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CONNECTA

Technical Assistance for the Deployment of Smart and Sustainable Mobility in the Western Balkans

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WORKSHOP no. 4

Resilient Mobility

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Climate proofing and climate vulnerability

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- EU methodology, best practice examples, technical guidelines used in EU, monitoring systems in place, financing – e.g. self-standing projects, part of regular maintenance etc.

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1. Climate change impacts to infrastructure

- Over the last decade, **climate resilience** in the context of infrastructure is becoming one of the major considerations and areas of combating against climate change impacts.
- According to the Climate-Resilient Infrastructure Officer Handbook, climate-related shocks and stresses are **increasing in frequency and magnitude**, causing damages to infrastructure systems and disruptions in the provision of services. Yet there is **not sufficient investment** needed to infrastructure systems' climate resilience.
- Worldwide, **all types of infrastructure will be affected by negative climate impacts** and therefore will be exposed to variety of risks. Increasing its resilience to these impacts will have a crucial role in avoiding substantial direct and indirect economic and financial damages.
- Climate change risks fall into two categories:
  - **Chronic stresses** – Hazards due to long-term changes in average climatic conditions, which are typified by their slow onset occurrence.
  - **Acute shocks** – Hazards due to extreme weather events.

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2. Status in the European Union (EU)

- **Candidates for European Union** (EU) membership commit to transposing the EU legal framework into its national legal system.
- At the EU level, the umbrella document related to adaptation to climate change is the new EU Strategy on Adaptation to Climate Change , amending the **EU Strategy on Adaptation to Climate Change** enacted in 2013.
- The new Strategy was adopted in 2021. It sets out how the European Union can adapt to the unavoidable impacts of climate change and become climate resilient by 2050. It is largely focused on **investing in resilient, climate-proof infrastructure**. It states that in order to minimise the risk of disasters and be cost-effective over its lifetime, infrastructure investments should be climate resilient.
- The EC developed extensive climate proofing guidance for new major infrastructure projects called **Technical guidance on the climate proofing of infrastructure in the period 2021-2027**. These guidelines provide comprehensive recommendations on how to integrate the climate vulnerability and risk assessment from the beginning of the project development process.

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2. Status in the European Union (EU)

- Climate change adaptation considerations have been included in the preparation and approval process of **European Structural and Investment Funds***. The European Structural and Investment Funds promote eleven Thematic Objectives, of which Thematic Objective 5 is **'Promoting climate change adaptation, risk prevention and management'**.

- The European Structural and Investment Funds comprise a family of five funds: the European Regional Development Fund (ERDF) and European Territorial Cooperation goal (ETC); the Cohesion Fund (CF); the European Social Fund (ESF); the European Agricultural Fund for Rural Development (EAFRD); and the European Maritime and Fisheries Fund (EMFF).

- The **EU taxonomy (**Regulation (EU) 2020/852) represents a new comprehensive classification system for standardising "green" economic activities and is primarily designed for use in the financial sector. It consists of six main environmental objectives, that are simultaneously tested for an investment/measure.

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3. Vulnerability assessment analysis

- For the purposes of this climate vulnerability and impact analysis, the key elements defining the level of climate risk include: (a) climate hazards, (b) exposure of the infrastructure, (c) vulnerability factors of the infrastructure. – for example **– North Macedonia**

Climate hazards		
Greater frequency and intensity of extreme events -> **extreme rainfall events, floods, landslides**.	Rise in average temperatures and extreme temperatures -> **higher temperatures, heatwaves**	Variability of seasonal rainfall patterns -> **longer dry seasons, drought**.
Exposure		
River flooding. The exposure to river flood hazard in North Macedonia is classified as **HIGH**, which means that potentially damaging and life-threatening river floods are expected to occur at least once in the next 10 years.		**Drought**. The exposure to drought hazard is classified as **MEDIUM**, which means that there is up to a 20% chance that droughts will occur in the coming 10 years.
Landslides. The landslide susceptibility of North Macedonia is classified as **HIGH**, which means that this area has rainfall patterns, terrain slope, geology, soil, land cover and that make localized landslides a frequent hazard phenomenon.		**Extreme heat**. The exposure to extreme heat hazard is classified as **MEDIUM**, which means that there is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years.
Vulnerability		
Sensitivity. (1) Limited capacity of water drainage systems in urban areas to accommodate high volume of rainfall in short periods. (2) Inadequate construction materials and limited integration of risk-informed design options		**Coping capacity**. (1) Limited capacity of key agencies to translate forecasts into meaningful guidance and anticipatory actions to protect infrastructure during extreme events. (2) Insufficient legal framework to ensure risk-informed infrastructure design.

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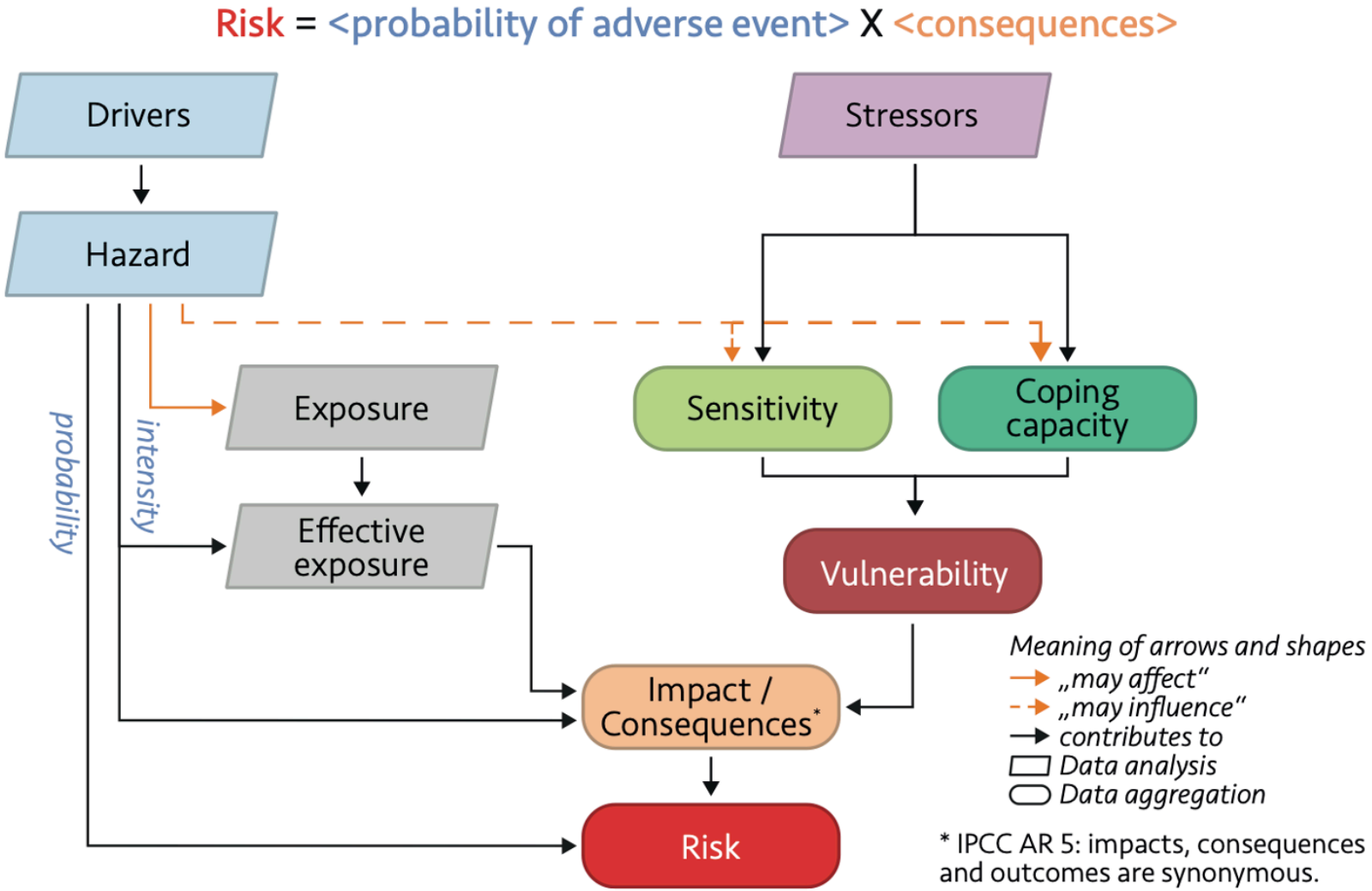
3. Vulnerability assessment analysis



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4. Climate change impacts to transport infrastructure

Climate hazard	Impacts for the transport infrastructure
Heat waves **Increase in average temperature**	• Impacts to road surfaces (expansion of concrete) and railways (expansion of metal) • Impacts to electricity system (increased demand / decreased efficiency) and other fuel transport infrastructure
Cold waves **Snowfall**	• Snow impacts on transport infrastructure • Impacts on road surfaces and railways
River flooding	• Structural damage to roads / bridges, etc. • Emergency situations on roads
Wind storms	• Structural damage as a result of wind pressure or debris impact • Disruption caused by the action of wind on foreign bodies on the infrastructure: falling trees, etc.

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5. Climate resilient infrastructure

- The defining characteristic of climate-resilient infrastructure is that it is **planned, designed, built and operated in a way that anticipates, prepares for, and adapts to changing climate conditions**. It can also withstand, respond to, and recover rapidly from disruptions caused by these climate conditions. (OECD)
- Given the context-specific nature of climate adaptation, the measures used to achieve this will vary widely. In general, there are two broad categories of adaptation measures in this context:
  - **Structural adaptation measures**: e.g., changing the composition of road surfaces so that they do not deform in high temperatures, building seawalls or using permeable paving surfaces to reduce run-off during heavy rainfalls.
  - **Management (or non-structural) adaptation measures**: e.g., changing the timing of maintenance to account for changing patterns of energy demand and supply, investment in early warning systems or purchasing insurance to address financial consequences of climate variability.

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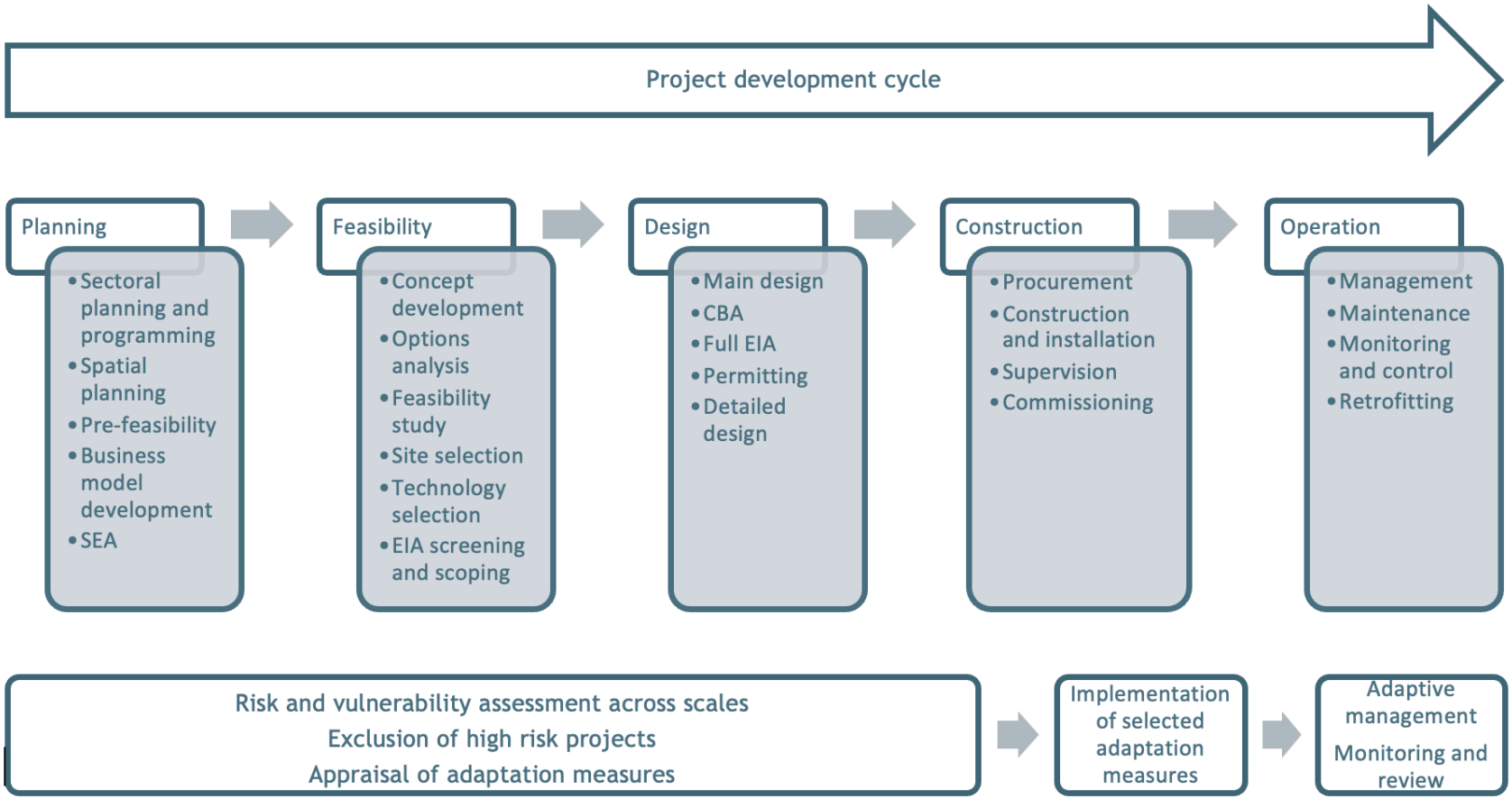
6. Best practices

- Integrating Climate Change Adaptation into the Project Development Process:



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6. Best practices

Integrating Climate Change Adaptation into the Project Development Process:

- **Enabling climate resilience through policy and regulation** – This is by far the most effective way for the introduction of climate proofing into infrastructural projects, especially if climate risk assessment and consideration of appropriate measures through the various stages of infrastructure planning and development is introduced as a legal obligation (e.g. planning for 50-year events, incorporating climate extremes, etc.).
- **Voluntary standards relevant for climate proofing**.
- **Voluntary guides, toolkits and standards for disclosing climate risks** - There are number of guidance documents/methodologies on how to climate proof infrastructure, for all phases of infrastructural projects.
- **Infrastructure developers and engineers/investor initiatives**. In many developed countries climate resilience is now being integrated into frameworks of voluntary sustainability rating programmes.

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6. Best practices

International practices and standards relevant to increasing infrastructure resilience

- **ISO standards** are organisational standards:
  - ISO 14090:2019 Adaptation to climate change – These standards specify principles, requirements and guidelines for adaptation to climate change.
  - ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment.
- **Eurocodes** are construction standards that can play an important role in strengthening resilience to the effects of climate change. The Eurocodes fall into the Specification Standard category and include 10 sets of standards (EN 1990 - 1999) covering subjects related to construction.
- The **European standard** is a standard adopted by the European Organisation for Standardisation (CEN / CENELEC / ETSI). There are several European Standards relevant for increasing of climate resilience of infrastructure. However, these are Specification Standards or Test/ Analysis Standards and have yet to be modified to account for future climate changes.

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6. Best practices

Do No Significant Harm assessment for EU-funded projects – in line with the EU Taxonomy

- 2 step process to ensure that climate change impacts are incorporated and ensure that investments / policies are not “mal-adaptation”:
  - Does the action require a thorough assessment of the measure in terms of the 'Do no significant harm' principle?
  - Is the measure expected to lead to an increased adverse impact of the current climate and the expected future climate on the measure itself or on humans, nature or property?

- Additional questions related to water resources, climate change mitigation, etc. with guidance on all aspects being currently drafted by the European Commission
- EU Taxonomy information here: https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en
- Do No Significant Harm approach described here: https://ec.europa.eu/info/sites/default/files/2021_02_18_epc_do_not_significant_harm_-technical_guidance_by_the_commission.pdf

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7. Example 1

- Based on **Western Balkans Investment Framework** (WBIF) Grants for Technical Assistance Guidelines issued in January 2021, which defines **eligibility criteria for the projects to be financed**, tracking climate finance commitments is a responsibility of donors or financiers, not of the Beneficiaries. In this context, the assessment of contributions to climate finance (mitigation and adaptation) **examines whether climate change is the principal objective** of a project, one of the (significant) objectives or it is not an objective at all.
- The grant application should provide information on potential contribution of the project to **GHG emissions reduction and assessment of climate risks**, including the measures that would improve the climate resilience of the project.

Parameter	Elaboration
Average temperature rises and increased risk of heat waves	• Regions where average temperature is already high; • Urban centres, where the 'urban heat island effect' will exacerbate high temperatures; • Regions with limited freshwater supplies.
Mean sea level rise, coastal flooding and erosion	• Coastal areas and islands.
Decreased seasonal precipitation, increased risks of drought, wildfire	• Regions where rainfall is already scarce; • Locations where current demand for water almost matches supply or outstrips; • Locations where water quality is poor; • Regions prone to wildfire; • Trans-boundary river basins where tensions over water use already exist
Increased seasonal precipitation and more rapid snow melt – increased risk of river flooding, flash floods, or soil erosion	• Regions with high rainfall; • Estuaries, deltas, river floodplains; • Mountainous regions; • Locations prone to landslips; • Urban centres with storm water systems not designed to manage intense rainstorms; • Contaminated environments (land, water).
Possible increase in storm intensity and frequency	• Areas at risk of storms; • Urban centres at risk from storms.

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7. Example 2

Operators in the UK shall carry out **climate change risk assessment for each new environmental permit application** (for certain installations and projects), if they expect to operate for more than 5 years. When completing the permit application form, they must calculate their **climate change risk test result**.

The screening tool - three questions to which there are different answers with different weights. A combined score of five or more requires the operator to complete and submit a climate change risk assessment as part of the application form. If the screening result is lower than five, the operator does not need to submit his risk assessment with the application form, but must still keep it as part of his environmental management system.

The completed climate change risk assessment will take into account:

- Future summer and winter maximum daily temperatures
- Increase in rainfall intensity
- Increased winter rainfall
- Sea level rise
- Dryer summers
- Fluctuations in watercourse flow

The next step for the operator is to find measures to manage the significant risks identified. These measures could:

- manage risk by introducing control measures to address climate change hazard, its impact on business or environmental impact
- risk transfer, such as insurance
- eliminate the risk, for example by changing the hazard elimination procedure

The UK Environment Agency provides examples in the sectoral guides for climate change risk assessment, which can guide operators in developing their climate adaptation plans.

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7. Example 3

Enhancing Environmental Performance and Climate Proofing of Infrastructure Investments in the Western Balkan Region from an EU integration perspective" (CLIMAPROOF)

The project CLIMAPROOF was financed by the Austrian Development Cooperation (ADC) and implemented by UNEP (2017-2021).

ClimaProof aimed to increase technical capacities of the relevant national authorities in the field of climate proofing of road infrastructure and green infrastructure.

For large infrastructural projects detailed and specific climate projections during the planning phase will be prepared which will allow integration of adaptation measures in both the planning and realisation phase, thus maximizing resilience to climate variability and extreme weather events.

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7. Example 4

Technical assistance preparation of climate resilience design guidelines for the public enterprise for state roads in North Macedonia - Climate resilience design guidelines (2019)

Guidelines provide detailed and practical instructions on how to conduct a climate change and natural hazard road network vulnerability and risk assessment. The methodology distinguishes between two main groups of actions: i) risk impact assessment, and ii) identification and prioritisation of engineering/ non-engineering solutions for risk reduction/ mitigation.

The identification of road sections under the most critical need for intervention is performed through four steps incorporating 9 tasks spanning across three layers: hazard, risk, engineering screening and the planning layer. The Guidelines defines engineering and non-engineering measures, as well as institutional and legal recommendations.

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7. Example 5

Moravian Corridor ("Moravski koridor"), Serbia (expected to be completed in mid-2024)

The construction of a new highway in Serbia can be mentioned as an example of a good practice in the Western Balkans region. As this **highway passes through an area that often has serious problems with floods**, this climate impact is seriously taken into account during design and construction processes. Construction of the highway "Moravian Corridor" E761 from Pojate to Preljina is underway. That corridor will connect the central parts of Serbia with the two most important highways in Serbia, which are part of the European road network: the E75 highway, through which it connects in the north with Belgrade and Central and Western Europe and in the south with North Macedonia and Bulgaria, and with the E763 Belgrade - South Adriatic highway.

Realisation of the Moravian Corridor Project includes:

- construction of a highway with a total length of 112.37 km and 40 bridges;
- hydro-technical regulation of the river Zapadna Morava;
- "digital corridor".

The contractor Bechtel ENKA will build a **large flood protection system to protect the area around the highway from flooding**, **erosion and subsequent water pollution**. This will be the first flood mitigation system of this magnitude to be built along the highway in the Balkans.

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Questions and Discussion

Any comments/suggestions?

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Thank you!

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