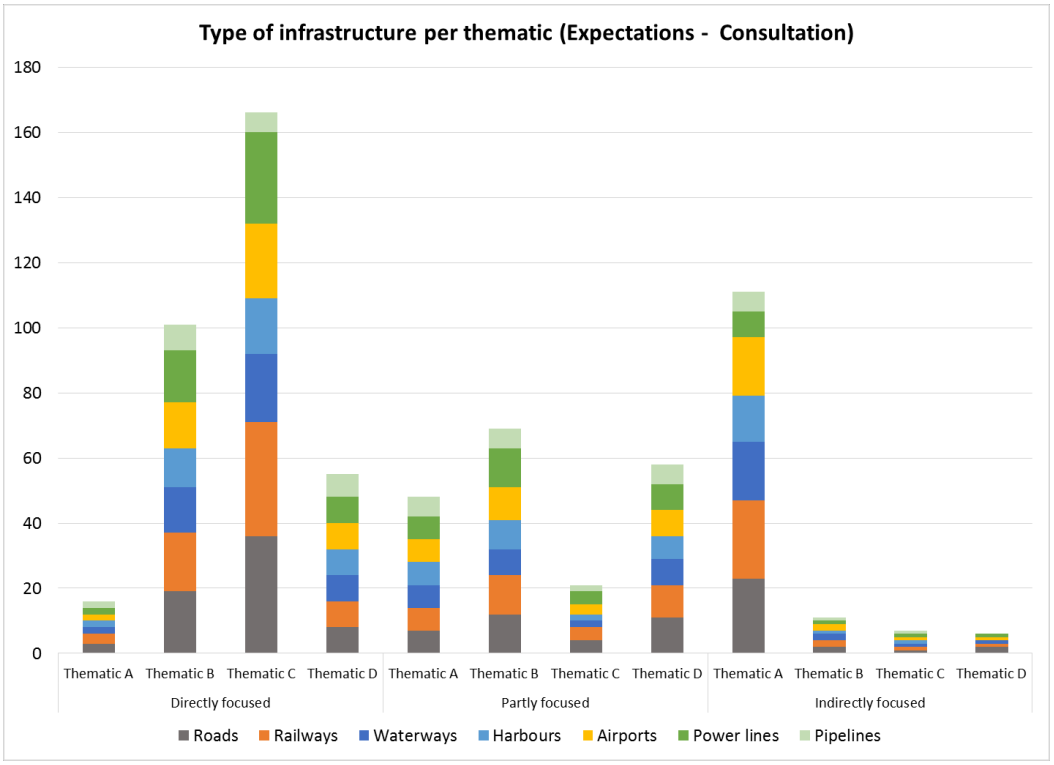

Figure 29. Occurrence of infrastructures in expectations according to thematics and degree of match - Consultation

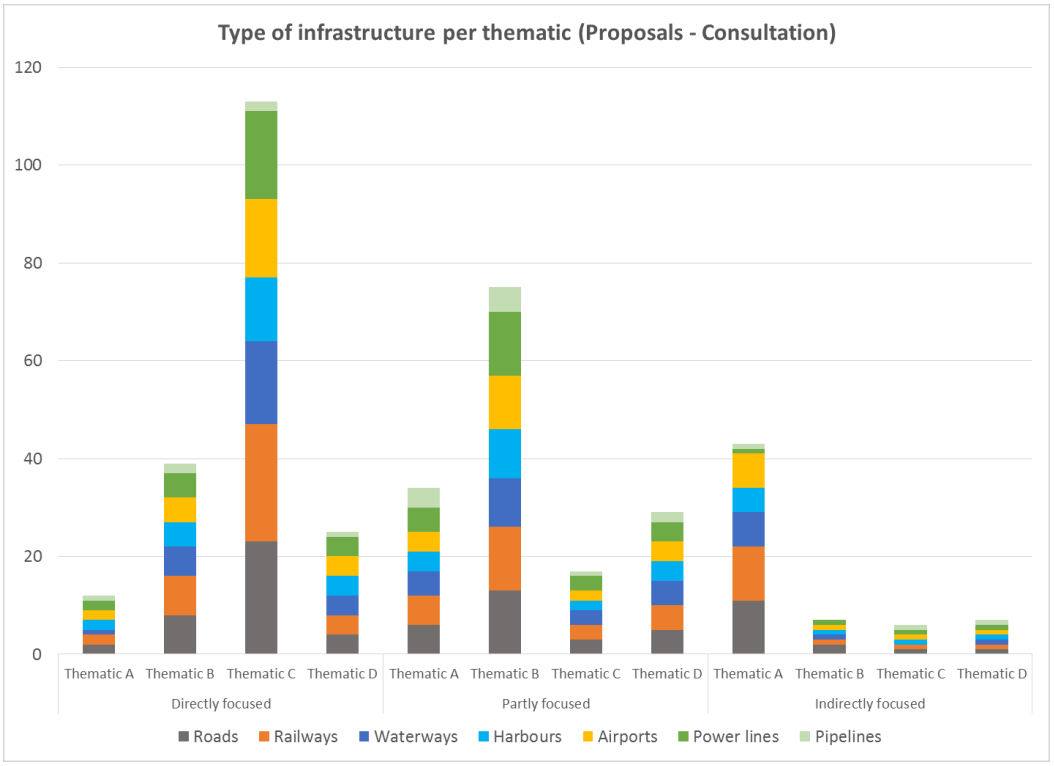

Figure 30. Occurrence of infrastructures in proposals according to thematics and degree of match - Consultation

4.4.3. Infrastructures in publications' inputs

The publications analysed (N = 190 expectations and 231 proposals, see Section 4.2) are less exclusive of roads and railways than inputs from consultation (see Section 4.4.2), even though they account for the vast majority of the inputs: 83% and 67% for expectations; 64% and 56% for proposals (see Table 7). Compared to the consultation inputs, the share of other infrastructures is decreasing sharply, with harbours, waterways and airports present at 48% to 58% of the expectations and 49% to 78% of the proposals. Power lines and pipelines are less taken into account: 46% of the expectations and 26% of the proposals for the first; respectively 42% and 25% for the second.

Table 7. Occurrence of infrastructure types in inputs - Publications

Infrastructure		Roads	Railways	Waterways	Harbours	Airports	Power lines	Pipelines
Expectations	n	159	128	110	91	93	88	80
(N= 190)	%	*83*	*67*	*58*	*48*	*49*	*46*	*42*
Proposals	n	149	131	78	49	58	61	45
(N = 231)	%	*64*	*56*	*33*	*21*	*25*	*26*	*19*
Mean	%	*73*	*61*	*44*	*33*	*36*	*35*	*29*

The total amounts of mentioned infrastructures also follow the general breakdown of inputs (see Figures 23 and 24 above); hence most occurrences are in thematic B – Planning and environmental impact assessment for directly focused expectations, then thematic A – Policy and strategy for partly focused expectations (Figure 31). The share between the different types of infrastructures is as balanced as for consultation inputs, including the case of pipelines. On the opposite, regarding proposals (Figure 32), roads and railways represent the major share of

mentioned infrastructures (Thematic B, Thematic C – Implementation and management, Thematic D – Education, awareness, consultation and communication of directly focused proposals). Proposals with partly focused inputs are the most numerous for thematic B (see Figure 24 above), which explains the highest amount of infrastructure occurrences.

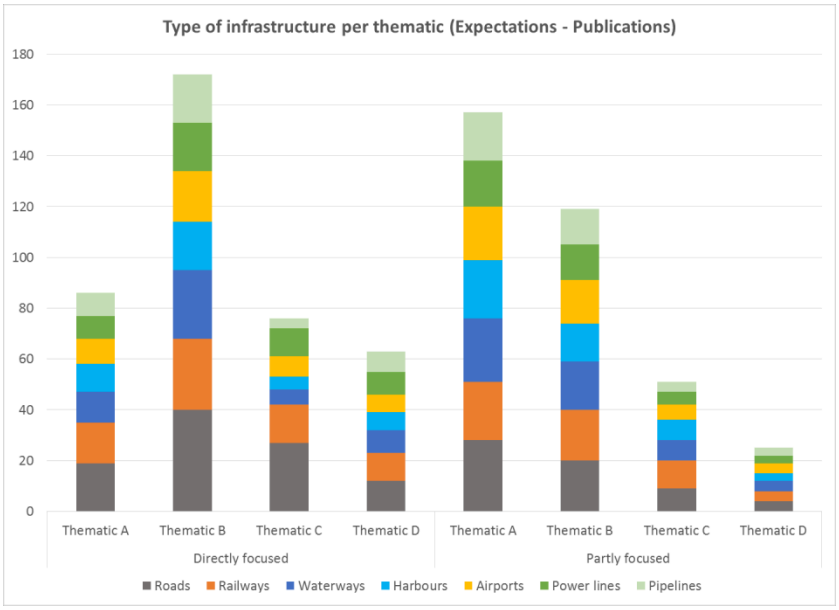

Figure 31. Occurrence of infrastructures in expectations according to thematics and degree of match - Publications

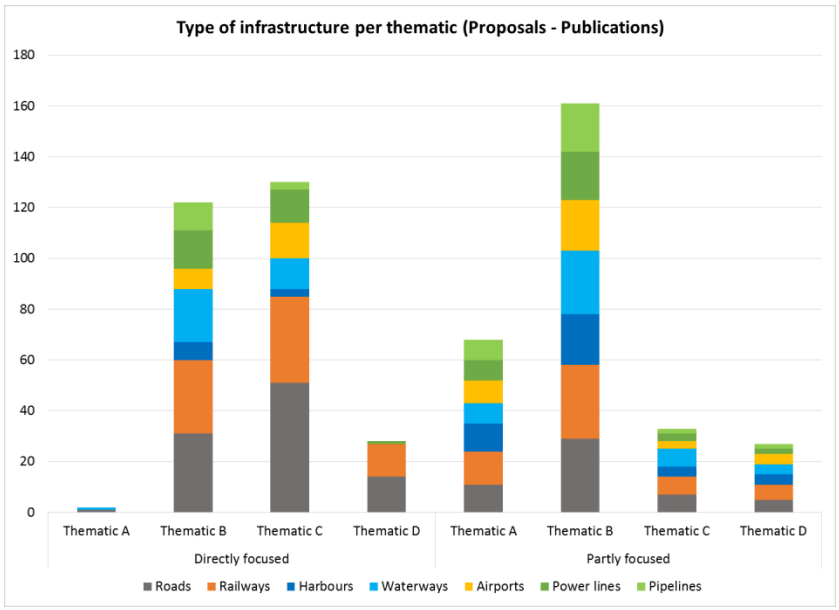

Figure 32. Occurrence of infrastructures in proposals according to thematics and degree of match - Publications

5. CONCLUSIONS

The online consultation carried out in order to collect expectations and proposals from all types of stakeholders in the aim of achieving more biodiversity-friendly transport modes and transport systems, was open for 59 days. This was in consideration with the date to report on the specific purpose of Deliverable 4.1.

A total of 47 contributors responded to the two questions implemented in the BISON online questionnaire for the sake of Deliverable 4.1. Finally, they formulated a total of 135 expectations and 83 proposals. All these inputs were assessed with regard to their direct or indirect match with the topic (i.e. more biodiversity-friendly transport modes and transport systems), and classified according to the four thematics: A – Planning and strategy; B – Planning and environmental impact assessment; C – Implementation and management; D – Education, awareness, consultation and communication. This processing of stakeholder inputs is a first step of analysis in the general process designed in WP4 for the construction of the Strategic Research Agenda (Deliverable 4.2). Hence, among well-focused inputs gathered by means of the consultation, this processing concludes notably to 68 expectations and 39 proposals, with a predominant importance given to thematic C (n = 38 and 25 respectively). It is significant that the majority of expectations and proposals expressed by contributors are cross-sectoral in relation to transport infrastructures: indeed most of them concern several types simultaneously. The various types of infrastructures (roads, railways, waterways, airports, power lines, harbours and pipeline) are integrated in these inputs in average (expectations and proposals) at 95%, 94%, 70%, 71%, 71%, 61% and 33% respectively.

The document survey was planned in the WP4 general methodology in order to compensate or complement the possible risk of insufficient contribution to the consultation or an unbalanced share between the different types of stakeholders. The analysis of documents was achieved by several WP4 members. A total of 80 documents were analysed. As a whole, they provide a series of 190 identified expectations and 231 identified proposals. The document survey compensated for a certain imbalance in the representation of stakeholder through the online consultation (NGOs and associations notably). The same processing (direct/indirect match; thematic ranking) was applied to publication inputs. Among well-focused inputs, it concludes notably to 115 expectations and 153 proposals, with a predominant importance given to Planning and environmental impact assessment among expectations (n = 45) and to Implementation and management among proposals (n = 81). Most documents published by stakeholders' organisations acting at national, European and international levels deal with a diversity of infrastructures limited to one or two types. The various types of infrastructures (roads, railways, waterways, airports, power lines, harbours and pipeline) are integrated in these inputs in average (expectation and proposals) at 73%, 61%, 44%, 36%, 35%, 33% and 29% respectively, i.e. less than in consultation inputs.

All the original inputs are individually reported in appendices A and B. Several are similar. In the next step of the WP4 process towards the Strategic Research Agenda, they will all be considered with attention in view to identify the direct or induced research questions they can raise. Deliverable 4.1 and more particularly appendices A and B will constitute an important basement to identify relevant research questions as well as the gaps with the present state of

knowledge. For the sake of Task 4.2, it will be complemented by further documentation and collection of input from stakeholder (the BISON online consultation was extended until July 2021), as well as the own expertise and documentation of all WP4 members. As it stands, Deliverable 4.1 provides a general overview of the main points of interest of stakeholders today towards the issue of research for more biodiversity-friendly transport modes and transport systems. As a whole one can note that they express a predominant interest for the thematic Implementation and management (C). The series of expectations and proposals gathered in appendices A and B can also help BISON Task 3.3 and Task 5.3 to highlight the major trends developing today and to build plausible scenarios of deployment.

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APPENDIX A: CENSUS OF EXPECTATIONS

1. EXPECTATIONS EXPRESSED DURING CONSULTATION

1.1. Thematic Policy and strategy

Table 8. Consultation - Expectations related to policy and strategy

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Policy and strategy	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Con_11.4	Speed reduction - a general policy to limit speediness on existing and planned infrastructures in Europe	University & Research institution, France	X	X					
EXP_Con_55.1	Inclusion of biodiversity-friendly transport and conservation/maintenance/ restoration of ecological corridors in relevant legislation	Public agency, Slovakia	X	X	X	X	X	X	X
EXP_Con_55.3	Development of updated national strategies on biodiversity and on sustainable transport	Public agency, Slovakia	X	X	X	X	X	X	X
Broader issue but with direct relation to the Topic									

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Policy and strategy	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_02.1	Establishment of legislatively protected network of important wildlife migratory corridors for animal species and strengthening of the protection of existing legislative measures	Environmental administration, Slovakia	X	X	X	X	X	X	X
EXP_Con_05.1	More importance to biodiversity issues and considering biodiversity at the same level as economic development	Environmental administration, France	X	X	X	X	X	X	X
EXP_Con_12.2	Ecological network and biotopes network / GI	NGOs and associations, Germany	X	X	X	X	X	X	X
EXP_Con_18.2	Ecological corridors are legally protected	Public agency, Slovakia	X	X	X	X	X	X	X
EXP_Con_19.5	Smart and detailed international recommendations linked to precise monitoring system for better national collaboration and implementation	Environmental administration, Spain	X	X	X	X		X	X
EXP_Con_40.1	Legal status of ecological infrastructure ensured	Transport Infrastructure company, France	X	X	X	X	X	X	X
EXP_Con_45.1	Revision of the regulatory corpus for better integrating the environmental issues into decision making	Transport Infrastructure company, international	X	X	X	X	X	X	X
Issue with indirect or distant relation to the Topic									
EXP_Con_04.2	Promotion of public transport and cycling	Public agency, France	X	X					
EXP_Con_10.1	There is currently more concerns, increasing competence and being created capacity	University & Research institution, Sweden	X	X	X			X	X
EXP_Con_16.1	Prices and taxes in transport less lying - following the EU principle of fair and efficient pricing	University & Research institution, Germany	X	X	X		X	X	X
EXP_Con_27.2	Shifting the freight transport from roads to other modes - esp. railways, partly waterways	University & Research institution, Slovakia	X	X	X				
EXP_Con_27.4	A fundamental shift in social-economic development paradigm - leading to a reduction in traffic volumes and a strengthening of their efficiency and socially and environmentally friendly modes	University & Research institution, Slovakia	X	X	X	X		X	
EXP_Con_29.1	Reducing the gas emissions - natural gas, coal, oil	University & Research	X	X	X			X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Policy and strategy	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
		institution, Slovakia							
EXP_Con_29.2	Modification of the transport structure - healthier travel choices	University & Research institution, Slovakia	X	X	X			X	
EXP_Con_29.4	Use of hybrid/electric cars, busses, locomotives or other innovative green technologies	University & Research institution, Slovakia	X	X	X			X	
EXP_Con_32.1	Reducing the number of business trips	Public agency, Slovakia	X	X				X	
EXP_Con_32.2	Reducing the number of trips to work by car	Public agency, Slovakia	X	X					
EXP_Con_32.3	Using the air transport only to the necessary extent	Public agency, Slovakia						X	
EXP_Con_32.4	Reducing the truck transport - shift to the rail	Public agency, Slovakia	X	X					
EXP_Con_32.5	Reducing the amount of consumer goods imported from other continents	Public agency, Slovakia	X	X	X			X	X
EXP_Con_33.2	Stricter emission controls	University & Research institution, Slovakia	X	X	X			X	X
EXP_Con_33.3	Supporting the green technologies	University & Research institution, Slovakia	X	X	X	X	X	X	X
EXP_Con_33.4	Implementation of relevant international and national documents, strategies and proposals	University & Research institution, Slovakia	X	X	X	X	X	X	X
EXP_Con_48.1	Change in decision making during the planning of the technical infrastructure (integration of factors)	Transport administration, Poland	X	X	X	X		X	X
EXP_Con_56.2	Less pollution caused by transport infrastructure	Environmental consultancy, Poland	X	X	X	X	X	X	X
EXP_Con_56.3	Less energy consumption and energy-efficient technologies	Environmental consultancy, Poland	X	X	X	X		X	X
EXP_Con_56.4	More public transport instead of private transport modes	Environmental consultancy, Poland	X	X				X	
EXP_Con_56.5	Less trucks on the roads	Environmental consultancy, Poland	X	X					

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Policy and strategy	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_60.1	Improving the management of inland waterway transport and reducing emissions	Transport administration, Poland			X				X
EXP_Con_60.2	Supporting the transition to alternative driving powers and fuels in waterborne transport	Transport administration, Poland			X				X
EXP_Con_61.2	Providing a general understanding of the issues related to the global challenges	Transport Infrastructure company, international	X	X	X	X	X	X	X
EXP_Con_61.3	Describing and promoting the measures that constitute a railway contribution to the UN SDGs	Transport Infrastructure company, international		X					
EXP_Con_69.1	Reducing number of vehicles on the road replacing them by public transportation	Environmental administration, Israel	X	X					
EXP_Con_71.1	Reducing new infrastructures projects	University & Research institution, France	X	X	X	X	X	X	X

1.2. Thematic Planning and environmental impact assessment

Table 9. Consultation - Expectations related to planning and environmental impact assessment

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Con_02.2	Setting important standards for building mitigation measures for large infrastructure projects in legislation form	Environmental administration, Slovakia	X	X	X	X	X	X	X
EXP_Con_02.3	Mosaic of heterogeneous and diverse habitat protection is a guiding principle in the implementation of any measures in transportation	Environmental administration, Slovakia	X	X	X	X	X	X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
	project								
EXP_Con_07.1	Obligation to include biodiversity in developing transport network	University & Research institution, Poland	X	X	X	X	X	X	X
EXP_Con_08.1	Consideration of ecological connectivity in the preparation and planning of transport infrastructure	University & Research institution, Slovakia	X	X	X	X	X	X	X
EXP_Con_12.1	Ecologically effective standards for specific modes of transport and the GI	NGOs and associations, Germany	X	X	X	X	X	X	X
EXP_Con_17.1	Proper integration of biodiversity safeguards from early stages of planning and scoping of transport infrastructure	NGOs and associations, Romania	X	X	X	X	X	X	X
EXP_Con_20.3	Increasing number of green bridges over highways	Public agency, Slovakia	X						
EXP_Con_24.1	Harmonized development of transport networks while maintaining ecological connectivity	University & Research institution, Czech Rep.	X	X	X	X	X		
EXP_Con_31.1	Higher budget allocated to biodiversity	Environmental consultancy, France	X	X	X	X		X	X
EXP_Con_33.1	New transport routes - intelligent spatial planning	University & Research institution, Slovakia	X	X	X	X	X	X	X
EXP_Con_40.2	Increasing the infrastructure permeability for animals	Transport Infrastructure company, France	X	X	X	X			
EXP_Con_40.3	Better interaction between infrastructure types (roads, railways)	Transport Infrastructure company, France	X	X					
EXP_Con_45.2	Fulfilling the principle "avoid, reduce and compensate" within the infrastructure life cycle	Transport Infrastructure company, international	X	X		X		X	X
EXP_Con_45.4	Using the standardized methodology within the maintenance and management of TI	Transport Infrastructure company, international	X	X		X		X	X
EXP_Con_54.1	Firstly, avoiding the impacts of new infrastructures, then mitigating, and only at the end compensating	Public agency, France	X	X	X	X		X	X
EXP_Con_56.1	Less habitat fragmentation caused by technical infrastructure	Environmental consultancy, Poland	X	X	X	X		X	
EXP_Con_57.1	Higher budget dedicated to biodiversity when building transport infrastructures	Environmental consultancy,	X	X		X		X	

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
		international							
EXP_Con_63.2	Applying the specific targets for the permeability of new proposed infrastructure	Environmental consultancy, Romania	X	X	X				
EXP_Con_64.1	Considering the benefits and costs (qualitative and quantitative) for improving biodiversity along transport infrastructure, e.g. ecosystem services	Transport administration, Netherlands	X	X	X	X		X	X
Broader issue but with direct relation to the Topic									
EXP_Con_04.1	Fewer but broader infrastructure to reconcile several different transport modes	Public agency, France	X	X		X			
EXP_Con_11.2	Better understanding of transportation's environmental whole costs	University & Research institution, France	X	X	X	X		X	X
EXP_Con_11.5	Transport infrastructures is beneficial to crossed territories	University & Research institution, France	X	X	X	X		X	X
EXP_Con_17.2	Dedicated funding for missing data collection and for planning and implementation of needed green infrastructure	NGOs and associations, Romania	X	X	X	X	X	X	X
EXP_Con_18.1	Ecological corridors identification completed	Public agency, Slovakia	X	X	X	X	X	X	X
EXP_Con_24.2	Spatial planning taking into account landscape connectivity and GI	University & Research institution, Czech Rep.	X	X	X	X	X	X	X
EXP_Con_25.1	Better integrating the effects on biodiversity into infrastructure life cycle assessment.	University & Research institution, France	X	X		X		X	
EXP_Con_27.1	Better planning for optimizing the transport system at all levels	University & Research institution, Slovakia	X	X	X	X	X	X	X
EXP_Con_29.5	Strategic transport planning for protecting organic farming and biodiversity	University & Research institution, Slovakia	X	X		X			
EXP_Con_45.3	Considering the proportionality dimension into the decision-making process	Transport Infrastructure company, international	X	X		X		X	X
EXP_Con_54.3	Demonstrating the main public interest of a new infrastructure projects	Public agency, France	X	X	X	X	X	X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_55.2	Updating the national and regional territorial system of ecological stability (green infrastructure network)	Public agency, Slovakia	X	X	X	X	X	X	X
Issue with indirect or distant relation to the Topic									
EXP_Con_12.3	Reduction of land consumption	NGOs and associations, Germany	X	X	X	X	X	X	X
EXP_Con_29.3	Improving the traffic planning, flow, transport efficiency	University & Research institution, Slovakia	X	X	X			X	

1.3. Thematic Implementation and management

Table 10. Consultation - Expectations related to implementation and management

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Con_01.1	Fauna passages are considered like other engineering structures and incorporated in maintenance schemes and engineering structures data bank	Transport administration, Switzerland	X						
EXP_Con_02.4	Evaluation and monitoring of the efficiency of the mitigation measures in current/ planning road, railway and other infrastructure	Environmental administration, Slovakia	X	X	X	X	X	X	X
EXP_Con_08.2	Implementation of technical solutions to reduce mortality, including passages for fauna	University & Research institution, Slovakia	X	X	X				
EXP_Con_08.3	Monitoring the effects of transport on nature	University & Research institution, Slovakia	X	X	X	X		X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_08.4	Compensatory measures e.g. creation or improvement of habitat quality	University & Research institution, Slovakia	X	X	X	X		X	X
EXP_Con_11.1	Better understanding of animals behaviour towards transport infrastructures	University & Research institution, France	X	X	X	X		X	X
EXP_Con_17.3	Proper monitoring of green infrastructure efficiency and adaptation if and when needed	NGOs and associations, Romania	X	X	X	X	X	X	X
EXP_Con_18.3	Mitigation measures are designed and realised	Public agency, Slovakia	X	X	X	X		X	X
EXP_Con_18.4	Monitoring of the effectiveness of monitoring measures is in place	Public agency, Slovakia	X	X	X	X		X	X
EXP_Con_19.4	Effective environmental/biodiversity mainstreaming within the whole infrastructure cycle	Environmental administration, Spain	X	X	X	X	X	X	X
EXP_Con_20.1	Elimination of migration barriers	Public agency, Slovakia	X	X	X	X			
EXP_Con_20.2	Support for the construction of elements of accompanying green roads	Public agency, Slovakia	X	X					
EXP_Con_21.1	More guidelines on implementing a biodiversity friendly management of airfields for aerodrome operators	Public agency, France						X	
EXP_Con_24.3	Functional system for independent monitoring aimed to the effectiveness of the measures taken	University & Research institution, Czech Rep.	X	X	X	X		X	
EXP_Con_24.4	Revealing of response patterns of different species to the degree of pollution and disturbance caused by traffic on roads and railways	University & Research institution, Czech Rep.	X	X					
EXP_Con_27.3	Effective biodiversity protection and gradual realization of defragmentation measures	University & Research institution, Slovakia	X	X	X	X	X		
EXP_Con_30.2	Reducing the number of collisions between animals and vehicles and improving traffic safety	University & Research institution, Slovakia	X	X		X		X	
EXP_Con_37.2	Long-term coherence between the territorial development and the transport infrastructures measures (ecoducts, fences, etc.)	Environmental consultancy, France	X	X		X		X	
EXP_Con_40.4	Harmonised protocol to study biodiversity in infrastructures	Transport Infrastructure company, France	X	X	X	X	X	X	X
EXP_Con_41.1	Better knowledge of biodiversity issues within the infrastructure planning and maintenance	Transport administration, Spain	X	X	X	X	X	X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_46.1	Better considering the biodiversity management costs within the maintenance of TI	Transport Infrastructure company, France	X	X		X			
EXP_Con_46.2	Recognising the interaction of transport infrastructure with marine biodiversity in space and time	Transport Infrastructure company, France				X			X
EXP_Con_46.3	Alternative vegetation management of TI as a contribution to the local ecological continuity	Transport Infrastructure company, France	X	X		X			
EXP_Con_54.2	Improving the knowledge about the mitigation measures efficiency	Public agency, France	X	X	X	X		X	X
EXP_Con_57.2	Re-integration and restoring the biodiversity infrastructures on already existing transport infrastructures for defragmentation	Environmental consultancy, international	X	X		X		X	
EXP_Con_57.3	Protection and monitoring of biodiversity to make sure that the undertaken measures were efficient	Environmental consultancy, international	X	X		X		X	
EXP_Con_57.5	Standardizing the methods for specific species to provide the best adapted solutions on transport infrastructures	Environmental consultancy, international	X	X	X	X		X	X
EXP_Con_58.1	Innovative techniques for design and maintenance of wildlife passages are applied	Environmental consultancy, Spain	X	X					
EXP_Con_58.2	Integrated information and monitoring systems are applied to allow appropriate maintenance of transport infrastructure assets related to biodiversity	Environmental consultancy, Spain	X	X	X	X		X	X
EXP_Con_58.3	Automatic systems to detect large animals posing risks to traffic and activation of systems to prevent such collisions are developed	Environmental consultancy, Spain	X	X	X			X	X
EXP_Con_58.4	Ecological management of transport infrastructure habitats for increasing the resilience and performance towards climate change adaptation are applied	Environmental consultancy, Spain	X	X				X	
EXP_Con_58.5	Inventories of biodiversity in transport infrastructure habitats are undertaken (species, habitats, ecological asset)	Environmental consultancy, Spain	X	X	X	X		X	X
EXP_Con_59.2	Improving the knowledge on the interactions between biodiversity and transport infrastructures	Environmental administration, Spain	X	X	X	X		X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_59.3	Developing a defragmentation programme for TI. Systematic application of the mitigation and compensation measures	Environmental administration, Spain	X	X		X			
EXP_Con_63.1	Applying the specific targets for defragmentation (on existing infrastructure)	Environmental consultancy, Romania	X	X	X				
EXP_Con_69.2	Allotment of budget for ecological bridges and underpasses	Environmental administration, Israel	X	X					
EXP_Con_72.1	Developing long term plans for vegetation management, embedding biodiversity management into maintenance activities	Transport Infrastructure company, Australia	X	X		X			
EXP_Con_72.2	Threatened species are managed to enhance habitat and range on transport land	Transport Infrastructure company, Australia	X	X		X			
Broader issue but with direct relation to the Topic									
EXP_Con_19.2	High budget achieved in the infrastructure transport projects for environmental requirement (prevention and mitigation)	Environmental administration, Spain	X	X	X	X	X	X	X
EXP_Con_20.4	Reducing the number of overhead power lines. Gradually replacing them with underground or other alternatives	Public agency, Slovakia				X			
EXP_Con_23.1	Biodiversity solutions are not more expensive than the technical solutions	Transport Infrastructure company, UK	X	X					
EXP_Con_30.1	Mapping and control of the spread of invasive plant species	University & Research institution, Slovakia	X	X	X	X	X	X	X
EXP_Con_37.1	Compliance of the infrastructure maintenance with the commitments made during the environmental studies	Environmental consultancy, France	X	X		X		X	
Issue with indirect or distant relation to the Topic									
EXP_Con_71.2	Maintaining the current infrastructure network	University & Research institution, France	X	X	X	X	X	X	X

1.4. Thematic Education, awareness, consultation and communication

Table 11. Consultation - Expectations related to education, awareness, consultation and communication

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Education, awareness, consultation and communication	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Con_02.5	A pool of experts and professionals will be developed in all sustainable transport-related fields	Environmental administration, Slovakia	X	X	X	X	X	X	X
EXP_Con_18.5	Cooperation with stakeholders in order to minimalize road kills and enabling the animal migration	Public agency, Slovakia	X	X	X	X	X	X	X
EXP_Con_41.2	Promoting the scientific research by Administrations, data sharing between science, admins and operators	Transport administration, Spain	X	X	X	X	X	X	X
EXP_Con_41.3	Dissemination of the measures adopted to integrate biodiversity into infrastructures - increasing the society awareness	Transport administration, Spain	X	X	X	X	X	X	X
EXP_Con_55.4	Increased awareness of nature conservation authorities, spatial planners and transport infrastructure stakeholders	Public agency, Slovakia	X	X	X	X	X	X	X
EXP_Con_57.4	Improving the communication to raise awareness among stakeholders (e.g. transport and environmental sector)	Environmental consultancy, international	X	X	X	X	X	X	X
EXP_Con_59.1	Establishing the intersectoral working group at regional level for biodiversity friendly infrastructures	Environmental administration, Spain	X	X	X	X		X	X
EXP_Con_61.1	Avoiding the habitat fragmentation and enhancing the biodiversity conservation on transport by sharing experiences and knowledge	Transport Infrastructure company, international	X	X	X	X	X	X	X
Broader issue but with direct relation to the Topic									
EXP_Con_01.3	Communication! Do field outings with engineers. Hands on work, go outside, exchange	Transport administration, Switzerland	X	X	X	X	X	X	X
EXP_Con_11.3	Understanding and improving the care (awareness) of travellers for nature at large	University & Research institution, France	X	X	X	X		X	X

Input code EXP_Con_Provider.n°	Description of the expectation - Thematic Education, awareness, consultation and communication	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Con_19.1	Bottom-up approach gets the top: binding agreements and collaboration among policy makers	Environmental administration, Spain	X	X	X	X	X	X	X
EXP_Con_19.3	Increasing society pressure on infrastructure transport administration, improving the communication tools	Environmental administration, Spain	X	X	X	X	X	X	X
EXP_Con_34.1	Sufficient inter-ministerial coordination e.g. in the field of railways and motorways	University & Research institution, Slovakia	X	X					
EXP_Con_37.3	Mandatory public access to the data about traffic collisions on public or private infrastructure	Environmental consultancy, France	X	X				X	
EXP_Con_38.1	Cooperation between Ministry of Public Works and Ministry of Environment	Transport Infrastructure company, Greece	X	X	X	X	X	X	X
EXP_Con_38.2	Inter-disciplinary cooperation between transportation designers and environmentalists	Transport Infrastructure company, Greece	X	X	X	X	X	X	X
EXP_Con_64.2	More international connection and exchange in the development of Green Infrastructure	Transport administration, Netherlands	X	X	X	X			
EXP_Con_64.3	Overview of knowledge gaps	Transport administration, Netherlands	X	X	X	X	X	X	X
EXP_Con_69.3	National level planners are more aware of their plans regarding possible impacts on the environment	Environmental administration, Israel	X	X	X	X	X	X	X
Issue with indirect or distant relation to the Topic									
EXP_Con_01.2	Stay pragmatic. Accept you won't achieve everything at once, in is along ongoing process	Transport administration, Switzerland	X	X	X	X	X	X	X
EXP_Con_27.5	Behavioural change in society - preference of public transport and eco-modes of transport	University & Research institution, Slovakia	X	X	X	X		X	

2. EXPECTATIONS IDENTIFIED IN PUBLISHED DOCUMENTS

2.1. Thematic Policy and strategy

Table 12. Published documents - Expectations related to policy and strategy

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Pub_2.4	Road and transport industries and public administrations are increasingly interested in measures like furthering renewable energies, minimizing or preventing pollution, protecting natural areas and wildlife habitats, promoting resiliency in road asset, and addressing service disruptions and repairs.	PIARC (2020)	X						
EXP_Pub_5.2	Many recent marine and inland water infrastructure projects have been delayed as a result of administrative procedures. Environmental regulations are not typically designed to stimulate development and innovation: indeed, the relative lack of flexibility in the application of much environmental regulation could prove to be counter-productive insofar as the aims of Working with Nature are concerned. It will therefore become increasingly important to look to the intention of the legislationrather than taking a prescriptive approach to its implementation. A transition from a philosophy of 'control' to one of 'management' is needed and the cultural differences between ecologists, civil engineers, planners and politicians similarly need to be addressed if 'Working with Nature' is to be embraced. Although these are real problems, they are not insurmountable.	PIANC (2011)			X				
EXP_Pub_12.2	Integration of Green Infrastructure themes (connectivity/corridors, permeability, fragmentation, ecosystem services, climate change adaptation etc.) in biodiversity, transport and other sectoral strategies	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_13.7	Develop a vision on defragmentation from a landscape perspective, in which population level impacts are addressed and clear goals for mitigation are defined that link with (inter) national legislation and policies	van der Grift et al. (2018)	X						
EXP_Pub_13.8	prevent a staged loss of biodiversity	van der Grift et al. (2018)	X						

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_23.8	Preserving natural ecosystems is much less costly than restoring or replacing them, so decision- and policy-makers should prioritize their protection when planning infrastructure development and seek to maximize the synergies between natural and grey infrastructure	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_32.4	Avoiding fragmentation of natural and semi-natural habitats caused by all transport modes and related infrastructure, as well as maintenance and improvement of ecological connectivity on the local, national and regional level	Carpathian Convention (2014)	X	X	X			X	
EXP_Pub_33.3	The goal of the Transport SAP is to provide indications to maintain and enhance the environmental quality standards in the Carpathians, without curbing its infrastructural development	Carpathian Convention (2020)	X	X					
EXP_Pub_33.4	The Transport SAP is addressed to competent authorities in each Carpathian country pointing, first, at the enhancement of the cooperation among different Ministries and responsible actors in each Carpathian country, and providing indications on the actions needed for the development of ecologically-friendly transport infrastructure and the implementation of the EU Green Infrastructures (GI) Strategy at national and Carpathian level	Carpathian Convention (2020)	X	X					
EXP_Pub_37.1	Strategic objective 2: Prevent habitat fragmentation and ensure ecological connectivity in the Carpathians	Papp et al. (2020)	X	X					
EXP_Pub_43.1	Recommendations towards the Implementation of the Protocol on Sustainable Transport.	Kadlečík & Lucius (2019)	X	X					
EXP_Pub_51.2	"4.4 Habitat fragmentation and biodiversity" "The significant potential of transport infrastructure to negatively affect biodiversity or support for its conservation within Europe highlights the need to optimise the integration of these areas within EU policy and adopt a more cross-sectoral and interdisciplinary approach to identify and implement sustainable solutions. While the policies outlined include requirements mandating the consideration of biodiversity impacts to varying degrees, several gaps remain regarding implementation in practice. Ensuring a more holistic approach to development within and across existing policies is important. Two ways in which this may be achieved are by addressing the fragmented nature of EIAs being applied in road construction proposals and by ensuring transparency in decision-making processes, particularly regarding the provision of information to and early involvement of the public (Gasparatos and Willis, 2015)"	EEA (2015)	X	X	X			X	X
EXP_Pub_56.1	Preserve and promote biodiversity on French airport platforms	MTES (2019)						X	

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_63.3	DECISION-MAKING FOR ADOPTING, AND SUSTAINING, INTEGRATED APPROACHES OVER-TIME	Kennedy et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_66.1	Definition of what is a sustainable infrastructure	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_66.2	opportunities and challenges for : Assessing infrastructure needs	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_66.10	Policy recommendations	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_69.4	Strategically combining green and gray infrastructure to lower costs and improve resiliency can help tackle the looming financial and environmental crisis facing global infrastructure systems	Browder at al. (2020)	X	X	X	X	X	X	X
EXP_Pub_71.1	The Global Strategy seeks to contribute to joining forces between transport and other forms of linear infrastructure towards realising a vision for a sustainable future; it intends to address the following: "In 2050, Transport and other Linear Infrastructure are designed, constructed and operated in such a cooperative and transparent way, that, transportation of people, goods, products and energy services, supports the prosperity of human societies, the maintenance of local cultures and the healthy development of economies; without damaging the cohesion of natural ecosystems, the survival of all the species and the quality of landscape, water, air and beauty of our planet"	Georgiadis (2020)	X	X	X	X	X		
EXP_Pub_71.2	Aim and objectives of the Global Strategy - promote and enhance the mainstreaming of biodiversity and ecological connectivity into Transport and other Linear Infrastructure (TLI) development and to define a roadmap on effective engagement of all the different stakeholders as important and crucial players in developing sustainable TLI globally. The main objectives to address this aim are: • Establishing appropriate legal frameworks and regulatory requirements at international, regional and national levels • Establishing ecosystem approaches based on the uniqueness of each landscape and habitat affected by TLI • Launching proactive policies at international, cross-border and national levels	Georgiadis (2020)	X	X	X	X	X		
EXP_Pub_73.19	[…] resemblance between recreational and ecological responses to infrastructure, and the options for joint mitigation, with three examples: i) the similar response to traffic noise in breeding birds and in people during outdoor recreation, ii) the similarity in movement patterns of wildlife and people in the vicinity of roads, and its implication on barrier effects and landscape fragmentation, and iii) the combined use of passages such	Wagner et al. (2010)	X	X					

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	as viaducts and ecoducts. Our overview highlights the common interests between social and ecological nature conservation.								
EXP_Pub_74.4	Innovative concepts, such as the ecosystem or building with nature approaches, that clearly provide added value are often restricted by narrow interpretations of the directives. Integrated planning approaches in or nearby protected areas suffer from a lack of experience with these new models. Courts are also not used to these innovative concepts and tend to fall back to the well-known article 6 procedures, even when Natura 2000 objectives are fully integrated in the plans	ESPO & EFIP (2015)							X
EXP_Pub_79.1	14th UN SDGs (Life below water): ... Protecting coastal and estuarine ecosystems Minimizing disturbing factors such as underwater noise for marine mammals	WPSP (2021)							X
EXP_Pub_80.1	Restoring and protecting biodiversity on land and sea in port regions and cities : 1 Improving and maintaining water quality in the port basins. 2 Conducting regular surveys of biodiversity in the City Port territory and publishing the findings. 3 Preventing the destruction of sensitive natural habitats when developing onshore or offshore port spaces and by regulating ship-generated waves. 4 Supporting the efforts of civil society to protect fauna and flora in the City Port territory. 5 Encouraging programmes aimed at restoring and developing biodiversity in the City Port territory.	AIVP (2021)							X
Broader issue but with direct relation to the Topic									
EXP_Pub_2.1	Additional areas that are given attention to facilitate mobility refers to planning for responsible land use, promoting healthy environments, fostering local economic capacities, and enhancing road safety.	PIARC (2020)	X						
EXP_Pub_2.2	In confluence with technological evolution, the natural dynamism of the road and road transport sectors calls for solutions developed in close engagement with the social and environmental context	PIARC (2020)	X						
EXP_Pub_7.1	In view of the majority share of transport by road, further progress is required from the actors concerned in terms of energy and ecological transitions, whether through vehicles or infrastructure and its equipment	Hautière et al (2019)	X						

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_7.2	The road can participate in the ecological transition by being less emissive and by saving the natural resources necessary for its construction.	Hautière et al (2019)	X						
EXP_Pub_12.1	Integration of the EU Strategy on Green Infrastructure in national legislation.	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.1	Clear and comprehensive definition of Green Infrastructure	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_13.5	evidence on the possible benefits and/or disadvantages of an outcome-based procurement approach and, consequently, allow for better judgement of when such an approach can be applied and when other approaches should be preferred	van der Grift et al. (2018)	X						
EXP_Pub_23.1	For infrastructure to serve a positive purpose, risks to people and the planet must be managed while societal, environmental and economic benefits are enhanced, and it should also be resilient and flexible under changing conditions. Making well-informed decisions is critical, because infrastructure systems typically last for decades, defining our collective future by locking in the consequences of decisions that are being made now.	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_24.2	We know of no economic incentive programs similar to those present within agricultural landscape that support conserving habitats for pollinators and other beneficial biodiversity in cities or infrastructure.	IPBES (2016)	X	X	X	X	X	X	X
EXP_Pub_26.1	The Report concludes that an urgent step change in effort is needed to prevent irreversible land degradation and to accelerate the implementation of restoration measures. Delaying the implementation of proven actions to combat land degradation will result in the necessary steps becoming progressively more difficult and costly. Existing multilateral environmental agreements, coupled with coordinated policy agendas that encourage sustainable production and consumption, provide a platform for action to avoid and reduce land degradation and promote restoration. Landscape-wide approaches that integrate agricultural, forest, energy, water and infrastructure agendas, coupled with the elimination of perverse incentives and devising positive incentives, can assist in addressing the problem.	IPBES (2018)	X	X	X	X	X	X	X
EXP_Pub_26.2	The main direct drivers of land degradation and associated biodiversity loss are expansion of crop and grazing lands into native vegetation, unsustainable agricultural and forestry practices, climate change, and, in specific areas, urban expansion, infrastructure development and extractive industry.	IPBES (2018)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_26.3	The strongest drivers of biodiversity loss to date have been agriculture, followed by forestry, infrastructure, urban encroachment and climate change. In the period 2010–2050, climate change, crop agriculture and infrastructure development are expected to be the drivers of biodiversity loss with the greatest projected increase {7.2.2.1}. Source: Adapted from Van der Esch et al. (2017).I.e : Infrastructure development remains a first rank driver of biodiversity loss	IPBES (2018)	X	X	X	X	X	X	X
EXP_Pub_26.4	The biodiversity footprint methodology used in this analysis uses a high-resolution input-output economic model that traces the commodities whose production is associated with threatened biodiversity, through several intermediate trade and transportation steps, to the country of final consumption. i.e: To summarize, the transportation step is part of the impact of the trade of some goods on threatened biodiversity	IPBES (2018)	X	X	X			X	X
EXP_Pub_27.1	Due to expansions of infrastructure, extensive areas of the planet are being opened up to new threats (well established) {2.1.11}. Globally, paved road lengths are projected to increase by 25 million kilometres by 2050, with nine tenths of all road construction occurring within least developed and developing countries. The number of dams has increased rapidly in the past 50 years. Worldwide, there are now about 50,000 large dams (higher than 15 metres) and approximately 17 million reservoirs (larger than 0.01 hectares or 100m2) {2.1.11}. The expansions of roads, cities, hydroelectric dams and oil and gas pipelines can come with high environmental and social costs, including deforestation, habitat fragmentation, biodiversity loss, land grabbing, population displacement and social disruption, including for indigenous peoples and local communities (established but incomplete). Yet infrastructure can generate positive economic effects and even environmental gains, based on efficiency, innovation, migration, and urbanization, depending on where and how investment is implemented and governed (well established){2.1.11}. Understanding this variation in impacts is critical.	IPBES (2019)	X	X	X		X		
EXP_Pub_29.2	To reflect nature protection, stability and development of ecosystems and climate change adaptation in all sectoral development strategies as public interest e.g. in transport planning, land-use planning…	MIRRI (2021a)	X	X	X	X	X	X	
EXP_Pub_29.6	In the collaboration of the state and territorial self-governments to safeguard socially, economically and environmentally sustainable transport services for the communities of villages, towns and regions	MIRRI (2021a)	X	X	X				

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_31.5	The Danube is a waterway of international importance according to the international classification of inland waterways. In this context, the aim is to improve the navigability of the Danube and will have a significant impact on the greater and more efficient use of existing ports on the Danube in the Slovak Republic and will significantly strengthen the role of water transport in transport of goods over 300 km as a significant mode of transport in a multimodal transport system. While waterborne transport has the potential to bring other modes of transport and can contribute to the reduction of emissions, noise and the like, the rules applicable to the Water Framework Directive, the protection of sensitive protected areas and Natura 2000 sites must be observed.	MDV (2016)			X				
EXP_Pub_32.5	Development and promotion of environmentally friendly transport models and systems, in particular, in environmentally sensitive areas	Carpathian Convention (2014)	X	X	X			X	
EXP_Pub_38.2	Guidance and recommendations on planning and establishment of transnational ecological corridors connecting Natura 2000 areas on local and regional level, derived from pilot actions.	DaRe to Connect (2020)	X	X	X			X	
EXP_Pub_40.1	Fulfilment of strategic goal B.3: By 2020, ensure the preservation and strengthening of ecosystems and their services through the establishment of green infrastructure and the restoration of at least 15% of degraded ecosystems.	MoE (2014)	X	X	X	X	X	X	X
EXP_Pub_40.2	Fulfillment of the strategic goal C.6: Ensure a favorable conservation status of aquatic and water-related habitats and species in line with the objective of achieving good environmental status of aquatic ecosystems by 2020, while ensuring that in the field of aquaculture development and regulation water use does not adversely affect aquatic species, habitats and ecosystems.	MoE (2014)			X				
EXP_Pub_40.3	Fulfillment of the strategic goal A.1: Halt the degradation of all species and habitats, in particular those covered by EU legislation, and achieve significant and measurable improvements in their status.	MoE (2014)	X	X	X	X	X	X	X
EXP_Pub_62.6	Create new procurement criteria for large-scale infrastructure funding	Bartlett (2019)	X	X	X	X	X	X	X
EXP_Pub_62.8	Use existing climate and development policy support and coordination initiatives	Bartlett (2019)	X	X	X	X	X	X	X
EXP_Pub_65.1	National laws and policies: incentives and penalties	CBD (2018)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_65.4	Effective institutions: enforcement, transparency, coordination and consultation	CBD (2018)	X	X	X	X	X	X	X
EXP_Pub_65.7	Innovation: reducing demand, increasing efficiency and considering alternatives	CBD (2018)	X	X	X	X	X	X	X
EXP_Pub_69.2	Recognizing that next generation infrastructure has a critical role to play in meeting the climate adaptation challenge, a growing movement is promoting nature-based solutions and creating opportunities to scale up use of green infrastructure.	Browder at al. (2020)	X	X	X	X	X	X	X
EXP_Pub_69.3	While this report focuses on the services shown in Table ES-1, the general approach can be applied to almost all gray infrastructure, including transportation and power.	Browder at al. (2020)	X	X	X	X	X	X	X
EXP_Pub_73.1	Several trends are currently changing the nature of planning in the U.S. Both federal policies and requirements and input from local citizens and elected officials reflect these trends (Dietz, 2008), which include: 1. Integrating issues from traditionally separate fields, such as conservation and transportation, when making decisions;	Wagner et al. (2010)	X	X	X	X	X	X	X
EXP_Pub_74.1	Despite the Nature directives and the EC guidelines for their implementation, there is significant remaining legal uncertainty. It is still common that court rulings dominate the implementation and understanding of the directives without taking into account the guidelines that have been jointly developed by the Commission and the stakeholders. ESPO and EFIP would like to see the guidelines gaining more weight in the decision making process.	ESPO & EFIP (2015)							X
EXP_Pub_74.2	Although that Member States have designated Natura 2000 sites, the implementation of appropriate management plans is in many cases lacking. The uncertainty over the favourable status of the designated areas represents a challenge for development projects, which are forced to undergo the stringent exemption procedure, even in cases when the impact of the project as such is somewhat negligible.	ESPO & EFIP (2015)							X
EXP_Pub_74.3	Obsolete port facilities, or built-up areas waiting for further development, often attract various species, especially related to pioneer habitats that could then pose a challenge on using the facilities in the future for the purpose that they were developed. ESPO and EFIP call for a rationalisation of the framework so that temporary nature can be developed in these facilities while ensuring that those can still be used in the future for economic activities.	ESPO & EFIP (2015)							X
EXP_Pub_77.3	The GloFouling Partnerships Project will address the fact that biofouling represents an important threat to marine biodiversity and as such will build on and optimize benefits from measures implemented for other vectors, such as ships' ballast water, to ensure that investments in managing one IAS vector are not diluted by failing to address others.	UNDP & IMO (2018)							X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	The GloFouling Partnerships will develop a global, regional and country-based programmatic framework for the management of aquatic biofouling to minimize the introductions of IAS. The Project will also support the development of solutions to manage biofouling by increasing awareness, catalysing change within the shipping sector and outreaching to other maritime industries. Given the synergistic reduction in fuel use and GHG emissions associated with overall reductions in biofouling, GloFouling will also contribute to the global GHG emissions reduction goals. The aims and objectives of the GloFouling project are an extension of previous GEF interventions to address the IAS issue, with a focus on national legal, policy and institutional reforms in targeted developing countries and SIDS, and an emphasis on integrated management and cross-sectoral coordination.								
EXP_Pub_79.2	15th UN SDGs (Life on land): Supporting local projects regarding nature development and biodiversity • Recovering and protecting nature and biodiversity in the port surroundings • Offering nature and environmental education programs to employees • Port area development in balance with ecosystems ...	WPSP (2021)							X

2.2. Thematic Planning and environmental impact assessment

Table 13. Published documents - Expectations related to planning and environmental impact assessment

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Pub_3.2	Describes the context of when and where WwN may be implemented for port and navigation projects. Ports, waterways and shoreline developments have traditionally relied on conventional infrastructure methods using dredging, steel, concrete or stone for armouring and shoreline protection. WwN recognises the opportunity to proactively	PIANC (2018)			X				

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	integrate nature into large infrastructure projects to protect or improve natural habitat.								
EXP_Pub_4.1	Chapter 2 is an introduction to ES concepts, in general, and in the context of WTI projects. It introduces the ES cascade, linking biophysical structure and function to ES, human benefits and values, and ecosystem use in decision making. It introduces an ES classification, emphasising the need to consider not only ES provided by living systems but also abiotic services essential to WTI. It defines the role of ES concepts within various types of decision making.	PIANC (2021)			X				
EXP_Pub_12.5	Comprehensive, clear, unitary / official methodology for identification of Green Infrastructure	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.6	Coherent and functional data-base including relevant maps	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.7	Dedicated platform for data-base / maps / information sharing	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.8	Impact assessment procedures are taking into account connectivity	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_13.1	ensure all relevant issues (in the roads and wildlife) are correctly addressed and in a timely manner	van der Grift et al. (2018)	X						
EXP_Pub_13.2	better insight into the cost-effectiveness of measures and, consequently, will allow for better decisions on what road mitigation to apply in specific situations;	van der Grift et al. (2018)	X						
EXP_Pub_13.9	avoid a bias in mitigation planning towards the more visible or popular wildlife species	van der Grift et al. (2018)	X						
EXP_Pub_13.10	Mitigation measures for bats - Acquire further knowledge on the effectiveness of the mitigation measures currently used or planned and ensure all research data and results are widely available; and Pursue improved collaboration between the road and environmental authorities and researchers, to avoid ineffective measures being applied. Ensure all innovative measures are correctly tested before being widely used.	van der Grift et al. (2018)	X						
EXP_Pub_13.11	Make performance evaluations an obligatory part of road mitigation projects	van der Grift et al. (2018)	X						
PRO_Pub_13.15	Develop practical approaches to address cumulative impacts across projects systematically	van der Grift et al. (2018)	X						
PRO_Pub_13.16	Acquire knowledge and develop mitigation strategies not only for 'indicator' or 'umbrella' species but also for less prominent species	van der Grift et al. (2018)	X						
EXP_Pub_17.1	Data source do identify the biodiversity stakes in a study area and the fragmentation effects of infrastructures.	Marzouk & Amsellem (2018)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_22.2	road systems can facilitate the movement of organisms, either along the road surface, above the road or within roadside vegetation. Such movements may benefit individual animals and assist in the persistence of metapopulations, but they also facilitate the spread of invasive species.	ANET (2014)	X						
EXP_Pub_22.3	For the last few decades, road engineers and road ecologists have teamed to increase the ecological permeability of roads while at the same time enhancing public safety. This has led to considerable design innovation with a wide variety of safe passages for wildlife being constructed throughout the world. This includes purpose-built fauna underpasses and overpasses, as well as fish ladders, glider poles and rope ladders. In some cases, species-specific structures have been developed included remarkable over-road bridges for lemurs, dormice and even koalas.	ANET (2014)	X						
EXP_Pub_22.4	At the road network design phase, design the placement of roads, or traffic routing, in such a way that it minimises impacts on wildlife, and/or (2) develop structures, such as over-passes and under-passes, that allow animals to move across roads unharmed	ANET (2014)	X						
EXP_Pub_23.5	Social and environmental impacts can be both immediate, as a result of construction (biodiversity loss from land clearance, displacement of people, etc.) and ongoing during operation (carbon emissions, disrupted ecosystem and habitat connectivity, changes in land use and economic activity, illegal wildlife trade, etc.). Environmental, social, and economic costs and benefits should be considered across the entire infrastructure lifecycle. For example, the environmental and material footprint of each stage of the lifecycle must be assessed and the cumulative impacts considered.	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_23.6	Where greenfield development - i.e. building in previously undisturbed areas - is absolutely necessary, areas important for the persistence of biodiversity or having high ecosystem service value should be avoided altogether. Such areas provide the most benefits at a larger scale, which makes it extremely difficult or impossible to adequately compensate for impacts on them. These include, but are not limited to, protected areas and Key Biodiversity Areas	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_23.7	In the project design phase, measures to avoid, minimize and restore negative impacts should be identified. Compensation measures for any estimated residual impact should be identified as early as possible and planned and budgeted for. The infrastructure project should aim for zero net loss of biodiversity, at a minimum, and preferably a net biodiversity gain.	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_23.12	The planning and management of infrastructure throughout the lifecycle should be informed by key performance indicators that should promote the collection of data, including data that is disaggregated by stakeholder groups.	UNEP (2021)	X	X					

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_23.14	Planners should also take account of the cumulative impacts of multiple interconnected infrastructure systems and projects, and evaluations should not be arbitrarily constrained by administrative boundaries. Environmental impacts should be considered on a landscape or ecosystem scale, across all relevant jurisdictions. This includes transnational impacts, which are particularly important for resources such as water, where upstream impacts in one country may have downstream effects in other countries, and impacts on migratory species whose ranges and habitats extend beyond national borders. In the latter case, ensuring habitat connectivity across borders is an important way of managing impacts.	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_41.2	Identification and valuation of migratory barriers on national level, as well as local level.	Černecký et al. (2020)	X	X	X				
EXP_Pub_41.3	Identification and valuation of migratory limitation on national level, as well as local level.	Černecký et al. (2020)	X	X	X				
EXP_Pub_42.4	Practices which minimize the land fragmentation in planning highways and railways through appropriate environmental assessments, stakeholder consultation and involvement processes, decision making.	Papp et al. (2019)	X	X					
EXP_Pub_42.11	Harmonisation of grey and green infrastructure in the Carpathian eco-region.	Papp et al. (2019)	X	X					
EXP_Pub_44.1	finding solutions to minimize negative impacts of transport infrastructure development on wildlife in the Carpathians	Hlaváč et al. (2019)	X	X	X				
EXP_Pub_45.1	The Guidelines aimed to support finding solutions to minimize negative impacts of transport infrastructure development on wildlife in the Carpathians	Muilerman & Kempter (2019)			X				
EXP_Pub_45.2	Provide practical guidance to waterway managers - the ultimate aim is to create integrated projects that ideally allow the achievement of good navigation status (GNS), good ecological status (GES) and favourable conservation status (FCS) at the same time (according to TEN-T Regulation (1315/2013); Water Framework Directive (2000/60/EC) and Habitats Directive (92/43/EEC)	Muilerman & Kempter (2019)			X				
EXP_Pub_52.1	Anthropogenic noise not only affects species sensitive to noise, but has impacts on a wide range of terrestrial and aquatic species that inhabit very different ecosystems. • Anthropogenic noise causes a range of physiological and behavioural responses in terrestrial and marine wildlife, which can lead to reduced reproductive success, increased mortality risk and emigration, resulting in decreased population densities. • Although the responses to noise are very much species dependent, effects can start to appear at levels as low as 40 dB(A) for terrestrial animals. In addition to levels of noise, impacts may also depend on noise frequency and type. • At least 19 % of nature protection areas covered by Natura 2000 are located in areas	EEA (2020)	X	X	X			X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	where noise levels are above the Environmental Noise Directive reporting thresholds because of roads, railways and aircraft."								
EXP_Pub_52.3	"Finally, apart from the effects of noise on human health, there is increasing scientific evidence regarding the harmful effects of noise on wildlife. Recent literature calls for conservation actions aimed at protecting wildlife from noise pollution (Kunc and Schmidt, 2019). Although there is currently no specific EU noise legislation aimed at protecting terrestrial wildlife from exposure to noise, the requirement for identifying and protecting quiet areas in association with the END presents an ideal synergy with the need to protect wildlife from noise and areas of valuable habitat identified by other European assessments, such as Natura 2000 protected sites. However, the END reporting thresholds may not be fully appropriate for all natural habitats."	EEA (2020)	X	X					
EXP_Pub_56.4	Propose a roadmap concerning biodiversity on airports	MTES (2019)						X	
EXP_Pub_58.1	Optimising the connection between ecological networks and infrastructure networks: recommendations	Michel et al. (2015)	X	X	X	X	X	X	X
EXP_Pub_62.5	Update existing project screening and other "checklist" tools	Bartlett (2019)	X	X	X	X	X	X	X
EXP_Pub_63.2	HOLISTIC APPROACH TO SUSTAINABLE INFRASTRUCTURE DEVELOPMENT AT SCALE: AN EMERGING TREND, YET TO MATURE	Kennedy et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_65.2	Good planning: spatial planning and strategic environmental assessment	CBD (2018)	X	X	X	X	X	X	X
EXP_Pub_65.3	Impact assessment and mitigation: environmental and social impact assessment	CBD (2018)	X	X	X	X	X	X	X
EXP_Pub_66.4	opportunities and challenges for: Environmental and social safeguards	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_66.5	opportunities and challenges for: Procurement and contracting	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_66.6	opportunities and challenges for: Financing	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_66.7	opportunities and challenges for: Construction	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_71.3	Encouraging better planning and innovative science-based solutions on resilient, high quality and environmentally sustainable TLI; Securing sufficient and responsible funding as sustainable investment in TLI	Georgiadis (2020)	X	X	X	X	X		
EXP_Pub_73.15	At the road planning stage, connectivity of habitats or natural areas must be the leading priority. Alternative road alignment to avoid natural habitat should be seriously considered. Building animal passages is an important mitigation measure. Regional	Wagner et al. (2010)	X						

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	critical road density derived in this research is a useful indicator to evaluate road planning and allow focal species enough area to thrive. Road construction immensely impacts regional ecosystems. Only congregational development, ecologically friendly design and construction can achieve conservation and transportation convenience at the same time and, thus, meet the needs of both human beings and nature.								
EXP_Pub_73.21	Long after a new or a maintenance project is complete the greatest threat to the adjacent areas may be what was introduced or spread by the project. The spread of invasives tends to lead to overall less species diversity and it should be a pro-active consideration in all transportation projects. Where ever possible invasive species should be identified within project work areas early in the project development phase, treated and controlled in advance of the project, the issue highlighted to the contractor(s), develop appropriate contract items, the project area monitored following construction, and treatments/controls as necessary following project completion.	Wagner et al. (2010)	X	X					
EXP_Pub_73.23	Our results suggest that effective mitigation for movement-limited habitat specialists may include spatially and/or temporally targeted approaches such as road-underpasses or temporary signage. For widespread generalist species it is extremely difficult to determine exact locations for mitigation, thus broader-scale approaches such as driver education are likely to be more effective.	Wagner et al. (2010)	X						
Broader issue but with direct relation to the Topic									
EXP_Pub_3.1	Provides background information on the WwN approach. The overall framework is introduced, along with beneficiaries of the WwN approach and potential challenges that project owners may face when implementing WwN – by recognising opportunities and challenges, the hope is that project owners can proactively pursue WwN opportunities for their projects.	PIANC (2018)			X				
EXP_Pub_12.1	Specific Action Plans for Green Infrastructure	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.3	Sectoral strategies and policies are subject to SEA procedure	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.4	Expertize in mapping Green Infrastructure	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_13.3	enable the road planner to address population level impacts more appropriately and to better comply with the objectives and regulations of EU Directives and agreements	van der Grift et al. (2018)	X						
EXP_Pub_23.3	Although there are many existing guidelines, standards and tools for integrating sustainability into infrastructure, there is an overreliance on project level tools and	UNEP (2021)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	safeguards that seek simply to “do no harm.” These types of tools often lack ambition or are applied too late in the planning process to influence key decisions about what project to build and where to build it, resulting in missed opportunities to minimize negative impacts and maximize positive ones								
EXP_Pub_23.4	Over the last few decades, interest in development corridors has increased significantly. By concentrating infrastructure development in already-disturbed areas and facilitating movement of capital, goods and services, and people, development corridors can enable regional integration and socioeconomic development in previously remote areas while avoiding impacts to undisturbed habitat and ecosystems.	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_27.2	Urban planning approaches to promote sustainability include encouraging compact communities, designing nature-sensitive road networks and creating low-impact infrastructure and transportation systems (from an emissions and land-use perspective), including active, public and shared transport {5.3.2.6, 6.3.5}	IPBES (2019)	X	X	X	X	X	X	X
EXP_Pub_27.3	However, given that most urban growth between now and 2030 will take place in the Global South, major sustainability challenges include creatively and inclusively addressing the lack of basic infrastructure (water, sanitation and mobility), the absence of spatial planning, and the limited governance capacity and financing mechanisms.	IPBES (2019)	X	X	X			X	X
EXP_Pub_38.1	Definition of feasible ecological corridors between Natura 2000 areas on transnational and macro-regional level by innovative GIS and remote sensing approaches, partly based on newly available EU-Copernicus (Sentinel) data.	DaRe to Connect (2020)	X	X	X			X	
EXP_Pub_41.1	Identification and valuation of migratory corridors on national level, as well as local level.	Černecký et al. (2020)	X	X	X				
EXP_Pub_41.4	Identification of types of ecosystems and assess their suitability for migration on national level, as well as local level.	Černecký et al. (2020)	X	X	X				
EXP_Pub_42.2	Definition of status of the road and railway network development in Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_53.1	‘The construction and operation of airports, stations and railway lines also has an impact on land use. Impacts are both direct, through the uptake of land by the hubs and infrastructure themselves, and indirect, through the land development projects that are induced by their presence. Additional land take causes habitat damage and fragmentation, leading to adverse effects on ecosystems and biodiversity. In the case of railway lines, barrier effects arise in the form of physical and behavioural barriers to wildlife movement, as well as disturbance to populations living close to them, on account of noise, vibrations, chemical pollution and human presence. Mortality among animals trying to cross the infrastructure is another — and most visible — manifestation	EEA (2021)		X				X	

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	of the barrier effect. However, the magnitude of the effects is still not very well known (Barrientos and Borda de Agua, 2017). Other impacts of the infrastructures are visual intrusion, soil sealing and soil and water pollution from the use of herbicides. The recently published EU Taxonomy report, in its list of assessment criteria for the 'do no significant harm' assessment of the construction of land infrastructure (which includes railway infrastructure), also identified the following other types of potential environmental harm (EU Technical Expert Group on Sustainable Finance, 2020): • contamination of water during construction and unsustainable use of water during construction and operations; • unsustainable use of resources during construction, e.g. generating large amounts of waste, no recycling/reuse of construction waste; • noise pollution as a result of the poor condition of rail tracks; • change and degradation of hydro morphological conditions of water bodies as a result of railway infrastructure (in particular tunnels), affecting aquatic ecosystems; • the spread of invasive plants (such as Japanese knotweed) along transport infrastructure. “								
EXP_Pub_59.1	Better application of the mitigation hierarchy	IUCN (2016)	X	X	X	X	X	X	X
EXP_Pub_62.1	Develop explicit funding programs designed to support holistic, cross-sectoral landscape- or regional-scale planning	Bartlett (2019)	X	X	X	X	X	X	X
EXP_Pub_62.3	Develop integrated regional- or landscape-scale planning standards	Bartlett (2019)	X	X	X	X	X	X	X
EXP_Pub_62.7	Increase investment in ecosystem service modelling science	Bartlett (2019)	X	X	X	X	X	X	X
EXP_Pub_65.5	Funding and environmental and social safeguards: innovative solutions to finance and investment	CBD (2018)	X	X	X	X	X	X	X
EXP_Pub_66.3	opportunities and challenges for : Integrated Master Planning at the Appropriate Scale	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_73.3	Increasing the use of enhanced technical planning tools to improve the performance of investments.	Wagner et al. (2010)	X	X	X	X	X	X	X
EXP_Pub_73.4	To increase confidence in the planning process, planners need a decision-making framework for complex multi-criteria problems that can accommodate both qualitative and quantitative information from disparate sources and of different resolutions and formats. A solution explored by the Pikes Peak Area Council of Governments (PPACG) is	Wagner et al. (2010)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	using a strategic assessment planning framework that is a cross between traditional NEPA analysis and integrated regional planning. This process incorporates multi-criteria analysis (MCA) that is typically used in conservation planning (Mendoza, 2004). A precautionary note: the MCA process rarely results in community consensus due to broadly perceived needs, priorities and impact distribution. It can, and in PPACG‟s case did, lead to informed consent for the decisions that were made. The difference between consensus and consent is that groups that were involved in the process, but did not agree with the outcomes, did agree to not actively work against implementation of the recommendations.								

2.3. Thematic Implementation and management

Table 14. Published documents - Expectations related to implementation and management

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
EXP_Pub_2.3	Understanding the road and road transport impact on wildlife habitats and their interconnections is essential for road construction to be implemented in the area affluent with natural environment. TC carefully considers environmental sustainability, and diligently presents how road organizations commit to restraining air pollution and traffic noise, and the impact on wildlife habitats	PIARC (2020)	X						
EXP_Pub_12.12	A clear set of management measures and monitoring procedures linked to management objectives	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.13	Implementation of conservation / management measures are financially supported in a coherent and consistent manner	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_13.4	allow for enhanced decisions on what maintenance strategies to apply	van der Grift et al. (2018)	X						

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_13.12	Secure appropriate budgets for maintenance of road verges and mitigation measures in a timely manner and ensure that the necessary maintenance is carried out consistently	van der Grift et al. (2018)	X						
EXP_Pub_13.13	Performance evaluation of mitigation measures	van der Grift et al. (2018)	X						
EXP_Pub_13.14	improve the quality of monitoring reports and better allow for cross-project comparisons and analyses	van der Grift et al. (2018)	X						
EXP_Pub_19.1	How do roads and wind turbines impact bats	Vanpeene (2018)	X			X			
EXP_Pub_20.1	Synthesis of evidence about the potential of linear transportation infrastructure verges as corridor and/or habitat for insects in temperate landscapes	Villemey et al. (2018)	X						
EXP_Pub_22.1	Remnant vegetation along road reserves can preserve examples of natural vegetation, support plant and animal species (including some threatened species), and comprise a substantial percentage of remaining native vegetation in developed landscapes	ANET (2014)	X	X					
EXP_Pub_22.5	Road verges can contribute positively to New Zealand's biodiversity by supporting native plant and animal species and habitats. The second was to determine whether reducing the grass-cutting frequency assisted biodiversity of native and beneficial exotic invertebrates.	ANET (2014)	X						
EXP_Pub_22.7	The effectiveness of these measures still remains scant due to insufficient monitoring and reporting practices. Many important issues and higher order ecological questions persist, in particular, optimal placement of wildlife road mitigation measures	ANET (2014)	X	X					
EXP_Pub_23.13	Regular monitoring of infrastructure performance and impacts is necessary to generate data, which should be made available to all stakeholders.	UNEP (2021)	X	X					
EXP_Pub_24.4	Organizations and governments have identified right-of-way infrastructure as a key way to support pollinators and connect habitat patches, however, there are few policy strategies underway to institute these efforts for large-scale landscape management. Finally, studies are essential to evaluate the impact of urban management on pollination, the value of pollination for food production in cities, and the efficient and economic options for managing right-of-way infrastructure to support pollinators.	IPBES (2016)	X	X	X	X			
EXP_Pub_28.1	Overview of the issues related to the movement of flying species, in particular birds and bats, faced with specific obstacles	Sordello et al. (2019)	X			X		X	
EXP_Pub_28.2	Management measures recommended to limit the impact of infrastructure on flying species.	Sordello et al. (2019)	X					X	X
EXP_Pub_41.5	Identification problematic sections of roads and railways and other animal migration	Černecký et al. (2020)	X	X	X				

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	facts on national level, as well as local level.								
EXP_Pub_42.3	Effects of current road and rail transportation on ecological corridors in Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_42.5	Analyses of existing mitigation measures in current/planning road and railway infrastructure in Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_42.6	Evaluation and monitoring of the efficiency of the mitigation measures in current/ planning road and railway infrastructure in Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_42.7	Analysis of existing compensation measures in current/ planning road and railway infrastructure in Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_42.10	There is an urgent need to develop national databases where they are absent, with road and rail kills, but also with biodiversity data in order to be more efficient in the identification of conflicts with wildlife and the selection of proper mitigation measures and locations where they should be implemented.	Papp et al. (2019)	X	X					
EXP_Pub_47.2	Methods for assessing the hazardousness of power lines for birds	Probst et al. (2019)				X			
EXP_Pub_47.3	Proposals for technical solutions to reduce birds mortality, good practice examples	Probst et al. (2019)				X			
EXP_Pub_47.4	Guideline for protected area administrations, nature conservation associations, power line operators and environmental policy makers	Probst et al. (2019)				X			
EXP_Pub_48.1	Reduction of collisions of birds with power lines as well as reduction of damage to the facilities of the electric systems and negative effect on the power transfer	Gális et al. (2019)				X			
EXP_Pub_56.2	better understand the ecosystems at airports	MTES (2019)						X	
EXP_Pub_56.3	provide the operator with knowledge of his spaces, environments and the species that inhabit them, in order to facilitate their management, to limit animal and especially bird risks, to optimize interventions on the herbaceous cover, and lower the costs.	MTES (2019)						X	
EXP_Pub_66.8	opportunities and challenges for: Operation	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_66.9	opportunities and challenges for: Decommissioning	Perera & Uzsoki (2017)	X	X	X	X	X	X	X
EXP_Pub_73.8	Addressing wildlife transportation issues requires access to timely and accurate information on the spatial and temporal movement patterns of wildlife. The success of mitigation measures in ensuring movement and reducing collisions is highly dependent on appropriate placement and therefore on obtaining an accurate understanding of	Wagner et al. (2010)	X	X					

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	wildlife spatial movement patterns								
EXP_Pub_73.14	Traffic volume and road location were the two most important factors in determining impacts to wildlife. Traffic volume can be readily measured and used to determine how various patterns of development will impact wildlife and wildlife habitat. Although we have identified thresholds of impacts, it is important to note that impacts increase over a continuum and thresholds may need to be adjusted to avoid impacts to wetland-dependent species or endangered species	Wagner et al. (2010)	X						
EXP_Pub_73.22	Our preliminary findings indicate that the installation of wildlife fencing and jump-outs has significantly reduced UVC‟s in the fence/buff area near the MRL bridge. Additional monitoring of the track bed underneath the bridge has shown an increased use by ungulates indicating the effectiveness of fencing in funneling animals away from the freeway and maintaining habitat connectivity. Over time, the area underneath the bridge may see increased use as animals discover it and become more accustomed to using it.	Wagner et al. (2010)	X						
Broader issue but with direct relation to the Topic									
EXP_Pub_12.9	Legal statute of Green Infrastructure: administrative	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.10	Ecological requirements related to connectivity are available for (all) relevant (umbrella) species: coherent and consistent operationalization of ecological requirements of relevant (umbrella) species	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.11	Management objectives for Green Infrastructure components incorporate adaptation to climate change, ecosystem services, and other socio-cultural aspects	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_18.1	Artificial light impact on biodiversity and on fragmentation of natural habitats	Ranzoni et al. (2019)	X	X	X			X	X
EXP_Pub_21.1	Night lighting generates a loss of natural habitats, increased fragmentation and direct mortality for living species the night	Sordello et al. (2021)	X	X				X	X
EXP_Pub_23.9	Investment in preserving and enhancing natural capital and ecosystem services should also be considered even when there are no immediate and direct social or economic benefits, since well-functioning natural systems and biodiversity also have intrinsic value	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_24.1	Emerging and re-emerging diseases (e.g. due to host shifts of both pathogens and parasites, sometimes arising from accidental transport by humans) are a significant threat to the health of honey bees (well established), bumble bees and solitary bees (established but incomplete for both groups) during the trade and management of	IPBES (2016)	X	X					

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	commercial bees for pollination (2.4).								
EXP_Pub_24.5	There has been a great deal of research to assess the value of pollinators and pollination (see Chapter 4), and to measure the effectiveness of different measures. Researchers and policymakers must now work together to quantify the costs, and find viable measures of relative effectiveness, for the different responses discussed in this report.	IPBES (2016)	X	X	X				
EXP_Pub_25.1	Clearly identify the points of the infrastructure where it is a priority to do something	Lescroart et al. (2019)	X	X	X	X			
EXP_Pub_46.1	Elimination of negative hydro-morphological effects on Slovak waterways and habitats.	MoE (2015)			X				
EXP_Pub_49.1	Need for the development of new non-chemical technologies for vegetation control for water and nature protection areas	Pietras-Couffignal et al. (2021)		X					
EXP_Pub_49.2	Need for research on optimisation of the use of plant protection products (PPP)	Pietras-Couffignal et al. (2021)		X					
EXP_Pub_75.1	Port authorities have a clear interest in water management both in terms of potable water consumption and water quality. Water is a valuable natural resource and as such needs to be used with caution. The significance of water consumption may vary between regions of Europe but the unnecessary consumption of a natural resource is not a sustainable practice. In addition, the use of water is linked to waste water treatment techniques while savings in water consumption represent an opportunity for port authorities also from an economic perspective. In parallel, good water quality is essential for ecosystems and biodiversity and the varied port operations can impact significantly in port waters. Ship ballast water discharges may introduce alien species, surface water runoff may carry contamination into the water bodies, while the same stands for port estate land and marine spillages including ones associated with cargo handling operations.	ESPO (2012)							X
EXP_Pub_77.1	Impacts on marine environment: IAS known to be transferred as biofouling have caused significant harm to the marine environment and are considered one of the leading causes of biodiversity loss. IAS can have a range of impacts on natural marine ecosystems and unlike many other tressors, such as coastal pollution and oil spills, once established in a marine environment, IAS are very difficult and often impossible or prohibitively expensive to eradicate. oreover, the impacts and cost of eradication often increase over time as an IAS increases its population and expands its geographic range. IAS can dominate benthic habitats, disturb native communities, and displace local species due to life history characteristics such as high reproductive output, mass settlement and rapid growth rates. Environmental impacts associated with IAS can fall into a number of broad categories including predation on and competition with native species for space and resources and	UNDP & IMO (2018)							X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	the alteration of broader habitat dynamics. IAS have been shown to drive fundamental changes in ecosystems, such as a shift from native mussels to alien oysters (Kochmann et al. 2008), the modification of physical structure by the European fanworm Sabella spallanzanii (O'Brien et al. 2006), or damaged due to the erosion of river and lake embankments by Chinese mitten crabs (Veldhuizen and Stanish, 1999). In addition to monopolization of space and resources, IAS can impact native species by shading, sweeping, smothering or reducing settlement by consuming larvae and juveniles (Wyatt et al. 2005, Gribben & Wright 2006).								

2.4. Thematic Education, awareness, consultation and communication

Table 15. Published documents - Expectations related to education, awareness, consultation and communication

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity- friendly transport modes and transport systems*									
EXP_Pub_12.14	Research support, experience exchange and learning mechanism	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.15	concrete Green and Grey Infrastructure harmonization related topics exist in transport- and environment-focused university curricula, and if there is any dedicated inter-disciplinary curricula focusing on transport ecology.	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.16	all stakeholders / interested groups are aware and understand the implications of different options evaluated for transport projects (from all perspectives – economic, social, cultural, well-being, environment etc.) and that the feedback is collected and taken into account	Moț et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_12.17	Non-conflictual/supportive, credible and efficient (informed, adequate, complete and consistent) communication from stakeholders	Moț et al. (2019)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_13.6	awareness of road impacts and the need to fill current knowledge gaps among all relevant actors. This should make the issue a shared responsibility and solving it a collaborative action;	van der Grift et al. (2018)	X						
EXP_Pub_23.11	Inclusive and meaningful stakeholder consultation is essential to the successful implementation of every aspect of sustainable infrastructure. It facilitates a good understanding of service needs and preferences and helps ensure that infrastructure development is culturally appropriate and well-aligned with demand. It is also an important tool for accurately assessing the environmental, social, and economic costs and benefits of different infrastructure solutions and balancing trade-offs between them.	UNEP (2021)	X	X	X	X	X	X	X
EXP_Pub_37.2	Strategic objective 5: Improve communication and cooperation between all relevant stakeholders	Papp et al. (2020)	X	X					
EXP_Pub_42.8	Best practice examples of sustainable transportation development in Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_42.9	Negative examples of transportation infrastructure development among Carpathian countries.	Papp et al. (2019)	X	X					
EXP_Pub_45.3	Share know-how and experiences about the setup of integrated waterway maintenance in practice.	Muilerman & Kempter (2019)			X				
EXP_Pub_47.1	Awareness raising of the problem of birds mortality on overhead power lines in the Danube region	Probst et al. (2019)				X			
EXP_Pub_63.4	TECHNICAL SOLUTIONS: SHARING THE TOOLBOXES ACROSS DISCIPLINES AND STAKEHOLDERS	Kennedy et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_63.5	LEARNING FROM COMPLEX STAKEHOLDER INTERACTIONS AND REPLICATING GOOD PRACTICES	Kennedy et al. (2019)	X	X	X	X	X	X	X
EXP_Pub_71.4	Promoting multi-sector cooperation; Engaging with the civil society and the broader public	Georgiadis (2020)	X	X	X	X	X		
Broader issue but with direct relation to the Topic									
EXP_Pub_38.3	The better understanding, improved knowledge exchange and cooperation of responsible public bodies and NGOs along the European Green Belt.	DaRe to Connect (2020)	X	X	X			X	
EXP_Pub_62.4	Expand existing and develop new open data access platforms to improve transparency and accessibility	Bartlett (2019)	X	X	X	X	X	X	X

Input code EXP_Pub_Provider.n°	Description of the expectation - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_65.6	Good data and information	CBD (2018)	X	X	X	X	X	X	X
EXP_Pub_73.2	Increasing public input and consider the needs and desires of all potentially affected interests in plans;	Wagner et al. (2010)	X	X	X	X	X	X	X

1. PROPOSALS EXPRESSED DURING CONSULTATION

1.1. Thematic Policy and strategy

Table 16. Consultation - Proposals related to policy and strategy

Input code PRO_Con_Provider.n°	Description of the proposal - Thematic Policy and strategy	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Con_02.3	Setting biodiversity priorities in infrastructure project	Environmental administration, Slovakia	X	X		X		X	X
PRO_Con_11.5	Creating the "no go zones" across Europe (for all modes of transport)	University & Research institution, France	X	X	X	X	X	X	X
Broader issue but with direct relation to the Topic									
PRO_Con_02.1	Adopting the new categorization of protected areas in EU and national legislation	Environmental administration, Slovakia	X	X	X	X	X	X	X
PRO_Con_11.3	Adopting the general reduction of speed at large scale	University & Research institution, France	X	X					
PRO_Con_18.3	Including ecological corridors into relevant legislation	Public agency, Slovakia	X	X	X	X			
PRO_Con_30.3	Mapping and control of the spread of invasive plant species - adopting the legislative framework	University & Research institution, Slovakia	X	X	X	X	X	X	X
PRO_Con_55.2	Including the strategic aims proposed in relevant international projects in new strategic documents	Public agency, Slovakia	X	X	X	X	X	X	X

Input code PRO_Con_Provider.n°	Description of the proposal - Thematic Policy and strategy	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Con_64.2	Adopting the European Ecological Network as an addition to the N2000.	Transport administration, Netherlands	X	X	X	X	X	X	X
Issue with indirect or distant relation to the Topic									
PRO_Con_14.1	Promoting high quality public transport at lower costs with smaller infrastructure needs	University & Research institution, Slovakia	X	X	X				
PRO_Con_16.1	Implementing the prices from the EU - eg. Handbook on external effects in transport	University & Research institution, Germany	X	X	X	X	X	X	X
PRO_Con_29.1	Promoting emission-free cars, incentives for electric vehicles, modal shift and smart solutions for more efficient and sustainable transport	University & Research institution, Slovakia	X	X	X			X	X
PRO_Con_29.2	Promoting public transportation as one of the most earth-friendly ways	University & Research institution, Slovakia	X	X					
PRO_Con_29.3	Achieving less amount of emission from burning coal or gas	University & Research institution, Slovakia	X	X	X				
PRO_Con_29.5	Increasing organic landscape features on agricultural land	University & Research institution, Slovakia	X	X					
PRO_Con_32.1	Replacing personal meetings with online meetings	Public agency, Slovakia	X	X				X	
PRO_Con_32.2	Encouraging commuting by public transport and use home office	Public agency, Slovakia	X	X				X	
PRO_Con_32.3	Preferring online meetings or traveling by train	Public agency, Slovakia	X	X				X	
PRO_Con_32.4	Promoting train traffic and penalizing truck traffic	Public agency, Slovakia	X	X				X	
PRO_Con_32.5	Supporting local producers and responsible consumption behaviour	Public agency, Slovakia	X	X	X			X	X
PRO_Con_60.1	Preparing and implementing the system of perks and motivations for emission reduction in international shipping	Transport administration, Poland			X				X
PRO_Con_60.2	Supporting innovations and funding of engine change and modernisation of marine transport	Transport administration, Poland			X				X

1.2. Thematic Planning and environmental impact assessment

Table 17. Consultation - Proposals related to planning and environmental impact assessment

Input code **PRO_Con_Provider.n°**	Description of the proposal - Thematic Planning and environmental impact assessment	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Con_02.2	Designing large scale green bridges with mosaic of habitats	Environmental administration, Slovakia	X	X					
PRO_Con_02.5	Enforcing the biodiversity expert as obligation in transportation sectors	Environmental administration, Slovakia	X	X	X	X		X	X
PRO_Con_11.2	Making transport infrastructure ROW (rights-of-way) beneficial for biodiversity	University & Research institution, France	X	X	X	X		X	X
PRO_Con_25.1	Providing the inventory of all methods or indicators actually proposed to evaluate the effects on biodiversity	University & Research institution, France	X	X	X	X		X	X
PRO_Con_31.1	Ensuring a significant budget allocated to biodiversity in the transportation projects	Environmental consultancy, France	X	X	X	X	X	X	X
PRO_Con_56.1	Elaborating the fauna passages solutions - planning, design and monitoring	Environmental consultancy, Poland	X	X					
PRO_Con_57.1	Promoting the modelling tools for optimisation of efficient mitigation measures	Environmental consultancy, international	X	X	X	X		X	X
PRO_Con_63.1	Including a defragmentation plan as an integral component of the Transport Master Plans	Environmental consultancy, Romania	X	X	X		X		
Broader issue but with direct relation to the Topic									
PRO_Con_18.1	Collecting all the data about ecological corridors localization	Public agency, Slovakia	X	X	X	X			
PRO_Con_18.2	Completing the whole picture on ecological corridors location by amending missing information	Public agency, Slovakia	X	X	X	X			
PRO_Con_24.1	Simplifying and refinement of the processes for preparation of infrastructure constructions with respect to the environment	University & Research institution, Czech Rep.	X	X	X	X	X	X	X
PRO_Con_24.2	Strengthening the power of spatial planning towards the protection	University & Research	X	X		X		X	X

Input code **PRO_Con_Provider.n°**	Description of the proposal - Thematic Planning and environmental impact assessment	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
	of undeveloped land	institution, Czech Rep.							
PRO_Con_25.2	Testing and discussing the valuation methods in the field of transport infrastructures	University & Research institution, France	X	X	X	X		X	X
PRO_Con_27.1	Establishing the joint geo-information system for spatial planning and transport infrastructure planning and maintenance	University & Research institution, Slovakia	X	X	X	X	X	X	X
PRO_Con_27.2	Adopting the regional action plans for transport-biodiversity harmonization	University & Research institution, Slovakia	X	X	X	X	X	X	X
PRO_Con_41.1	Establishing and maintaining cartographic database on biodiversity at national level, accessible to all infrastructure operators	Transport administration, Spain	X	X	X	X	X	X	X
PRO_Con_45.2	Promoting the anticipation principle within the TI life cycle	Transport Infrastructure company, international	X	X	X	X		X	X
PRO_Con_56.3	Promoting a system approach to the TI planning and coordination	Environmental consultancy, Poland	X	X		X		X	
PRO_Con_61.1	Setting the guidelines & action plan for No net loss/Net gain targets approach	Transport Infrastructure company, international	X	X	X	X		X	X
PRO_Con_61.2	Promoting the national and regional central database rather than localised and paper-based system	Transport Infrastructure company, international	X	X	X	X		X	X
PRO_Con_64.1	Elaborating the European Defragmentation Map	Transport administration, Netherlands	X	X		X	X	X	X
Issue with indirect or distant relation to the Topic									
PRO_Con_29.4	Using technologies for improving traffic planning, flow, transport efficiency	University & Research institution, Slovakia	X	X	X	X		X	X
PRO_Con_56.2	Promoting the cycling infrastructure - for reduction of car transport	Environmental consultancy, Poland	X						

1.3. Thematic Implementation and management

Table 18. Consultation - Proposals related to implementation and management

Input code PRO_Con_Provider.n°	Description of the proposal - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Con_02.4	Establishing and significantly extending long term monitoring of the effects of infrastructure on biodiversity	Environmental administration, Slovakia	X	X	X	X			
PRO_Con_04.1	Promoting above-ground crossing of the infrastructure with the surrounding environment (green bridges)	Public agency, France	X	X					
PRO_Con_04.2	Implementing ecobridges for fauna	Public agency, France	X	X					
PRO_Con_11.1	Adapting the infrastructure design and use to animal behaviour	University & Research institution, France	X	X	X	X		X	X
PRO_Con_17.1	Implementing the TRANSGREEN technical guidance in the practice	NGOs and associations, Romania	X	X					
PRO_Con_18.4	Implementing the mitigation measures on transport infrastructure	Public agency, Slovakia	X	X	X	X			
PRO_Con_24.3	Developing rules and indicators for monitoring of effectivity of realised measures	University & Research institution, Czech Rep.	X	X	X	X		X	X
PRO_Con_24.4	Promoting the research aimed to the disturbances of biota from traffic	University & Research institution, Czech Rep.	X	X	X	X		X	X
PRO_Con_24.5	Realising the env. audit of roads /railways - not only for biodiversity but also for environmental and health impacts	University & Research institution, Czech Rep.	X	X					
PRO_Con_25.3	Selecting and proposing methods and indicators to assess the effects of infrastructure on biodiversity. Implement methods in LCA tools	University & Research institution, France	X	X	X	X		X	
PRO_Con_30.1	Mapping and control of the spread of invasive plant species - knowledge improvement	University & Research institution, Slovakia	X	X	X	X	X	X	X
PRO_Con_30.4	Reducing the number of collisions between animals and vehicles and improving traffic safety through mapping and new databases	University & Research institution, Slovakia	X	X	X	X		X	X

Input code PRO_Con_Provider.n°	Description of the proposal - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Con_30.5	Reducing the number of collisions between animals and vehicles and improving traffic safety - adopting the system of financing, legislative framework	University & Research institution, Slovakia	X	X	X	X		X	X
PRO_Con_37.1	Enhancing monitoring of the ecological impact of fences related to transport infrastructure and other activities	Environmental consultancy, France	X	X				X	
PRO_Con_40.1	Establishing and promoting green tracks as a part of railway infrastructure	Transport Infrastructure company, France		X					
PRO_Con_41.2	Providing the research priorities applicable to infrastructures and biodiversity by state administration, results applicable by operators	Transport administration, Spain	X	X	X	X		X	X
PRO_Con_45.1	Promoting the multi-criteria approach to the management and maintenance of TI	Transport Infrastructure company, international	X	X	X	X		X	X
PRO_Con_45.3	Recognising the importance of monitoring - use of new tools and methods	Transport Infrastructure company, international	X	X	X	X		X	X
PRO_Con_45.4	Establishing a standardized methodology for mitigation the ecological impacts	Transport Infrastructure company, international	X	X	X	X		X	X
PRO_Con_50.1	Applying "Integrated Vegetation Management" to all power lines	Environmental administration, Germany				X			
PRO_Con_56.4	Promoting blue-green-infrastructure solutions, supporting their use in infrastructure design	Environmental consultancy, Poland	X	X		X		X	
PRO_Con_57.3	Including the budget for post-monitoring to the planning phase	Environmental consultancy, international	X	X	X	X		X	X
PRO_Con_58.1	Promoting the application of nature-based solutions in drainage systems, green areas, buildings, etc.	Environmental consultancy, Spain	X	X	X	X		X	X
PRO_Con_58.3	Developing the sensors to detect wildlife, and maintain them out of risk areas	Environmental consultancy, Spain	X	X	X	X		X	X
PRO_Con_63.2	Adopting a set of obligatory measures to reduce wildlife collisions on grey infrastructure	Environmental consultancy, Romania	X	X	X		X		
Broader issue but with direct relation to the Topic									

Input code PRO_Con_Provider.n°	Description of the proposal - Thematic Implementation and management	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Con_17.2	Adopting the official designation of ecological corridors with management plans in place	NGOs and associations, Romania	X	X	X	X			
PRO_Con_30.2	Mapping and control of the spread of invasive plant species - adopting the system of financing	University & Research institution, Slovakia	X	X	X	X	X	X	X
PRO_Con_58.2	Using durable materials in the design and construction of all elements of the infrastructure	Environmental consultancy, Spain	X	X	X	X		X	X
Issue with indirect or distant relation to the Topic									
PRO_Con_56.5	Reconstructing, renovating, upgrading existing infrastructure, instead of creating a new one	Environmental consultancy, Poland	X	X		X	X	X	X

1.4. Thematic Education, awareness, consultation and communication

Table 19. Consultation - Proposals related to education, awareness, consultation and communication

Input code **PRO_Con_Provider.n°**	Description of the proposal - Thematic Education, awareness, consultation and communication	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Con_11.4	Creating a strong European program of information for biodiversity and transport	University & Research institution, France	X	X	X	X	X	X	X
PRO_Con_41.3	Increasing the dissemination of environmental performance of infrastructure operators, in terms of biodiversity	Transport administration, Spain	X	X	X	X		X	X
PRO_Con_57.2	Developing an interactive communication and advisory platform for TI stakeholders	Environmental consultancy, international	X	X	X	X		X	X
PRO_Con_61.3	Scoring companies depending on transport modes - for assessing	Transport Infrastructure	X	X	X	X		X	X

Input code **PRO_Con_Provider.n°**	Description of the proposal - Thematic Education, awareness, consultation and communication	Respondent type / Country	roads	railways	waterways	power lines	pipelines	airports	harbours
	their impacts on environment and environmental efficiency	company, international							
Broader issue but with direct relation to the Topic									
PRO_Con_07.1	Providing and sharing a book of good practices	University & Research institution, Poland	X	X	X	X		X	X
PRO_Con_18.5	Establishing the inter-sectoral working group dealing with ecological corridors and proposing actions for their protection	Public agency, Slovakia	X	X	X	X			
PRO_Con_27.3	Promoting alternative and ecological transport modes, awareness raising	University & Research institution, Slovakia	X	X	X			X	X
PRO_Con_55.1	Translating and circulating the guidelines, tools and recommendations of relevant international projects	Public agency, Slovakia	X	X	X	X	X	X	X
PRO_Con_55.3	Promoting the biodiversity-related issues in relevant sectors, spatial planners and decision-makers	Public agency, Slovakia	X	X	X	X	X	X	X
Issue with indirect or distant relation to the Topic									
PRO_Con_64.3	Adopting the new research agenda to improve (inter)national research	Transport administration, Netherlands	X	X	X	X	X	X	X

2. PROPOSALS IDENTIFIED IN PUBLISHED DOCUMENTS

2.1. Thematic Policy and strategy

Table 20. Published documents - Proposals related to policy and strategy

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Pub_5.5	Whilst technical and scientific knowledge and understanding has improved significantly over recent years, this does not mean that we have all the answers. Working with Nature requires an understanding of dynamic natural ecosystems. In some cases we already have a reasonable understanding, in others we do not. Although some research into ecosystem dynamics and cause-and-effect relationships is ongoing, more is needed. Data must be collected. Modelling tools need further development and verification. But these gaps in knowledge and understanding should not be used as an excuse to defer attempts to put Working with Nature into practice	PIANC (2011)			X				
PRO_Pub_13.7	Make use of interdisciplinary teams of experts in road planning, procurement, construction and maintenance	van der Grift et al. (2018)	X						
Broader issue but with direct relation to the Topic									
PRO_Pub_14.4	Purchasing policy - In 2017, SNCF Réseau reinvented its purchasing policy for tropical wood. The new policy is grounded in CSR indicators, certified sustainable woods, due diligence, genuine partnerships with foresters and close collaboration with international organizations. Certification of sustainability (FSC) ensures that our purchases: • keep resources sustainable • respect the rights of local populations • preserve biodiversity • protect soil and water resources	PIANC (2011)			X				

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_14.9	Evaluate the ecological potential of our land holdings for ecological valorization purposes	van der Grift et al. (2018)	X						
PRO_Pub_14.11	Guarantee the use of 100% certified wood for our sleepers (purchased in France and outside France) through research and monitoring of eco-responsible wood sectors.	SNCF (2021)		X					
PRO_Pub_22.3	Ecological offsets are measures designed to compensate for these residual impacts so that on the whole, development impacts and conservation gains balance out and society incurs “no net loss”.	SNCF (2021)		X					
PRO_Pub_23.3	STRATEGIC ENVIRONMENTAL ASSESSMENT: Strategic Environmental Assessment (SEA) is a tool for integrating sustainability considerations into proposed policies, plans, and programmes. SEAs analyse the effects of proposed plans, programmes and policies, and can help planners to make decisions about trade-offs between environmental, social and economic outcomes. An SEA is applied much earlier in the planning process than a project level Environmental Impact Assessment (EIA), at a time when more strategic options are available, and can be applied to programmes involving multiple projects. If used correctly, they can be an effective way to mainstream sustainability into strategic infrastructure planning and help create an enabling institutional and policy environment.	SNCF (2021)		X					
PRO_Pub_23.6	While trade-offs between environmental, social and economic costs and benefits are inevitable, there are many options for meeting infrastructure service needs in a way that balances outcomes vis-à- vis the three dimensions of sustainability. These include reducing demand for services where usage is inefficient or unsustainable (e.g. through financial incentives and taxation); retrofitting or upgrading existing infrastructure assets, selecting the best available technologies, improving efficiencies of distribution including reducing losses and policing illegal connections and usage, and substituting nature-based solutions (NbS) for grey infrastructure where possible.	ANET (2014)	X						
PRO_Pub_23.10	Rural-urban linkages are also important. Infrastructure built in rural areas to meet the service needs of urban populations may have negative local impacts that outweigh the benefits to distant end-users. With large amounts	UNEP (2021)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	of infrastructure expected to be built in — or to provide services to — increasingly crowded and expanding cities, planners must understand the spatial distribution of the impacts of urban infrastructure, beyond municipal boundaries.								
PRO_Pub_23.15	Governments should develop plans at the transnational, national and subnational levels for pollution management and biodiversity stewardship, and assess the impacts of infrastructure projects in terms of local and national sustainability targets.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.20	To be effective, stakeholder consultation should be integrated throughout the infrastructure lifecycle and be informed by comprehensive stakeholder analysis to identify all potential users, as well as non-user groups that are directly and indirectly affected. It is particularly important to include women, people with disabilities, older people, youth, indigenous peoples, minorities and other more vulnerable, marginalized or disadvantaged groups to ensure that infrastructure is responsive to their needs. It is also important to engage the private sector, including project developers, sustainability standards setters, private financial institutions, construction and operating firms, and others that play a role in infrastructure at various points in the infrastructure lifecycle	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_26.1	Landscape-wide approaches that integrate the development of agricultural, forest, energy, water and infrastructure agendas, all informed by the best available knowledge and experience, are required to avoid, reduce and reverse land degradation.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_27.1	Between 2009 and 2013, the carbon footprint from tourism rose 40 per cent to 4.5 gigatons of carbon dioxide, and overall, 8 per cent of total greenhouse gas emissions are from tourism-related transportation and food consumption {2.1.11, 2.1.15}. The demand for nature-based tourism or ecotourism has also risen, with mixed effects on nature and local communities, including some potential for contributions to local conservation, in particular when carried out at a smaller scale {2.1.11}	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_43.1	The list of actions which should be taken into account in the implementation of Carpathian Convention Protocol on Sustainable Transport.	IPBES (2018)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_69.1	All stakeholders must work with and encourage policymakers to promote green-gray approaches through policies, laws, and regulations	IPBES (2019)	X	X				X	X
PRO_Pub_70.2	R2: Ensure compliance with the "Avoid, Reduce, Compensate" (ERC) sequence by filling the gaps in terms of skills, means (human and budgetary) and political demand.	Kadlečík & Lucius (2019)	X	X					
PRO_Pub_70.3	R3: Develop, through the mechanism of Access to Genetic Resources and Benefit Sharing (ABS), paid access to genetic resources in order to finance the protection of biodiversity in the territories from which they originate.	Browder at al. (2020)	X	X	X	X	X	X	X
PRO_Pub_70.5	R5: The CESE recommends that the Ecological Defense Council get more involved in the field of biodiversity, to the same extent as the fight against global warming. Note DF: The Ecological Defence Council is a restricted Council of Ministers bringing together the main ministers responsible for ecological transition, chaired by the President of the Republic	Bougrain Dubourg & Férey (2020)	X	X	X	X	X	X	X
PRO_Pub_74.1	ESPO and EFIP actively contribute to the ongoing Fitness Check of the Birds and Habitats directives. Both organisations participated in the evidence gathering exercise, responded to the online consultation and encourage all their member ports to do so. Overall, ESPO and EFIP feel that the existing challenges in working with the Nature directives relate mainly to their implementation and enforcement and not to their text, spirit and objectives that remain relevant and well-intended. Given the dedicated time and effort by all stakeholders in reaching an understanding regarding the nature directives, ESPO and EFIP stress that any revision of the current framework needs to be thoroughly assessed, and significant added value needs to be demonstrated. The focus of any potential revision should be on maintaining the well-intended objectives while simplifying procedures were justified in line with these objectives and enhancing legal certainty.	ESPO & EFIP (2015)							X
PRO_Pub_77.1	Develop National Biofouling Management Strategies and Action Plans in LPCs	UNDP & IMO (2018)							X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Policy and strategy	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	and PCs: Each LPC will develop and adopt a National Biofouling Management Strategy and Action Plan (NBMS) and implement it during the course of the project. The NBMS will cover all major facets of biofouling management, including legal and policy issues, institutional strengthening, regional cooperation, biofouling monitoring and management, port State control enforcement, and flag State requirements. The NBMSs should specifically address how elements of the IMO Biofouling Guidelines will be integrated into LPIR and how capacity for biofouling management will be developed and maintained. Furthermore, the NBMS will identify appropriate timeframes for the development and delivery of appropriate biofouling management measures and highlight how such initiatives will be sustained. Consideration should also be given to the existing National Biodiversity Strategies and Action Plans to incorporate reference to NBMS.								

2.2. Thematic Planning and environmental impact assessment

Table 21. Published documents - Proposals related to planning and environmental impact assessment

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Pub_2.3	Develop a road corridor landscape design and its role in ecological habitat connectivity.	PIARC (2020)	X						
PRO_Pub_3.1	Describes the WwN framework, outlining six steps identified in the WwN	PIANC (2018)			X				

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	process, from understanding the environment and developing WwN approaches to public engagement and design, implementation and monitoring. Each step is explained in the context of WwN, and how WwN can and should influence project visions and project management approaches.								
PRO_Pub_5.1	Working with Nature requires that a fully integrated approach be taken as soon as the project objectives are known – i.e. before the initial design is developed.	PIANC (2011)			X				
PRO_Pub_5.2	Working with Nature is about more than avoiding or mitigating the environmental impacts of a pre-defined design. Rather, it sets out to identify ways of achieving the project objectives by working with natural processes to deliver environmental protection, restoration or enhancement outcomes. Fundamentally, therefore, Working with Nature means doing things in a different order: i) establish project need and objectives ii) understand the environment iii) make meaningful use of stakeholder engagement to identify possible win-win opportunities iv) prepare initial project proposals/design to benefit navigation and nature	PIANC (2011)			X				
PRO_Pub_5.3	Working with Nature thus requires a subtle but important evolution in the way we approach project development. We need to move towards an approach which: - focuses on achieving the project objectives in an ecosystem context rather than assessing the consequences of a predefined project design; - focuses on identifying win-win solutions rather than simply minimising ecological harm.	PIANC (2011)			X				
PRO_Pub_5.4	Working with Nature considers the project objectives firstly from the perspective of the natural system rather than from the perspective of technical design	PIANC (2011)			X				
PRO_Pub_11.2	In Europe over the past few decades, there has been a rapidly increasing interest and research into the multi-faceted interactions between roads and the landscape. The issue of habitat fragmentation by infrastructure and its impact on ecological functions in the landscape was greatly enhanced by the emergence of the organization, Infra Eco Network Europe (IENE), which was	TII (2021)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	founded at an international symposium in Maastricht in 1995. Based on input from IENE experts, COST 341 produced the handbook, Habitat fragmentation due to transportation infrastructure. Widely appreciated by roads authorities, the Handbook was subsequently transformed into national versions in several countries. Although covering all major relevant aspects, the original COST 341 Handbook only superficially treated maintenance of mitigation measures and did not address the role of procurement of road structures, mitigation measures and their maintenance. The objective of the Harmony project is to address these three key issues missing from the original COST 341 Handbook. The main goals of Harmony are: 1. To provide guidance on a consistent approach to Environmental Impact Assessment (EIA) and Appropriate Assessment (AA). 2. To provide guidance on methods of procurement of road projects and mitigation measures. 3. To provide best practice recommendations for the maintenance of roads and mitigation measures								
PRO_Pub_13.4	The development of more user-friendly simulation models and web tools that can be used by road planners to identify potential impacts of road projects on wildlife populations, identify appropriate and feasible goals for mitigation that address these impacts and help in the preparation of scientifically-sound monitoring programmes and evaluation studies in which population-level indicators are used	van der Grift et al. (2018)	X						
PRO_Pub_13.5	The feasibility and practical application of outcome-based specifications in road mitigation procurement, as compared to the use of design specifications	van der Grift et al. (2018)	X						
PRO_Pub_13.13	Move towards an adaptive planning approach in road mitigation, based on feedback from well-designed performance evaluations	van der Grift et al. (2018)	X						
PRO_Pub_14.10	Strengthening the ERC approach (Avoid, Reduce, compensate) in our approach to design eco-project. Ensure long-term management of our compensation sites (with the effectiveness of the recommended measures: establishment of a traceability system).	SNCF (2021)		X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_15.4	Take into account biological cycles when planning works - On-site, during construction, numerous measures to minimise impacts were implemented. To limit direct impact on biodiversity, the biological cycles of plant and animal species were taken into account when planning works on sensitive sites. For each sensitive area, experts provided instructions and sensitised work teams before enabling works: definition of a deforestation protocol for clearance operations in autumn to reduce the impact on suitable habitats for otters, the European beaver, the Eurasian and Miller's water shrew and dormice; pond management according to amphibian breeding periods; and so on. Those instructions were reported in the EPP and assessed by the environment managers. When it was not possible to adapt the construction schedule to biological cycles, accredited experts verified the presence or absence of the species on-site. If the species were present, a species transfer solution was envisaged.	Aubrat & Lemeri (2018)		X					
PRO_Pub_15.6	Crossing structure design - Therefore, according to the ecological transparency needed for fish, small mammals, wild mammals and chiropterans, environmental engineering orientated the crossing structure design towards a specific type: viaduct, structure stepping over the minor bed of the river with a bench (Figure 4), pipes and so on.	Aubrat & Lemeri (2018)		X					
PRO_Pub_15.7	Compensate by anticipation - On BPL, to anticipate this issue regarding pond biodiversity compensation and generate a biodiversity gain earlier on, as early as 2012, construction teams created 78 immediate compensation ponds (Figure 5) in the vicinity of ponds affected by the project, before these were filled in. Their functionality is subject to monitoring for 5 years after their construction: water level, plant growth, presence of species and the 'environmental DNA' measure, a new methodology for ecological surveying (Herder et al., 2014). This anticipation permitted more than 25% of associated compensation to be instated even before the impact and provided a chance for the offset to generate a biodiversity gain.	Aubrat & Lemeri (2018)		X					
PRO_Pub_16.1	Preliminary studies in public debate / opportunity studies and general characteristics of the project Objective: Search for development scenarios or passage widths ranging from 3 to 10 km depending on the project Principle: Avoidance of areas with biodiversity issues. This is the key stage in	Hosy et al. (2012)		X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	avoiding high stake areas Method: By consulting organizations with basic data								
PRO_Pub_16.2	Studies prior to the public inquiry / definition studies 1st stage Objective: Characterization of the scenario and search for passage options or zones 1 to 3 km wide Principle: Avoidance of areas with biodiversity issues. Or avoid, reduce or compensate Method: Consultation of stakeholders, field reconnaissance, stakeholder opinions, impact calculation (GIS)…	Hosy et al. (2012)		X					
PRO_Pub_16.3	Studies prior to the public inquiry / definition studies 2 or 3 step Objective: Characterization of the reference band, search for routes and choice of the route of least impact within a band about 500m wide which will be proposed to the public inquiry Principle: Precise identification of biodiversity issues in the preferential passage scenario selected at the end of the previous step Method: call on specialized design offices and experts, consultation of administration services,…	Hosy et al. (2012)		X					
PRO_Pub_16.4	Detailed project studies Objective: optimization of the route inside the 500m strip Principle: precise definition of impacts and mitigation and compensation measures Method: call on specialized design offices and experts, consultation of administration services…	Hosy et al. (2012)		X					
PRO_Pub_22.1	Develop a more rigorous, evidence-based approach to ecological impact assessment and mitigation for use by road builders, planners and ecological consultants. It has the aim of studying the impact of roads (linear infrastructure) on bat populations.	ANET (2014)	X						
PRO_Pub_22.2	Solutions to mitigating the effects of roads requires an approach that recognises the place of roads in the landscape; that their influence extends far beyond the immediate construction site; that they have multiple ecological impacts that result in long-term change; and that as the road density and road traffic increase, these impacts accumulate in a non-linear	ANET (2014)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	manner.								
PRO_Pub_22.4	Identifying areas where impacts are likely to be highest, and avoiding them, if possible, is a key mitigation strategy during the planning phase. Wildlife crossing structures and structural designs, such as below-ground pipelines, may mitigate post-construction impacts.	ANET (2014)		X		X	X		
PRO_Pub_22.7	These early results suggest elevated road bridges over riparian corridors are more effective in assisting woodland birds to cross the highway than are bird underpasses that connect narrow woodland corridors on either side of the road	ANET (2014)	X						
PRO_Pub_22.10	A new line of research is needed to support the approach, for example better description of the relation between use and characteristics of non-wildlife passages, and deeper analysis of environmental goals and legislation in order to identify relevant target species for mitigation	ANET (2014)	X						
PRO_Pub_22.12	Our results demonstrate that minimising the length of fauna underpasses is likely to be the most critical factor in encouraging use by small mammals. Determining the cause for the decline in use with time since construction is also important to ensure the long-term value of these crossing structures.	ANET (2014)	X						
PRO_Pub_23.2	SUSTAINABLE INFRASTRUCTURE TOOL NAVIGATOR: The Sustainable Infrastructure Tool Navigator is an online platform that connects users with tools for integrating sustainability across the lifecycle of infrastructure projects. The platform is intended for public and private sector stakeholders involved in infrastructure development. The Navigator includes several categories of tools, including: high-level principles, impact assessments, computer modelling, project preparation & planning, financial and cost-benefit analyses, guidance, and rating systems. The Sustainable Infrastructure Tool Navigator is free to use and can be accessed at https://sustainable-infrastructure-tools.org.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.5	In meeting infrastructure service needs, planners should apply concepts like the mitigation hierarchy or “avoid-shift-improve” that seek to avoid negative environmental and social impacts (those resulting from project siting, resource use, emissions, population displacement, etc.) and where these are unavoidable, first minimize and then compensate for them. Reducing	UNEP (2021)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	demand for infrastructure services (e.g. transport or energy) is an important part of avoiding and minimizing negative impacts.								
PRO_Pub_23.8	Analysis of infrastructure options should take account not only of financial costs and benefits based on market prices, but also social and environmental externalities with adjustments for risks and market imperfections. Where possible and appropriate, positive and negative impacts should be quantified and monetarized so that trade-offs can be assessed objectively, based on a common frame of reference. Where that is not possible or appropriate, as with the value of biodiversity or human rights impacts, full account should be taken of measurements in physical units or qualitative terms.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.13	To fully understand all the costs and benefits of different infrastructure systems, tools such as SEA and Cumulative Effects Assessments (CEA) should be systematically applied as early in the infrastructure lifecycle as possible — ideally during strategic planning — when alternatives and opportunities for risk avoidance and synergies are still politically, economically and technically feasible.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.14	Adverse environmental impacts from infrastructure should be minimized, and natural capital enhanced to the greatest degree possible. Construction should be avoided in areas important for the persistence of biodiversity or having high ecosystem service value. The development of physical infrastructure should seek to complement or strengthen, rather than replace, nature's ability to provide services such as water supply and purification, flood control and carbon sequestration. Nature-based solutions should be prioritised.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_32.3	Promoting ecological connectivity by using instruments of spatial and transport planning and other measures	Carpathian Convention (2014)	X	X	X			X	
PRO_Pub_33.2a	Strategic objective 2: Ecological connectivity and wildlife-vehicle collisions are taken into account in the development of transport infrastructure 1. Ensure the protection of migration corridors and ecological connectivity in spatial planning 2. Make available the Innovative Decision Support Tool for transport/spatial planners; 4. Share common practices related to the application of methodologies (e.g.,	Carpathian Convention (2020)	X	X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	SEA, EIA, TIA, AA) for the assessment of impact of transport infrastructure on ecological connectivity 7. Make use of CCIBIS to identify strategic ecological connections in the Carpathian region 8. Based on CCIBIS, overlap existing and planned transport infrastructure and areas of ecological importance								
PRO_Pub_37.1	2.1. Identify a) patches of suitable habitats including core areas and stepping stones for large carnivores, within and between protected areas, Natura 2000 and Emerald networks b) key ecological corridors including wildlife/movement/migration corridors between them, and c) critical zones in terms of barrier permeability, with the use of the Methodology for Identifying Ecological Corridors in the Carpathian Countries by using Large Carnivores as Umbrella Species, as appropriate.	Papp et al. (2020)	X	X					
PRO_Pub_37.2	2.2. Include and regularly update, if applicable, the Map of ecological networks in the Carpathians for the large carnivore's species, and other relevant information, into the Carpathian Countries Integrated Biodiversity Information System (CCIBIS).	Papp et al. (2020)	X	X					
PRO_Pub_39.5	Wind farms should be sensitively located in locations with sufficient wind potential, but outside the migratory routes of birds and bats and outside sites important in terms of history or culture.	MoE (2019)				X			
PRO_Pub_44.3	Recommended mutual distances of fauna passages in different types of habitats	Hlaváč et al. (2019)	X	X	X				
PRO_Pub_44.5	Basic steps and processes for ensuring ecological connectivity within transport infrastructure development: General principles; Transport policy, delimiting transport corridors; Route selection; Preparation of a detailed project; Construction; Operation and maintenance; Approach to the specifics of individual types of transport infrastructure; Recapitulation of ensuring protection of wildlife in the process of preparing linear transport infrastructure	Hlaváč et al. (2019)	X	X	X				
PRO_Pub_44.7	Fauna passages and other technical solutions: General approach; Parameters of fauna passages and other technical measures according to the requirements of particular groups of species; Fauna passages; Avoiding and	Hlaváč et al. (2019)	X	X	X				

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	reducing animal mortality; Measures on roads for drivers (traffic measures)								
PRO_Pub_44.8	Ecological compensation: Concept of ecological compensation; Legal obligations; Types of compensation measures; Following activities	Hlaváč et al. (2019)	X	X	X				
PRO_Pub_45.2	Model process to achieve good navigation, good ecological and favourable conservation status – Step 1 Analyse navigation, ecological and conservation status; Step 2 Outline targets and scope of project; Step 3 Elaborate and assess integrated measures; Step 4 Agree on and attain authorisation for integrated measures; Step 5 Carry out and monitor integrated measures; Step 6 Report and evaluate outcomes	Muilerman & Kempter (2019)			X				
PRO_Pub_47.3	Bird-friendly solutions – Preliminary examinations and project assessments (Needs analysis and legal background; Variant check; New construction or conversion; Construction versus operation phase); Technical solutions against collision (Underground cabling; Marking of power lines with bird diverters; Deconstruction of power lines and removal of the ground wire; Habitat modifications to minimise risk of collision); Technical solutions against electrocution (Underground cabling; Primary surface solutions; Secondary surface solutions; Missing or unsuitable solutions)	Probst et al. (2019)				X			
PRO_Pub_47.4	DANUBE FREE SKY – a model for bird conservation at large rivers in Europe	Probst et al. (2019)				X			
PRO_Pub_48.2	Recommendations to prevent electrocution during (by?) construction of new safe power lines – various types of safe crossarms (EKOBIRD, Antibird) and other tested effective solutions	Gális et al. (2019)				X			
PRO_Pub_63.1	"We try to avoid affecting the surrounding environment as much as possible, particularly through the railway's alignment. For example, over 32 miles (51 kilometres) of the railway between London and the West Midlands will be in tunnels, and around 44 miles (73 kilometres) will be in cuttings – lowering the railway within the landscape and reducing its visual impact"	HS2 (2020)		X					
PRO_Pub_70.10	In theory, the sequence is therefore well prioritised: first, it is necessary to consider the possibility of avoiding the impact of the development project, by questioning the need for infrastructure or by proposing alternatives using the existing before consuming new space. Then, the "Reduce" phase aims to ensure that the preservation of biodiversity is taken into account as an	Bougrain Dubourg & Férey (2020)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	imperative throughout the project. For example, in the case of a road, try to adapt its route to limit habitat fragmentation or avoid areas that are home to protected species. Finally, as a last resort, when the ecological impacts of a development are unavoidable or cannot be reduced, the developer must take measures to compensate for them in terms of biodiversity (this is the most frequent case) or pay a sum of money. Note DF: This is not a proposal of the document (which assesses the application of the sequence), but as its application has been weak and it has been the object of many bypasses, the sequence can remain considered a proposal. The principle of compensation can also be discussed.								
PRO_Pub_71.1	The basic Principles of Sustainable Transport and other Linear Infrastructure (TLI): 1. Strong policy and legal framework; 2. Strategic planning; 3. Ecosystem approach; 4. Any case is a unique case; 5. Multi-disciplinary and cross-sector cooperation; 6. Stakeholder involvement and public participation; 7. Responsible polluter pays principle; 8. Long life effective maintenance; 9. Resilience to climate change; 10. Adaptable infrastructure habitats; 11. Environmental supervision; 12. Culture of learning.	Georgiadis (2020)	X	X	X	X	X		
PRO_Pub_71.2	5. The Action Plan: to work together 5.1. The stakeholders: their roles, actions, and outputs for the four levels of TLI development The Action Plan describes (i) all stakeholders and their actions and inputs that can contribute to the recognition of the problems, (ii) strategic decisions that secures political sustainability, and (iii) plans to implement TLI sustainable development at a local, regional level. Identification of relevant stakeholders involved in the design and development of the Action Plan in 3 stages: Stage 1: Scoping and mapping of stakeholders; Stage 2: Assessing, analysing and prioritising stakeholders; Stage 3: Understanding the roles of the Stakeholders. The Action Plan with the main stakeholders to be involved for the implementation of the Global Strategy is described in table 4 with four distinct levels of governance for stakeholder type:	Georgiadis (2020)	X	X	X	X	X		

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	A. Policy and strategy; B. Planning and environmental impact assessment; C. Implementation and management; D. Level of education, awareness, consultation and communication. These levels of governance are further split into four administrative levels: 1. International; 2. Continental/Regional; 3. National; and 4. Local (including states, countries, regions and/or provinces). The table 4 includes action, timeframe and expected outputs and results. 5.2. Implementation, follow up and funding of the Action Plan of the Global Strategy.								
PRO_Pub_72.1	Product A: A Landscape Prioritization Model for Roadside Habitat for Monarchs to assist roadside managers with identifying locations that are both compatible with their road and right-of-way (ROW) maintenance objectives and ranked in suitability for monarch habitat conservation. The national geographic information system (GIS) model can be enhanced with state or more local information to further refine prioritization of sites.	NCHRP (2020)	X						
PRO_Pub_73.8	Land Use Planning Concepts for Avoiding Impacts of Traffic on Wildlife: 1. Avoid road building in large undeveloped habitat blocks and remote areas (consider road closures) 2. Avoid increased traffic volumes on roads in rural and remote areas (prevent development that requires access through large undeveloped habitat blocks and remote areas) 3. Concentrate traffic on existing highly travelled roads 4. Avoid locating new roads near wetlands, ponds, lakes, rivers, and streams	Wagner et al. (2010)	X						
PRO_Pub_73.18	The Vista analyses highlight species that are threatened, either by existing or potentially planned development, including those that are not yet federally listed under the Endangered Species Act. This information can help planners be proactive in their development plans and reassure regulatory entities that conservation values are being taken seriously and incorporated early in the process.	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.27	The genetic data collected from the three hair sampling methods we employed could have other applications for the conservation and management of wildlife populations. The data could be used to monitor and estimate population size (Banks et al. 2003; Piggot and Taylor 2003; Pearse	Wagner et al. (2010)	X	X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	and Crandall 2004), develop species occupancy models (MacKenzie et al. 2006; Pearce and Boyce 2006; Long et al. 2008), calculate migration rates (Manel et al. 2005; Dixon et al. 2006) and quantify the degree of genetic population structure								
PRO_Pub_73.30	It combines mitigation requirements from transportation and water delivery, and flood management projects within the study region and identifies suitable mitigation sites that align with regional conservation objectives. When the environmental obligations from multiple agencies are integrated, planners can leverage program resources towards more significant habitat conservation at ecologically relevant scales across regions. This approach has multiple benefits to the resources of the State with greater fiscal efficiencies. The model developed here, if successful, is intended to be used throughout the state of California in the future.	Wagner et al. (2010)	X	X	X		X		
Broader issue but with direct relation to the Topic									
PRO_Pub_4.1	Chapter 3 expands on the role of ES-based assessments (ESA) in WTI project planning and decision making. It introduces the WTI project cycle, which starts with the initial project concept, moves through conceptual and technical design and approval, continues through project construction and operation, and then, after monitoring and evaluation, can move towards decommissioning (if at the end of life), or can start another adaptive project cycle (if requirements change). Generic framework and classification for ESA are introduced, and then their roles within the WTI project cycle are described. Within this context, basic steps to WTI ESA are described, with examples from case studies.	PIANC (2021)			X				
PRO_Pub_4.2	Chapter 4 delves into 8 case studies, describing their context and features in terms of the frameworks and classifications introduced in the previous chapter. Case studies are evaluated in terms of their position within WTI project cycle, the decision context, ES considered, analytical approaches, focus, and key lessons learned. Although no case study was found in which all aspects of the ES framework described here are applied, each illustrated some key features, practices and lessons which are essential to ES application in WTI decision making.	PIANC (2021)			X				

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_4.3a	Key conclusions are: 1) The ES concept is applicable to both large and small WTI projects, independent of the development stage of a country 2) Most benefits can be expected when ESA is included right from the beginning, but it can provide utility at any time of a project's lifecycle 3) ES framing helps to evaluate the WTI project in a broader context; identifying opportunities and avoiding undesirable impacts To solidify the application of the ES concept in WTI decision making, there is a need for more demonstration projects in the WTI sector. Further tools, evaluation and guidance will also facilitate the application of ESA in WTI.	PIANC (2021)			X				
PRO_Pub_13.1	Choose an integrated planning approach for road mitigation in which bottlenecks at local, regional and national road networks are jointly addressed	van der Grift et al. (2018)	X						
PRO_Pub_18.1	methodology for the identification of the nocturnal continuum through an approach based on the automated extraction of light sources from nocturnal ortho-photography and the modelling of their visibility within a territory	Ranzoni et al. (2019)	X	X				X	X
PRO_Pub_21.1	Methods to identify a black ecological network	Sordello et al. (2021)	X	X				X	X
PRO_Pub_21.2	Tools to preserve and restore black ecological infrastructure: spatial organisation of artificial light.	Sordello et al. (2021)							
PRO_Pub_22.5	Effective integrated planning by environmental agencies, resource extraction companies and permitting agencies is an opportunity to minimise unwanted impacts associated with paved and unpaved roads, rail and other ILC.	ANET (2014)	X	X		X	X		
PRO_Pub_23.1	In "business-as-usual" approaches, the environmental and social impacts of infrastructure are often considered only at the project level, and the synergies and interdependencies between different infrastructure systems and sectors — and their cumulative impacts on nature and societies — are not fully accounted for. When infrastructure is viewed as a "system of systems", trade-offs and synergies from different projects and sectors can be balanced against one another to achieve more efficient allocation of infrastructure investment in terms of delivering services and meeting national sustainable development objectives. Potential risks can also be identified and addressed earlier in the planning process, resulting in more	UNEP (2021)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	sustainable projects that are better aligned with users' needs and expectations.								
PRO_Pub_23.4	Planning should include clear environmental, social and economic goals and targets, which can help guide decision-makers towards the selection of more sustainable infrastructure projects. In addition to new sustainable infrastructure systems, these plans should include sustainability strategies for existing infrastructure. This can help to minimize environmental and social impacts, avoid stranded assets where possible, and mitigate the economic impacts where stranded assets are unavoidable	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.7	Tools such as strategic foresight, scenario analysis and computer-based modelling can help planners understand the interactions between different infrastructure systems, potential synergies, trade-offs between different costs and benefits, potential risks and future uncertainties, and the viability and sustainability of different infrastructure solutions. When used as part of systems-level approaches, these tools can help create flexible, "no-regrets" approaches that allow for adaptation to changes and ensure continued and sustainable delivery of infrastructure services.	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.11	Understanding the cumulative impacts — both positive and negative — and the synergies and trade-offs between environmental, social, and economic costs and benefits, can help determine if the overall mix of infrastructure systems provides the best solutions for meeting service needs while achieving sustainability objectives	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.12	Risk assessment is often too heavily skewed towards financial risks, which can miss major environmental and social risks that can themselves ultimately have an impact on the financial bottom line (e.g. resettlement and land tenure risks that can expose the projects to legal action).	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_23.19	Infrastructure planners and developers should systematically seek opportunities to create environmental and social co-benefits from infrastructure development, which requires integrated, systems-level planning that considers sustainability and interlinkages across sectors from the outset.	UNEP (2021)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
EXP_Pub_27.2	Urban planning approaches to promote sustainability include encouraging compact communities, designing nature-sensitive road networks and creating low-impact infrastructure and transportation systems (from an emissions and land-use perspective), including active, public and shared transport {5.3.2.6, 6.3.5}.	IPBES (2019)	X	X	X	X	X	X	X
PRO_Pub_29.1.3	Particular attention will be paid to monitoring and evaluation of environmental impacts, including health impacts, in accordance with the final opinion of the environmental impact assessment process. The specification of the selection of key indicators and the setting of their target values for the evaluation of the implementation of the strategy will be part of the first report on the implementation of the Vision and Strategy. To assess the progress of implementation, a composite indicator will be used, which will be based on the Social Progress Index and will be adjusted for the needs of Slovakia and defined in the revised version of this document in 2021.	MIRRI (2021a)	X	X	X	X	X	X	X
PRO_Pub_37.3	2.3. Develop and use, as appropriate, guidelines on identification, conservation, restoration and management of ecological corridors in the Carpathians.	Papp et al. (2020)	X	X					
PRO_Pub_37.5	2.5. Gap analysis on the identification of the needs for improving the planning processes and tools related to ecological corridors identification and preservation, if applicable.	Papp et al. (2020)	X	X					
PRO_Pub_39.3	Landscape diversity will be increased and further fragmentation will be avoided, taking into account the corridors connecting ecologically important areas that are also important for the migration of species, especially large carnivores.	MoE (2019)	X	X	X				
PRO_Pub_40.1	Develop a study about landscape connectivity for the migration of species (landscape permeability) in the system of protected areas with field monitoring of “bottleneck” or problematic areas and implementation of the results of the study into the spatial planning documentation.	MoE (2014)	X	X	X	X	X	X	X
PRO_Pub_40.2	Development of the model for the implementation of green infrastructure and its verification (implementation plan) in the demonstration area of the urban type settlement with the definition of recommendations for the application of this tool to support the connectivity of natural landscape	MoE (2014)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	elements in the peripheral areas of the settlement, including proposals for guidance systems to migratory facilities for wildlife.								
PRO_Pub_41.3	For the large-scale protected areas: a detailed map outputs showing the situation and evaluation of migration corridors and barriers, including the resulting calculated values.	Černecký et al. (2020)	X	X	X				
PRO_Pub_41.4	Map and definition of areas that are not in any protection category and are key to maintaining migratory permeability for animals.	Černecký et al. (2020)	X	X	X				
PRO_Pub_44.6	Integration of linear transport infrastructure into the surrounding landscape: Alignment – recommendations for different types of landscape; Design solutions of particular technical components	Hlaváč et al. (2019)	X	X	X				
PRO_Pub_52.3	"Data on action plans submitted by countries under the END show that noise reduction at the source (e.g. improvement of road and rail surfaces, air traffic management, reduction of speed limits, retrofitting, management of traffic flows) is the most extensively reported mitigation measure for all sources of noise inside and outside urban areas, except for major roads."	EEA (2020)							
PRO_Pub_63.3	"Woodland Fund This £5 million fund supports the creation of native woodland and the restoration of ancient woodland sites within a 25-mile zone surrounding the railway between London and the West Midlands. An additional £2 million of funding has been announced for the route between the West Midlands and Crewe."	HS2 (2020)		X					
PRO_Pub_63.5	Green Corridor online mapping tool: https://www.hs2.org.uk/building-hs2/hs2-green-corridor/	HS2 (2020)		X					
PRO_Pub_69.2	National and local government agencies should routinely consider opportunities to integrate green infrastructure approaches in regional and master planning, as well as land-use planning processes, such as river basin or urban development plans	Browder at al. (2020)	X	X	X	X	X	X	X
PRO_Pub_70.1	R1: The CESE recommends that plans and programs take greater account of biodiversity and the state of natural environments.	Bougrain Dubourg & Férey (2020)	X	X	X	X	X	X	X
PRO_Pub_70.7	R8:	Bougrain Dubourg & Férey							

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	The CESE recommends defining biodiversity indicators to facilitate information and decision-making for stakeholders, in particular companies. The CESE recommends that biodiversity indicators be defined to facilitate information and decision-making by stakeholders, in particular companies.	(2020)							
PRO_Pub_73.1	NatureServe Vista is a relatively new decision-support tool for land use and conservation evaluation and planning that operates as an extension to the Environmental Systems Research Institute, Inc. (ESRI) software ArcGIS version 9.x. Its primary purposes are to identify high-priority areas for conservation, evaluate competing land-use plans, identify uses that conflict with conservation goals, and compare different stakeholder values and visions in order to highlight areas of agreement or conflict	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.2	CommunityViz is designed to help stakeholders, government agencies, and community members develop, analyse, visualise, and communicate the outcomes of a proposed project or future growth and development	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.3	A combined transportation and conservation plan has the potential to focus development around city centers while relieving development pressure on land that can help to meet conservation goals.	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.4	Off-site out-of-kind mitigation could increase conservation benefits by proactively protecting a large resource or a complex of habitats that would accomplish other goals and avoid discontinuous mitigation sites that are surrounded by urban features that will suffer increasing pressures. By focusing on species most heavily impacted by the growth projections that can be protected in the region, and using conservation principles for those species out-of-kind out-of-region, efficient and cost-effective gains can be made for conservation targets.	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.9	Recommendations for Implementing Traffic Volume Tool into Land Use Planning: 1. Concentrate new traffic on existing high-volume roads (particularly roads approaching 10,000 vehicles/day) 2. Avoid increasing traffic to 3000-6000+ vehicles/day range 3. Limit new traffic on low use roads (e.g. 500-1500 vehicles/day) in rural and remote areas to less than 2000- 2500 vehicles/day 4. Limit new traffic on remote/logging roads to less than 300-400	Wagner et al. (2010)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Planning and environmental impact assessment	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	vehicles/day 5. On existing roads that bisect or occur near wetlands, ponds, lakes, rivers and streams, avoid increasing traffic volume above its current threshold range 6. On existing roads, use wildlife-crossing structures to facilitate animal movement. (NOT a solution to allow poorly located roads)								
PRO_Pub_73.17	Inherent in this framework is the need for technical tools that provide more and better information to decision-makers on the needs, deficiencies, and trade-offs between alternative programs, projects, and service investments within a region. While many tools can do similar functions, for this effort the PPACG and the Colorado Natural Heritage Program (CNHP) used NatureServe‟s decision-support software, Vista, to conduct initial conservation planning iteratively with growth and development scenarios created via Placeways‟ community planning software, CommunityViz.	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.31	The California Essential Habitat Connectivity Project developed a model to delineate natural landscape blocks and essential connectivity areas for habitat and wildlife throughout the state of California that will provide a vital data set at an appropriate scale to be useful for a variety of transportation and land use planning decisions and projects.	Wagner et al. (2010)	X	X	X	X	X	X	X

2.3. Thematic Implementation and management

Table 22. Published documents - Proposals related to implementation and management

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Pub_2.4	Identify barrier effect mitigation for wildlife.	PIARC (2020)	X						
PRO_Pub_2.5	«Planting areas, median-dividers and road slope surfaces of embankments and cuttings are preferably planted in order to harmonize the road construction with its local natural environment. At the same time, such areas above within the roads need to be designed in structures and devices in order to allow small animals to easily go through the areas, securing connectivity of wild habitats and forming so-called ecological network. When wildlife habitats fragmented by the road construction, some of animal species will not be able to survive if living on such small fragmented habitats which cannot feed enough food. In such a case fauna passages are required to connect both sides of the road constructed, and we would need to investigate some knowledge and devices for the animals to easily use such fauna passages.	PIARC (2020)	X						
PRO_Pub_3.2	Provides 12 independent case studies that provide examples of WwN. Each case study is outlined and presented in accordance with the six-step WwN process defined in the figure on the front page. The case studies are an integral component of this guide and illustrate the variety of ways that WwN can be integrated into infrastructure projects to protect and enhance nature. Examples include: - Creation of wetlands and new habitat as part of large infrastructure projects - Strategic dredged sediment in-water placement to create a variety of new in-water habitats - Stabilisation and upland placement as fill to create land for port expansion - In-river placement of sediment to promote the formation of islands that promote natural and targeted sediment accumulation, create new island	PIANC (2018)			X				

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	habitats, and reduce sedimentation in the navigation channel by increasing river velocities - Leveraging new infrastructure development (e.g. tunnel construction across a waterway) to develop new habitat and recreation areas, including wetlands, beaches and parks								
PRO_Pub_6.1	Tool for the 3D mapping of bats	EGIS (2016)	X	X					
PRO_Pub_6.2	Mapping of ecosystem services and to reduce biodiversity losses	EGIS (2016)	X	X					
PRO_Pub_6.3	Tool for the spatial analyses of biological fauna fluxes in order to take account green and blue networks in infrastructure projects	EGIS (2016)	X	X					
PRO_Pub_9.1	Operational recommendations for renaturing unused roads	Basilico & Jung (2021)	X						
PRO_Pub_9.1	Operational recommendations for the greening of artificial surfaces with technical constraints such as fire risk	Basilico & Jung (2021)				X			
PRO_Pub_10.1	Nature based solution for the conception of wildlife crossing. Two practical cases are presented. Recommendations for other implementations	Maurice et al. (2014)	X	X	X				
PRO_Pub_11.1	Saferoad has helped establish a sustainable green infrastructure across Europe, by identifying cost-efficient and ecologically-effective mitigation strategies and maintenance practices to reduce road-wildlife conflicts. Safe roads for wildlife and people The project generates new scientific knowledge and insights on needed methods in order to: • help prevent wildlife mortality due to animal-vehicle collisions; • assure that the barrier effect of roads is reduced sufficiently to maintain viable wildlife populations, such as the construction of wildlife crossing structures	TII (2021)	X						
PRO_Pub_13.2	Research on effectiveness of the different types of road mitigation measures and the key features of these measures that determine their performance	van der Grift et al. (2018)	X						
PRO_Pub_13.3	Research on effectiveness of the different types of maintenance measure and the key features of these measures that determine their performance	van der Grift et al. (2018)	X						
PRO_Pub_13.10	Adopt a process in preparing maintenance plans that allows for the definition of clear ecological goals for road verges, including goals for being habitat	van der Grift et al. (2018)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	refuges and goals for avoiding ecological traps or population sinks								
PRO_Pub_13.12	Establish a clear and systematic process for registering and evaluating road-kill data	van der Grift et al. (2018)	X						
PRO_Pub_13.14	Develop a standard monitoring reporting scheme for road authorities across the EU	van der Grift et al. (2018)	X						
PRO_Pub_13.15	Improve the storage of and access to monitoring data, and enhance the use of the data through web-based tools	van der Grift et al. (2018)	X						
PRO_Pub_14.1	Use adaptive management techniques to prevent trees from growing in areas close to SNCF infrastructures—and in the process, we're gradually recreating grassland spaces favourable to a wide range of species.	SNCF (2021)		X					
PRO_Pub_14.3	For idled track, we favour eco-grazing and other green maintenance practices.	SNCF (2021)		X					
PRO_Pub_14.6	Make our infrastructure corridors ecological corridors, and thus contribute to the green and blue frame by adaptive management of the areas around the railways and by the deployment of maintenance contracts with third parties. SNCF Réseau mainly uses trackside maintenance methods that seek to maintain a controlled herbaceous and / or shrub vegetation cover, making it possible to maintain the stability of embankments or earthen structures while favouring the development of biodiversity. For each type of intervention, the impact on the environment is taken into account by applying good practices such as: • the seasonality of interventions • the suitability of materials and methods of use • the use of targeted herbicides	SNCF (2021)		X					
PRO_Pub_14.7	Restore the ecological continuities of rivers	SNCF (2021)		X					
PRO_Pub_14.8	Reduce accidents with wildlife by : • maintain the vegetation in such a way as to make it less appetizing for wildlife than the surrounding environment • reduce its volume to prevent animals from finding refuge there • regenerate and / or reinforce existing fences or even deploy new ones	SNCF (2021)		X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_14.14	Fight against invasive plants to protect biodiversity and the health of our employees and residents. Tests are carried out with different types of tarpaulins, ties and a study of competition between species.	SNCF (2021)		X					
PRO_Pub_14.15	The restoration of a shrub cover in order to assess the reestablishment of plant competition for natural resources (water, nutrients, light).	SNCF (2021)		X					
PRO_Pub_15.3	Treatment of invasive species during construction - On the BPL project, the invasive alien species issue concerned various plants: Japanese knotweed (*Fallopia japonica*), knotgrass (*Paspalum distichum*), pampas grass (*Cortaderia selloana*), Himalayan balsam (*Impatiens glandulifera*), parrot's feather water milfoil (*Myriophyllum aquaticum*), New Zealand pygmyweed (*Crassula helmsii*) and so on. To prevent their spreading and associated adverse effects, strict management was undertaken with prior training by academics from the University of Rennes. All concerned spots observed were mapped, and contaminated areas were closed off using wooden stakes and orange mesh and identified with an information board. Appropriate treatment was implemented in line with the reproductive strategy of the invasive plants present, and environmental monitoring took place during the construction phase.	Aubrat & Lemeri (2018)		X					
PRO_Pub_15.5	Species translocations - Species translocations were designed and mostly conducted by entomologists from the national forestry agency (Office national des forêts (ONF)). For punctual egg translocations away from ponds, accredited experts were solicited. For plant species, the wild daffodil (*Narcissus pseudonarcissus* L.), the soft hornwort (*Ceratophyllum submersum*), the floating water plantain (*Luronium natans L.*) and the narrow-leaved water dropwort (*Oenanthe silaifolia*) were transferred with their substrate into host sites. For amphibians and insects, 25 translocations, representing 9000 specimens from 14 different species, were undertaken, including the transfer of the hermit beetle (*Osmoderma eremita*) with its fertile environment from fallen trees to pre-identified host trees.	Aubrat & Lemeri (2018)		X					
PRO_Pub_22.6	An experimental approach to mitigation and monitoring is urgently required, where the effect of specific variables on mitigation effectiveness are explicitly tested.	ANET (2014)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_22.8	Wildlife warning signs are the most commonly used and widespread form of road impact mitigation, aimed at reducing the incidence of wildlife–vehicle collisions. Animal-activated and vehicle speed-activated signs were ranked very highly by participants. Additionally, alternative signs should be designed in collaboration with relevant road authorities.	ANET (2014)	X						
PRO_Pub_22.9	Requirements, an Android app was developed to provide these contractors with guidance in animal identification, ensuring consistent reporting methodology and enabling collection of accurate spatial data. This information is being collated to assist with identifying roadkill patterns, the assigning of hotspot locations and informing decisions on how to mitigate roadkill occurrence.	ANET (2014)	X						
PRO_Pub_22.11	Many common species will use underpass crossing structures but arboreal species are likely to require more specialised structures. Further research is also required to evaluate effectiveness of the mitigation at maintaining viable wildlife populations	ANET (2014)	X						
PRO_Pub_22.13	bat guild does influence structure use, with the low flyers only using culverts (as well as underpasses) and less active at nearby roadsides at the at-grade sites, while high-flying species were comparatively more active at roadside edges	ANET (2014)	X						
PRO_Pub_24.1	Early successional habitat created by right-of-way management is increasingly considered valuable for pollinator conservation (Wojcik & Buchmann, 2012). Butterflies benefit from the presence of native plants on roadsides, as shown by North American and European studies. Butterflies benefit from the presence of native plants on roadsides, as shown by North American and European studies road verges planted with native prairie grasses and flowers supported a greater number and diversity of bees than paired conventionally managed verges (Hopwood, 2008). Moroń et al. (2014) found that railway embankments positively affected bee species richness and abundance, but negatively affected butterfly populations Management efforts to encourage pollinators must also satisfy the highway engineers, and must be developed in a collaborative manner (Way, 1977).	IPBES (2016)	X	X		X			

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	This response must be considered to be proposed with great potential. Several studies have examined rightof-way linear elements such as road verges, power lines and railroad corridors as areas for active pollinator management, and they are often found to be valuable.								
PRO_Pub_24.2	There are right-of-way management programs for pollinator conservation underway such as the “B-lines” project in the UK (https://www.buglife.org.uk/campaigns-and-our-work/habitat-projects/b-lines), aiming to restore 150,000 ha of flower-rich habitat in the UK. In the US, Iowa installed in 1989 a program to establish roadside native vegetation funded partly by road use tax, by which 50,000 ha of roadsides have been planted with native vegetation (Brandt et al., 2011) that benefits pollinators (Ries et al., 2001). In the US state of Minnesota restored native plant habitat has been established along roadsides (The Xerces Society, 2011).	IPBES (2016)	X						
PRO_Pub_25.1	collision survey tools, their application in the field and examples of the use of this data to implement solutions for wildlife	Lescroart et al. (2019)	X	X	X	X			
PRO_Pub_31.1.2	Strategic principle n. 18 For the effective implementation of measures with potential impacts on the environment, uniform rules and parameters must be set for regular monitoring of noise and air quality, monitoring of vertebrate mortality on roads and railways, mapping of animal migration corridors, addition of measures to prevent precipitation and migration measures on existing infrastructure (ecoducts, wide underpasses and dry shore culverts, fences and amphibian barriers along with passages). From the substantive point of view, these rules must be set in accordance with the standards that regulate the issue. The obligation to regularly carry out environmental monitoring must be enshrined in legislative standards and strictly required.	MDV (2016)	X	X	X	X			
PRO_Pub_31.2.2	Strategic principle n. 19 The outputs of environmental monitoring implemented in accordance with strategic principle 18 will be the starting point for the design and implementation of technical measures (noise walls, bypasses, etc.) and will be documented for each technical proposal within the EIA process.	MDV (2016)	X	X	X	X			

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_32.1	Adopting measures for lowering mortality of animals due to traffic	Carpathian Convention (2014)	X	X	X			X	
PRO_Pub_33.1	Strategic objective 1: Reducing negative impact of existing transport infrastructure on ecological connectivity (1. Support and promote a common methodology for collection, analyses and mapping about fauna traffic mortality; 2. Identify “critical sections” on existing transport infrastructure; 3. Preparation of “restoration projects”, detailed proposal of measures to restore ecological connectivity for all critical sections)	Carpathian Convention (2020)	X	X					
PRO_Pub_33.2b	3. Make use of the “Wildlife and Traffic in the Carpathians-Guidelines how to minimize the impact of transport infrastructure development on nature in the Carpathian countries'' for monitoring the impact of transportation on nature and for evaluating the effectiveness of mitigation measures 5. Make use of the Carpathian Countries Integrated Biodiversity Information System (CCIBIS) to collect information about existing and planned transport infrastructure in the Carpathian region 6. Collect data about monitoring the impact of transport on fauna, new GI elements, prevention systems, mitigation measures and ecological corridors into CCIBIS;	Carpathian Convention (2020)	X	X					
PRO_Pub_37.4	2.4. Promote the use the Wildlife and Traffic in the Carpathians - Guidelines on how to minimize the impact of transport infrastructure development on nature in the Carpathian countries.	Papp et al. (2020)	X	X					
PRO_Pub_39.4	Strategic and environmental impact assessment: Fragmentation of animal populations will be avoided and appropriate preventive, mitigating and restoration measures will be put in place to secure migration corridors for animals and address their collisions with infrastructure, such as building ecoducts in places where motor vehicle encounters are most common.	MoE (2019)	X	X	X				
PRO_Pub_40.3	Actions that ensure the longitudinal continuity of rivers and habitats, passage	MoE (2014)	X	X	X	X	X	X	X
PRO_Pub_40.4	pipelines and bio-corridors, monitoring their functioning, rebuilding existing obstacles in the watercourse or removing obstacles.	MoE (2014)	X	X	X	X	X	X	X
PRO_Pub_42.7	Monitoring of both wildlife and transport is important for data collection and understanding and justifying the measures that are required for a sustainable	Papp et al. (2019)	X	X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	transport network in the Carpathians.								
PRO_Pub_44.9	Monitoring the impact of transport infrastructure: General principles; Monitoring the state of biota; Monitoring individual negative effects of transportation; Monitoring effectiveness of implemented measures; Standards and responsibility for monitoring	Hlaváč et al. (2019)	X	X	X				
PRO_Pub_46.1	Definition and implementation of measures (their placement on selected waterways and planned amount) which will make Slovak waterways more passable / available for animals e. g. passage through a functional fishing pipe or biocorridor, conversion of existing obstacles to slides or ramps, change of handling rules, removal of an existing building,	MoE (2015)			X				
PRO_Pub_47.1	Current mitigation measures	Probst et al. (2019)				X			
PRO_Pub_47.2	Prioritisation of protection measures – Collision; Electrocution	Probst et al. (2019)				X			
PRO_Pub_48.1	Recommendations to prevent electrocution on existing 22 kV power lines – treatment on risk-bearing crossarms or replacement of dangerous types of consoles to safer alternative	Gális et al. (2019)				X			
PRO_Pub_48.3	Recommendations (Technical solutions) to prevent collisions of birds with 22 kV, 110 kV, 220 kV and 400 kV power lines – use of flight diverters, markers, their characteristics and selection, ways of installation, placement, spacing; alternative ways of making power lines more environmental friendly – overhead bunched cables, planting of trees along the power lines as barrier, burying of cables in the earth, etc.	Gális et al. (2019)				X			
PRO_Pub_48.4	Methodology for collection of data to identify the most dangerous power lines for birds and for assessment of efficiency of measurers applied, protocol for collection of data on killed/injured birds after interaction with power lines; monitoring; establishment of online database	Gális et al. (2019)				X			
PRO_Pub_49.1	State-of-the-art table on research on vegetation control methods in the network of TRISTRAM project	Pietras-Couffignal et al. (2021)		X					
PRO_Pub_49.2	Review of currently investigated alternative method (hot water, wet steam, electro-weeding, organic acids)	Pietras-Couffignal et al. (2021)		X					
PRO_Pub_49.3	Digital tools for integrated vegetation control	Pietras-Couffignal et al.		X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
		(2021)							
EXP_Pub_52.2	Studies in this area recommend the use of physical barriers, geographical and temporal restrictions on human activity and quieter technologies as noise mitigation measures for wildlife (Shannon et al., 2016). Although the use of noise barriers has been suggested as the most suitable to protect roadside habitats, it has been reported to have had some drawbacks, including fragmentation or collisions, particularly with transparent barriers used to maintain visibility (Mitrus & Zbyryt, 2018). Noise barriers are also recommended for mitigating industrial activities, including in marine environments, where bubble curtains can be used to reduce pile-driving noise (Shannon et al., 2016; ACCOBAMS, 2019)"	EEA (2020)	X	X					
PRO_Pub_55.1	Preserve endangered animal/vegetal species Example : Preserving bald eagles at Denver International Airport Planning of Denver International Airport included detailed assessment of the possible negative impacts on local bald eagle populations and led to modifications and application of several conservation actions.	Nikolova & Hervouët (2018)						X	
PRO_Pub_55.2	Avoid bird/wildlife strikes Example : Willows are replacing grass at Billund Airport, Denmark Chopped willows, a fast-growing plant, can be used to replace the grass at the airfield. Smaller birds are thus only attracted to flock there. The locally grown willows at Billund Airport cover 25% of the energy needed at the airport.	Nikolova & Hervouët (2018)						X	
PRO_Pub_55.3	Biotope management against bird strike at Frankfurt Airport, Germany Example : Frankfurt Airport do not focus on driving birds away, but on special biotope management. For example, the site is made unattractive for typical bird strike species, such as geese, through particularly high growing grass planting, which prevents birds from hatching and resting. This measure incites the development of large number of smaller bird species such as the skylark which do not represent a danger for flight operations. After the adoption of this biotype management, the bird strike rate based on verified reports by pilots has been at between 2 and a maximum of 3.5 cases per	Nikolova & Hervouët (2018)						X	

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	10,000 aircraft movements in Frankfurt for the last 13 years.								
PRO_Pub_55.4	Use of falcons at Silvio Pettirossi Airport, Paraguay and at Spanish Airports Falcons are used to keep birds away from the airport at Silvio Pettirossi Airport in Paraguay as well as at Bilbao, Ibiza, Malaga-Costa des Sol and Sevilla Airports	Nikolova & Hervouët (2018)						X	
PRO_Pub_55.5	Use of Robotic Falcon at Edmonton Airport, Canada Edmonton airport is using drone to avoid bird strikes at runways. Flocks in the vicinity will be scared off by the combination of silhouette and wing movement. The birds believe that one of their natural enemies is eyeing them up, as the drone has the appearance and weight of a real falcon. The Robird is in function since the end of May 2017.	Nikolova & Hervouët (2018)						X	
PRO_Pub_55.6	Domestic goats at American Airports, USA Domestic goats graze fiends at the San Francisco Airport (SFO), SeaTac Airport (SEA) in Seattle, Chicago O'Hare International Airport (ORD) and Bend Municipal Airport (BDN) in Oregon SFO is employing goats to create a firebreak and protect the nearby residential areas during the dry season. It is an environmentally sustainable method for managing plant population in the airport area. Every spring for the past 9 years, the airport is replacing the noisy weed-shakers with a herd of 400 goats that graze away a 20-foot buffer along its western edge, without harming the San Francisco garter snake and California red-legged frog – two endangered species that inhabit the area. Goats are very useful as they can go places that are difficult for lawnmowers to reach. They are mostly deployed to rocky and hilly areas that are covered with dense brush.	Nikolova & Hervouët (2018)						X	
PRO_Pub_57.1	Protocol for making the link between the height of vegetation and the presence of birds	Cornic et al. (2021)						X	
PRO_Pub_57.2	Content of an ecological management plan	Cornic et al. (2021)						X	
PRO_Pub_57.3	Considering biodiversity in the management of an aerodrome / airport: example of mows	Cornic et al. (2021)						X	
PRO_Pub_57.4	Biodiversity survey for aerodromes	Cornic et al. (2021)						X	
PRO_Pub_63.4	"Case studies: Minimising and compensating for the environmental impact of	HS2 (2020)		X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	HS2 Bernwood Forest, Buckinghamshire This ecologically and historically valuable area includes a network of ancient woodlands that are home to a range of wildlife, including rare and important species like Bechstein's Bat and the Black Hairstreak butterfly. The railway bisects the forest, so we are taking extensive action to keep the two sides connected for wildlife. We are building several Green Bridges to guide bats and other wildlife safely across the railway and planting new woodland to leave the character of the landscape better than we found it."								
PRO_Pub_72.2	Product B: A Rapid Assessment of Roadside Habitat for Monarchs protocol enables roadside managers to quickly survey a roadside area to evaluate the current status of the habitat quality for monarchs. The assessment focuses on functional components of monarch habitat: breeding habitat, foraging habitat, threats and landscape context, and roadside vegetation management practices. Data are entered into Esri Survey123, software used by most state transportation authorities; the survey may be customized by each state, and results are easily tracked and summarized within each state department of transportation.	NCHRP (2020)	X						
PRO_Pub_72.3	Product C: The Roadside Monarch Habitat Calculator transforms Rapid Assessment data into monarch habitat quality scores, metrics that can be used to compare sites within a road system or state and inform land managers of needed conservation actions. Data gathered in this assessment create an adaptive management feedback loop in order to track success of efforts through time and improve future conservation practices. The functional components of the rapid assessment are combined into one Monarch Habitat Quality Score but also reported independently to inform adaptive management.	NCHRP (2020)	X						
PRO_Pub_72.4	Product D: Decision-support tools for roadside managers were developed to help align road authority objectives and regulations with conservation goals in a way that is economically and environmentally additive. A survey of roadside management entities across the U.S. helped identify areas where roadside management objectives and barriers intersect with conservation objectives, and findings were used to inform the tools developed through this project to ensure the tools were adopted by and useful to road authorities. Online and print materials were also developed to support land	NCHRP (2020)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	managers in their conservation-oriented decisions, including a decision tree, milkweed guides, a weed and herbicide resource sheet, and a set of frequently asked questions								
PRO_Pub_72.5	Best Management Practice Guide: Herbicides, Weeds, and Monarchs	NCHRP (2020)	X						
PRO_Pub_73.5	In order to continue to reduce wildlife vehicle collisions state-wide, retrofit options are being considered as many of the larger highway upgrade construction projects are being put on hold. These retrofit options will allow site-specific solutions that will have immediate benefits rather than waiting for the funding for the overall upgrade of the area. Reducing the risk of collisions between the motoring public and wildlife will mean fewer human injuries and fatalities, less money spent on vehicle repair, reduced insurance costs, and reduced mortality in wildlife populations.	Wagner et al. (2010)	X	X					
PRO_Pub_73.10	On-going validation and refinement of the road-mortality hotspot model can be achieved by engaging local citizens, conservation authorities and naturalist groups to report and collect locations of wildlife-vehicle collisions within their communities. This type of data collection requires a coordinated effort to sample road mortality across each watershed in southern Ontario. Local citizens can repeatedly monitor sections of roads falling under a larger project such as–‗Adopt-ACrossing'	Wagner et al. (2010)	X						
PRO_Pub_73.11	This Project clearly furthered the goal of maintaining a connected California, while simultaneously making transportation planning projects more cost efficient and reducing dangerous interactions between vehicles and wildlife. Through the successful completion of this project, transportation and land use planners will be able to take into account essential habitat connectivity and wildlife movement corridors early in their planning processes. This will allow planners integrate connectivity conservation considerations early when such decisions are both less costly and more effective.	Wagner et al. (2010)	X	X	X	X	X	X	X
PRO_Pub_73.12	Core elements to be used to accomplish desired landscape objectives include the following: • Increased use of native plants appropriate to each landscape region of the state. • Using seeding of native grasses, legumes and forbs in new ways as design elements to accomplish landscape objectives as well as provide soil	Wagner et al. (2010)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	stabilization for the roadway corridor. • Using required environmental mitigation in a manner that will accomplish landscape objectives within the highway corridor. • Using permanent erosion control and stormwater control constructions as design features to accomplish landscape objectives within the highway corridor, as appropriate. • Development of additional ways to use plantings to reduce maintenance efforts and improve stewardship. • Enhance existing partnerships and develop new partnerships with natural resource agencies and others to broaden benefits and to share knowledge and combine resources for mutual benefit.								
PRO_Pub_73.13	Depending on general weather conditions, the adaptations to maintain a humid environment on the overpass and its ramps significantly improve overpass use by amphibians. As a result wildlife overpasses with special adaptations as implemented at the Groene Woud overpass may become an alternative, and less costly, measure than elevating roads to restore habitat connectivity for semi-aquatic species in wetland areas.	Wagner et al. (2010)	X						
PRO_Pub_73.14	The species detected exhibit varying degrees of arboreality and different population dynamics, suggesting that canopy bridges may be useful for arboreal species elsewhere. We also observed crossings by two species of conservation concern, the Squirrel Glider and the Brush-tailed Phascogale. Brush-tailed Phascogales occur at low population densities, and due to their dependence on roadside habitats in our study area are likely to frequently encounter roads (Soderquist 1995; van der Ree et al. 2001). Canopy bridges provide an opportunity for Phascogales to cross the road safely, however their effectiveness depends on the ability of individuals to detect and use the structures.	Wagner et al. (2010)	X						
PRO_Pub_73.15	Our preliminary observations suggest that installation of drift fences effectively reduced road mortality and that the installation of road tunnels provides an effective and safe route of travel for a diversity of animals including long-toed salamanders. Monitoring via trapping and cameras promises to produce a meaningful assessment of the use of tunnels by amphibians and their effectiveness in reducing road mortality in	Wagner et al. (2010)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	Waterton Lakes National Park.								
PRO_Pub_73.16	It would however be better to design waste and drainage systems from the start with escape ramps. When planned in a fauna friendly manner from the start, the extra costs are insignificant. This is now becoming a standard demand in semi-urban and countryside settings in Switzerland. The publication of these experiences as an annex to standards for road and storm water engineers should help disseminate the gained knowledge and make them more sensitive to the issue. It is hoped that further experience can be gained and solutions optimized. For this a regular control of the success of mitigation measures with consequent reporting is important.	Wagner et al. (2010)	X						
PRO_Pub_73.19	Fencing should be considered as an integral component of wildlife mitigation measures, since permeability in concert with effective passage structures, should extend outward from passages at a distance that sufficiently funnels animals, intercepts peak crossing zones, and prevent at-grade crossings. Looking at the pre-fencing and post-fencing data, a clear safety benefit can be achieved (Dodd et al. 2007). The addition of fencing to an existing structure that is large enough to accommodate wildlife is an inexpensive means that will rapidly address safety issues in an area. Fencing combined with underpasses and overpasses, as appropriate, is a broadly accepted method that is theoretically sound and proven to be effective in the reduction of wildlife vehicle collisions (Hedlund et al. 2004). The use of ungulate proof fencing commonly increases elk use of underpasses or overpasses by 80% or more (Ruediger et al. 2005).	Wagner et al. (2010)	X	X					
PRO_Pub_73.23	There may be ways to even further enhance the design of the underpasses. Water from leakage between concrete sections, road runoff released at tunnel entrances, and river flooding curtailed monitoring at times and most likely influenced animal usage (deer, raccoon, weasel, and kayakers were often undaunted).	Wagner et al. (2010)	X						
PRO_Pub_73.28	Temporary amphibian fencing was immediately installed and a collection system was developed. Approximately 950,000 toadlets were successfully recovered and transported across the highway. As a result of the migration, BCMoT developed a wildlife migration response protocol and initiated Western toad	Wagner et al. (2010)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	monitoring in the area. Similar migration events, with the same and other amphibian species, have the potential to occur at other locations in Europe and North America. The collection and dissemination of best practices can promote and facilitate the expedient use of existing experience and knowledge developed to protect amphibians on either continent.								
PRO_Pub_73.29	A Habitat Suitability Index (HSI) was then attached to each road pixel. Opportunistic validation using Chi-squared statistics showed that HSI's on roads with a score greater than 30,000 had higher numbers of road mortality than expected by chance. Alternatively, HSI scores less than 10,000 had significantly fewer road mortality.	Wagner et al. (2010)	X						
PRO_Pub_73.32	Fencing the highway right-of-way and providing safe passage crossing structures was considered the most desirable option because of proven effectiveness and low maintenance (Huijser et al 2007). Therefore, highway segments were assessed for their suitability for right-of-way fencing and the locations and spacing of sites deemed suitable for installing crossing structures.	Wagner et al. (2010)	X						
Broader issue but with direct relation to the Topic									
PRO_Pub_8.1	Operational recommendations for the management of invasive species	Boyer et al. (2018)	X	X	X	X	X		
PRO_Pub_14.2	In response to France's ban on the use of pesticides in public spaces, we've rethought our approach to green space maintenance.	SNCF (2021)		X					
PRO_Pub_15.1	Specific organisation - A specific sustainable development organisation has been established on all operational levels, gathering around 30 individuals (at the top of activities), including both on-site and off-site environment managers. Some of them take part in the 'BPL sustainable committee', which, by bringing together project managers several times a year, enables sharing of experiences and feedback, as well as cross-managerial, cross-technical and cross-operational points of view on strategic topics such as public consultations, environmental permits, land acquisitions and biodiversity offset, in order to achieve the best compromise in line with the sustainability objectives.	Aubrat & Lemeri (2018)		X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_22.14	We established that *Litoria raniformis* does use culverts of the design used at our study site and therefore the installation of these structures may assist with maintaining habitat connectivity for this species and potentially for closely related species such as *L. aurea*. Culverts may be most effective when they are permanently inundated (with air space) and are hydrologically linked to aquatic habitat on either side of the roadway.	ANET (2014)	X						
PRO_Pub_23.16	Where construction and operation of infrastructure — or the use of potentially polluting or hazardous materials or technologies — is necessary, best practice measures to manage waste and mitigate environmental and safety impacts throughout the lifecycle should be factored into the analyses of the various options being considered	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_24.3	AMBITION : IMPROVING CURRENT CONDITIONS FOR POLLINATORS AND/OR MAINTAINING POLLINATION STRATEGY : UTILIZE IMMEDIATE OPPORTUNITIES Manage road verges* Manage rights of way and vacant land in cities to support pollinators Those responses with potential adverse effects are marked with an asterisk (*)	IPBES (2016)	X	X	X	X			
PRO_Pub_34.5	Regular monitoring of the environment and implementation of measures to reduce the negative effects of transport on the environment	MDV (2017)	X	X				X	
PRO_Pub_44.1	Connectivity of different types of habitats – measures to ensure connectivity of populations of species in various habitat types in the Carpathians	Hlaváč et al. (2019)	X	X	X				
PRO_Pub_45.3	Good practices on environmentally sound waterway management - Austria – Integrative Bedload Management; Slovakia – Fish and other species migration and habitats quality improvement in the Slovak rivers; Hungary - Restoration of the Szabadság Island and its sidearm; Croatia - Arrangement of Drava River Waterway; Serbia - Stakeholders' Forum; Romania - Technical Assistance for the Review and Completion of the Feasibility Study on Improvement of the Navigation Conditions on the Romanian-Bulgarian Danube Joint Sector and Complementary Studies; Romania - Automatic water quality monitoring system; Bulgaria - Cooperation Agreement between	Muilerman & Kempter (2019)			X				

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	EAEMDR and Nature Parks Persina and Rusenski Lom Administrations								
PRO_Pub_46.2	Measures to ensure lateral continuity of wetlands and floodplains by (re)connection of stagnant river arms and other morphological measures.	MoE (2015)			X				
PRO_Pub_61.3	Action area 3.4: Improve air operations and traffic management Key element: standards and best practices for air craft operations and air traffic services Breakdown level 1: understanding environmental and socio-economic impacts of aircraft operations Breakdown level 2: identify and assess environmental benefits at the aggregated multi-trip level	ACARE (2017b)						X	
PRO_Pub_73.20	The Causeway Improvement Plan embodies the following key elements: 1) provide an ecopassage system (culverts/bridges and funnel walls) to provide safe wildlife movement across the causeway; 2) re-establish the hydrological connection between the marsh and the Inner Bay; 3) provide supplementary turtle nesting habitat; 4) provide a safer roadway cross-section (and trail opportunities) for both local residents and visitors to the wetland; 5) provide signage to raise public awareness; ... 8) monitoring.	Wagner et al. (2010)	X		X				
PRO_Pub_76.1	Sustainability: With the increasing emphasis on environmental sustainability, many ports have responded to ensure that their operations are environmentally sustainable and committed themselves to working towards improved environmental performance through focused action on the following areas: air quality, energy conservation and climate change, waste management, noise management, and water (both consumption and quality) management. Harbour Masters have a key role to play including the implementation of pollution-prevention measures and the development of contingency plans and responses to oil spills, dealing with the immediate effects of the oil spill and aiming to minimise the impact on the port's customers and stakeholders. Harbour Masters may control waste management services in ports, including the disposal of dangerous chemicals. Ballast water protocols aim to prevent the accidental introduction of exotic and potentially invasive aquatic	IHMA (2021)							X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Implementation and management	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	organisms into ports in order to protect the marine environment.								
PRO_Pub_76.2	Ship waste and ballast water: The International Convention for Control and Management of Ship's Ballast Water and Sediments came into force in 2017 and represents a significant step in the protection of the marine environment. The IMO has developed a manual entitled "Ballast water management - how to do it" (ISBN 978-92-801-1681-6, sales number: I624E).	IHMA (2021)							X
PRO_Pub_76.3	Tank Cleaning: The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. Annex I covers prevention of pollution by oil from operational measures as well as from accidental discharges. Ports and harbours must offer oil reception facilities for oil-water residues, slops and bilges. In accordance with rules for products specified in Annex II of the convention, shore reception facilities are required, because, for instance, category A products can only be discharged to a shore tank and cannot be pumped overboard.	IHMA (2021)							X

2.4. Thematic Education, awareness, consultation and communication

Table 23. Published documents - Proposals related to education, awareness, consultation and communication

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
Well focused on the Topic *Biodiversity-friendly transport modes and transport systems*									
PRO_Pub_13.6	Arrange frequent and systematic feedback between policy makers and road planners in order to implement the legislation and policy plans in a coherent manner	van der Grift et al. (2018)	X						
PRO_Pub_13.11	Raise awareness of ecological issues in maintenance among both road authorities and contractors, and arrange training to deal more effectively with road-wildlife conflicts	van der Grift et al. (2018)	X						
PRO_Pub_14.5	Our biodiversity policy is supported by partnerships with environmental groups such as France Nature Environnement (FNE) and France's Bird Protection League (LPO - A gir pour la biodiversité).	SNCF (2021)		X					
PRO_Pub_14.12	Strengthen specific training / awareness of biodiversity applied to professions.	SNCF (2021)		X					
PRO_Pub_14.13	Contribute to knowledge by promoting participatory science tools among citizen collaborators in collaboration with environmental associations.	SNCF (2021)		X					
PRO_Pub_15.2	Critical revision by independent experts - Ecological surveys were also a subject of critical revision by independent and recognised specialists regarding protocols, proposed impact reduction and offsetting measures	Aubrat & Lemeri (2018)		X					
PRO_Pub_33.3	Strategic objective 3: Fostered cooperation of all relevant stakeholders of Carpathian Convention and enhancement of stakeholder participation in spatial planning, and development of transport infrastructure (1. Facilitate integrated consultations, coordination and cooperation between all relevant stakeholders, in order to encourage their active participation in discussing current and future environmental conflicts and raise awareness on the potential impact of planned infrastructures on ecologically sensitive areas;	Carpathian Convention (2020)	X	X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	2. Disseminate and promote the implementation of the "Wildlife and Traffic in the Carpathians-Guidelines how to minimize the impact of transport infrastructure development on nature in the Carpathian countries" among transport infrastructure, spatial planning and other relevant authorities, with regards mainly to: • Basic steps and processes for ensuring ecological connectivity within transport linear infrastructure • Fauna passages and other technical solutions • Monitoring the impact of transport on nature; 3. Conduct proper public participation procedures, such as public consultations on feasibility studies or environmental impact assessments, making use of good practices; 4. Develop and make use of training courses on interrelations between biodiversity and transport networks for national and local stakeholders).								
PRO_Pub_42.3	Sharing information among different institutions including the Traffic police, the Institute for Traffic, the Road building association, the Slovak Railway association, the State Nature Conservancy, etc. with aim of better understanding of traffic wildlife mortality and disruption of ecological corridors.	Papp et al. (2019)	X	X					
PRO_Pub_42.5	The harmonisation of grey and green infrastructure is a long-term and complex process but essential for all well-being. Cooperation between all parties involved in the process is a prerequisite for success.	Papp et al. (2019)	X	X					
PRO_Pub_42.9	A pool of experts and professionals should be developed in all sustainable transport-related fields.	Papp et al. (2019)	X	X					
PRO_Pub_42.10	It is crucial to improve communication, knowledge and data sharing between Environmental, Transport and Spatial planning sectors.	Papp et al. (2019)	X	X					
PRO_Pub_48.5	Cooperation, competencies, priority areas – stakeholders and their role in reduction of collisions of birds with power lines (including ministries, governmental agencies, NGOs and initiatives) and their cooperation	Gális et al. (2019)				X			
PRO_Pub_73.6	There are currently three ways citizens can contribute to the Road Watch project: 1) submit observations through an interactive Web-based mapping tool, 2) report through a phone-in hotline; and 3) involvement in systematic	Wagner et al. (2010)	X	X					

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	wildlife surveys of Highway 3. This multi-pronged approach ensures that a diversity of users is reached as it addresses different commitment and computer literacy levels across the community.								
PRO_Pub_73.7	Road Watch is an innovative successful model for increasing individual knowledge on wildlife movement and collision zones in the region. A qualitative study suggests participation has resulted in some behavioural change (such as self-described changes in driving behaviour). Participants are also sharing information about Road Watch with the community including project. Results indicated a high level of understanding in regard to the value of the Road Watch project. Values were expressed beyond simply generating a large dataset such as informing decision makers, community and the development of mitigation strategies to protect wildlife and increase human safety	Wagner et al. (2010)	X	X					
PRO_Pub_73.21	Road Watch in the Pass is an innovative framework for connecting researchers, citizen volunteers and decision makers through a CBM project to address wildlife transportation issues. It enables citizens to use an interactive Web-based mapping tool (please see www.rockies.ca/roadwatch) to enter wildlife observations along Highway 3	Wagner et al. (2010)	X	X					
PRO_Pub_73.22	Road Watch enables citizens to collect information on wildlife observed along Highway 3 and share the data with other community members, municipal and provincial government and non-governmental organizations.	Wagner et al. (2010)	X	X					
PRO_Pub_73.24	Irrespective of the biological value of the crossing structures, the Route 2 underpasses have proven successful in terms of social and political factors (Servheen et al. 2007). Publicity about the underpasses in local and regional media helped educate the public about the presence of wildlife near roadways in their communities, the impacts roads have on wildlife, and measures taken to mitigate the negative effects. The photographs gathered by this study proved to be a valuable public relations and educational tool. Citizen involvement has been part of the project from the beginning. The underpasses were planned and installed in part because of local interest; they were monitored by a volunteer group who were curious and committed to finding out if they —worked. Ultimately it will be the public that decides whether the crossings structures are —worth the expenditure.	Wagner et al. (2010)	X						

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
PRO_Pub_73.25	Live animal observations are important in order to get a clearer picture of wildlife use in the roadway corridor. Live animal observations are also more difficult to obtain. Therefore, a network of motorists/citizen scientists can supplement traditional data sources; however, there are potential biases and limitations of citizen science. The website also provides information about the road mortality problem and potential mitigation measures	Wagner et al. (2010)	X						
PRO_Pub_73.26	Relying on highway patrol crash data, department of transportation carcass data, and even systematic roadkill monitoring can underestimate or incompletely describe the road mortality situation. Utilizing the motoring public as citizen scientists can supplement traditional data sources while increasing support for mitigation measures to reduce WVCs and allow for safe passage. A wildlife reporting website can provide a convenient venue for engaging a local community in this effort, but such data does not replace the need for formal data collection.	Wagner et al. (2010)	X						
Broader issue but with direct relation to the Topic									
PRO_Pub_4.3b	4) ES concepts provide a transparent basis for communication to a diverse range of stakeholders.	PIANC (2021)			X				
PRO_Pub_23.21	The quality of stakeholder consultation depends on the availability of appropriate information and the design of the processes themselves. Effective consultations involve early and ongoing public participation and full disclosure of relevant information, including development objectives, spatial planning data, environmental baseline data, options considered, results of assessments, justifications for decisions, procurement processes and costs, among others. This information must be communicated in ways that the various stakeholders can access and understand. Consultation processes must also be designed with enough time to allow for stakeholders to provide feedback, and they must begin early enough in the decision-making process (ideally as part of strategic planning) to enable stakeholders to influence key decisions about what to build and where to build it, as well as overseeing implementation	UNEP (2021)	X	X	X	X	X	X	X
PRO_Pub_26.3	Education and awareness-raising at the individual level, especially among consumers, is also of great importance to expose the environmental impacts	IPBES (2018)	X	X	X			X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	associated with the full chain of production, transportation and, ultimately, waste management related to consumer products and services (well established) {2.2.1.3, 2.3.2.2, 6.4.2.4}. i.e : To summarize, the environmental impact of the transportation step implied by consumption choices must be made explicit to individuals								
PRO_Pub_37.6	2.6. Address the need of enhanced connectivity with other mountain ranges and neighbouring areas in order to improve the gene pool of large carnivore populations, through knowledge exchange and increased cooperation at the regional and European level.	Papp et al. (2020)	X	X					
PRO_Pub_37.7	5.2 Ensure involvement of representatives of different sectors, such as environment, transport, forestry, hunting, agriculture, tourism, and spatial planning and others in generating and implementing viable solutions and measures to address the conservation of large carnivores through the implementation of the Action Plan and cross-sectoral cooperation.	Papp et al. (2020)	X	X					
PRO_Pub_54.1	UAF&FA responded to a call for projects within the framework of the ecophyto2 + plan. The proposal aims to reduce or even eliminate the use of phytosanitary products by: • on the one hand identifying, promoting and disseminating the good practices already implemented • on the other hand, testing and developing technological innovations to improve these practices (Ecophyto2 + is a French national plan piloted by the Ministry of Agriculture)	UAF&FA (2021)						X	
PRO_Pub_63.2	"In partnership with the communities neighbouring HS2 and other stakeholders, we are supporting and funding a range of green projects and encouraging the identification of new ones." "We offer funding for community and environmental projects in the Green Corridor through several funding schemes, each of which supports different kinds of projects"	HS2 (2020)		X					
PRO_Pub_69.4	In addition to supporting their client's efforts to develop green-gray infrastructure, development partners can advance the knowledge frontier for next generation infrastructure in three ways. First, they can build capacity with their own organizations to understand the potential of green infrastructure and engage developing country clients. Next, they can utilize	Browder at al. (2020)	X	X	X	X	X	X	X

Input code PRO_Pub_Provider.n°	Description of the proposal - Thematic Education, awareness, consultation and communication	Reference	roads	railways	waterways	power lines	pipelines	airports	harbours
	green-gray assessment tools and approaches in their internal processes. And finally, they can help overcome knowledge gaps that act as barriers to scaling green infrastructure, by investing in performance monitoring and in widely communicating results and real-world experience.								
PRO_Pub_79.3	EcoPorts is a key environmental management initiative of the European port sector. It was initiated by a number of ports in 1997 and has been fully integrated into the European Sea Ports Organisation (ESPO) since 2011. The overarching aim of EcoPorts is to raise awareness on environmental protection by cooperating and sharing knowledge between ports and improving environmental management. EcoPorts offers two main tools for port environmental management: The Self Diagnosis Methodology (SDM) and the Port Environmental Review System (PERS). The EcoPorts Self Diagnosis Methodology (SDM) provides the means for ports to self-evaluate their environmental management and allows them to compare their performance against the sector benchmark. The EcoPorts Port Environmental Review System (PERS) is the only port sector specific environmental management standard and is independently certified	WPSP (2021)							X