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Ligamos destinos

LNEC Lisbon Conference
Urban Risks and Societal Resilience

IP´s experience on developing a
Climate Change Resilience Plan (**PRIAC**)

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PRIAC Taskforce
14th of October of 2024

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INTRODUCTION

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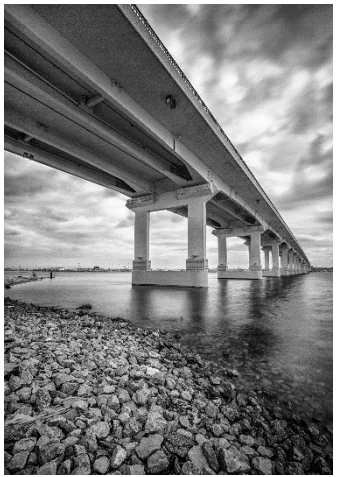
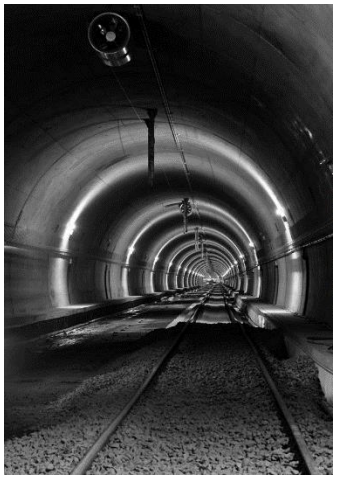
MISSION

Conception, design, construction, financing, maintenance, operation, upgrading, extension and modernization of the Portuguese road and rail networks, including traffic command and control.





VISION

IP's vision is to position itself as multimodal mobility Manager enhancing the asset management, synergies and new revenue to ensure the provision of sustainable, safe and efficient services.

VALUES

They reflect our commitment to society and the desire for continuous improvement.

Ethics · Safety · Sustainability

how to face Climate Change?

COMMITMENTS AND
MEASURES ALREADY IN PLACE

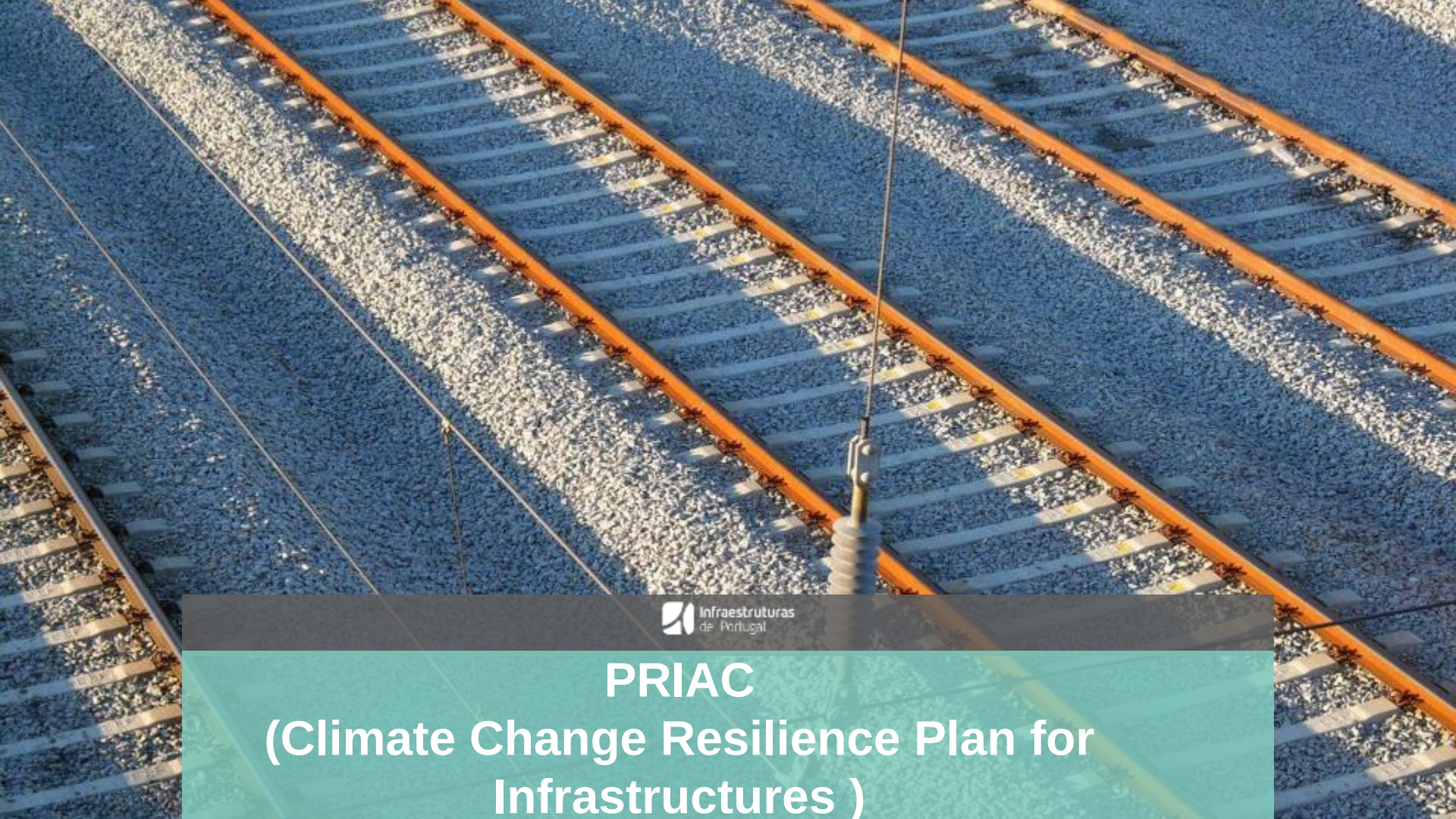
MITIGATION

- 1.5 BUSINESS AMBITION
- DECARBONIZATION PLAN
- RAILWAY CLIMATE RESPONSABILITY PLEDGE

INTERNATIONAL UNION OF RAILWAYS

ADAPTATION

- CLIMATE CHANGE ADAPTATION STUDIES (FINANCIAL FUNDING REQUIREMENT)
- **CLIMATE CHANGE RESILIENCE PLAN** (PRIAC)



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PRIAC
(Climate Change Resilience Plan for Infrastructures)

objectives & output

- Strategic Guidance
- Operational information: Geographic Information System

OBJECTIVE 01

Current Climate Vulnerabilities
- knowing where we are -

OBJECTIVE 02

Future Climate Vulnerabilities
- envision where we will be -

OBJECTIVE 03

Ensuring Climate Resilience of EU financed projects

OBJECTIVE 04

Develop Climate Adaptation Plans

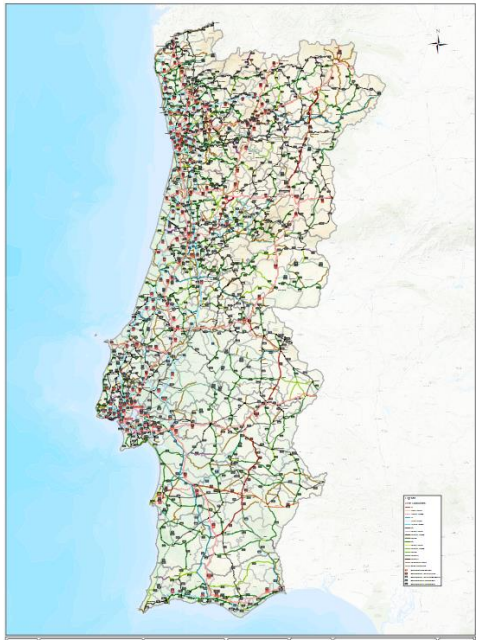
Aligned with the decarbonization objectives of the Portuguese economy in 2030/2050 and with the reduction of social economic costs that guide national and European policies

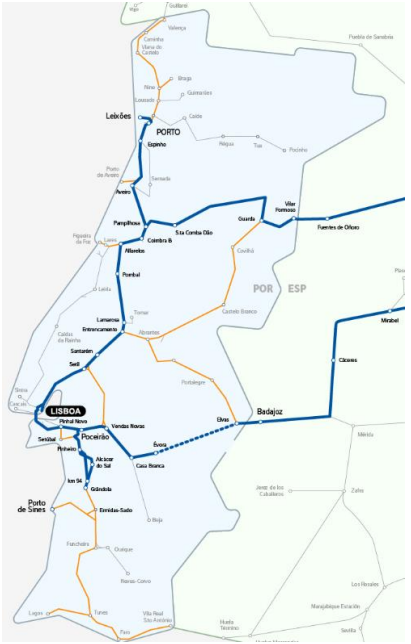
scope

PRIAC will cover the existing and projected rail and road network (-2030)

- Existing rail network: 2 600 km
- Projected rail network: 3 015 km

- Existing road network: 15 050 km
- Projected road network: ≈ 15 050 km





AXIS/CHAPTER	MAIN CONTENTS TO BE DEVELOPED
CLIMATE RISK ASSESSMENT	1. Evaluation of climate scenarios 2. Identification and selection of critical infrastructures; 3. Identification of relevant climate hazards for IP networks 4. Climate Risk mapping of IP networks on IP GIS 5. Benchmarking of costs and impacts including other European transport authorities
INFRASTRUCTURE RESILIENCE	1. Systematic monitoring of climate related incidents on networks 2. Identification of climate hotspots 3. Integration of above data in IP GIS platform 4. Future climate impacts assessment on critical infrastructure
DESIGN AND CONSTRUCTION	1. Integration of climate risk assessment for all new investment projects 2. Review of design regulations/standards to ensure climate change resilience 3. Systematization of adaptation measures in IP projects 4. Study and development of more climate resilient materials and products
MAINTENANCE AND OPERATION	1. Adaptation of maintenance to climate change (existing O&M contracts) 2. Adaptation of pavements to drought and temperature increase 3. Adequacy of traffic management systems to extreme weather events 4. Monitoring and development of alert and information systems for users in case of extreme weather events (occurrences, alternative routes, etc.)
ASSET MANAGEMENT	1. Adaptation of inspection cycles and activities to climate change 2. Development of degradation models of structures and predictive maintenance solutions

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PRIAC´s METHODOLOGY

methodology

The methodology proposed for carrying out the Plan is based on official documents published by JASPERS and by the European Commission, respectively:

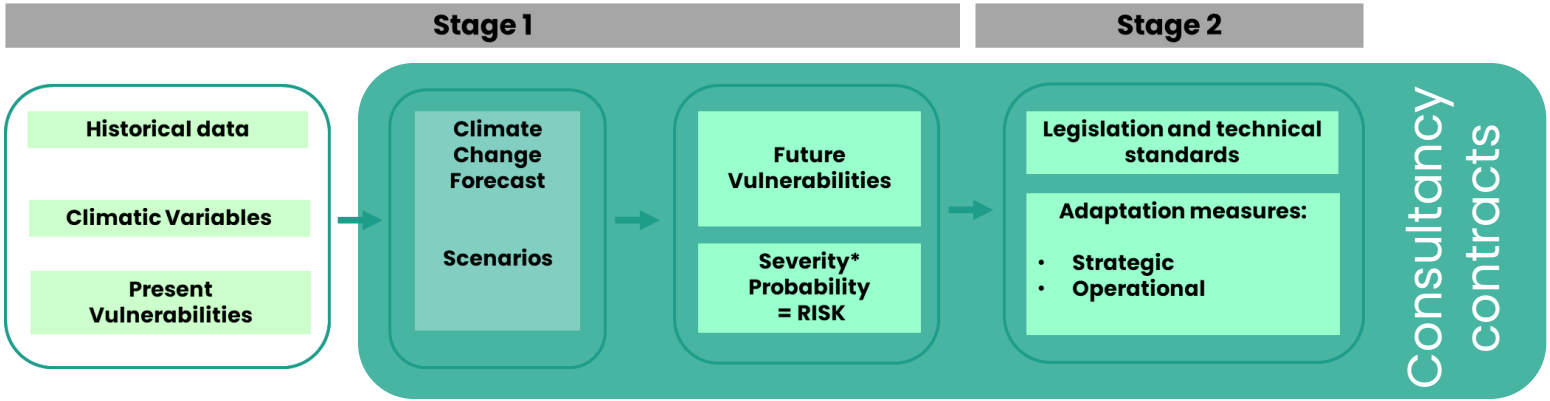
- JASPERS, 2017, Guidance Note, The Basics of Climate Change Adaptation Vulnerability and Risk Assessment

- European Commission, 2021, Technical guidance on the climate proofing of infrastructure in the period 2021-2027

For the development of PRIAC IP has also the support of JASPERS.

methodology

- PRIAC will be carried out in two stages:
  - Stage 1, will encompass current and future climate change vulnerability and risk analysis of the infrastructure from a technical and socioeconomical perspective
  - Stage 2, according to the findings of Stage 1 - will examine necessary adaptation measures, the implementation and monitoring plans, and financial aspects (including proposing, as relevant, resilient investment programs),



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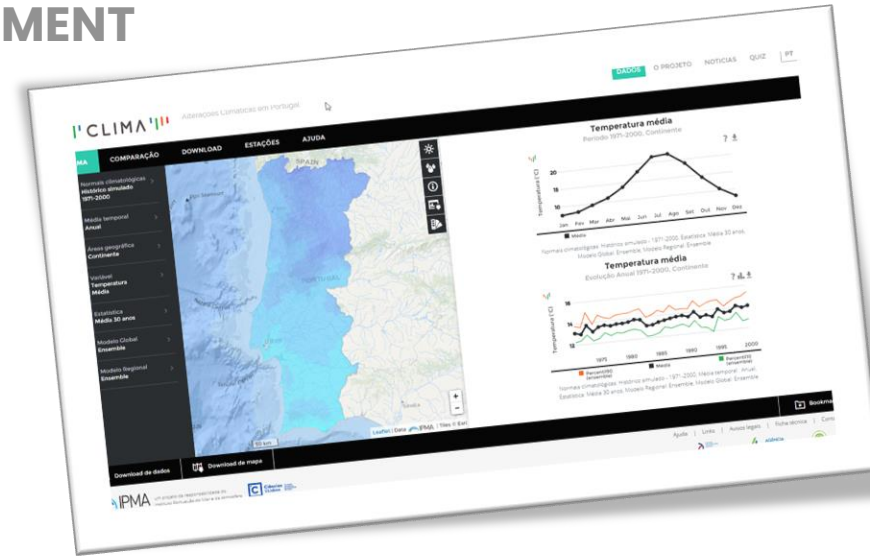
STAGE 1 – CLIMATE CHANGE VULNERABILITY ASSESSMENT

methodology

CLIMATE CHANGE VULNERABILITY ASSESSMENT

1. Current climate vulnerability based on available registered data
2. Future vulnerabilities, based on available climate scenarios



		Exposure		
		Low/No Exposure	Medium	High
Sensitivity	Low/No Sensitivity			
	Medium			
	High			

Sensitivity x
Exposure = Vulnerability

→ Subsequent Risk Analysis

methodology

RISK ASSESSMENT MATRIX

Probability / Severity		Rare	Unlikely	Possible	Likely	Almost Certain
		1	2	3	4	5
Insignificant	1	1	2	3	4	5
Minor	2	2	4	6	8	10
Moderate	3	3	6	9	12	15
Major	4	4	8	12	16	20
Catastrophic	5	5	10	15	20	25

1-3	Negligible Risk
4-6	Low Risk
7-10	Medium Risk
11-17	High Risk
18-25	Extreme Risk

Probability x Severity = Risk

High and extreme risk (orange and red color) require implementation of strategies and operational adaptations measures.

Monitoring is of equal importance.

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PRELIMINARY CONCLUSIONS

preliminary conclusions

- PRIAC´s stage 1 – Concluded - The main risks in the infrastructures under IP management have been identified and presented in GIS
- PRIAC's Stage 2 – On going (2023/2025)

- PRIAC must be articulated with other plans of similar nature, on a regional and national basis

After PRIAC´s…

- Implemented measures will have to be periodically evaluated and adjusted to the needs, respecting the life cycle of assets in the road and rail networks…

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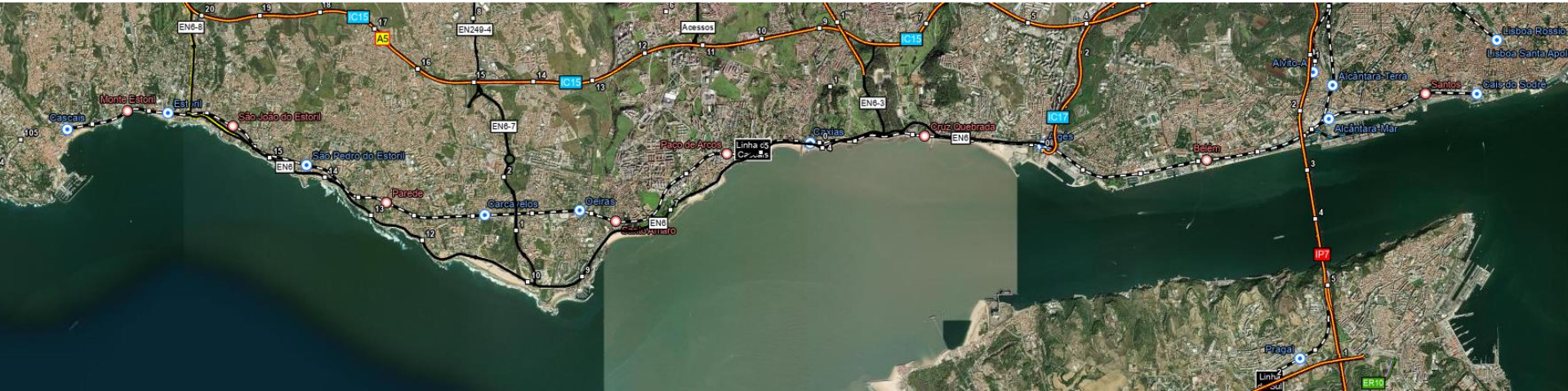
CASCAIS RAILWAY LINE

location

Cascais Line, between Cais do Sodré and Cascais



framework and objectives

- Identify risks associated with climate change
- Propose adaptation measures
- Establish itself as a management and decision-making support tool
- Promote adaptive management

synthesis of risk assessment

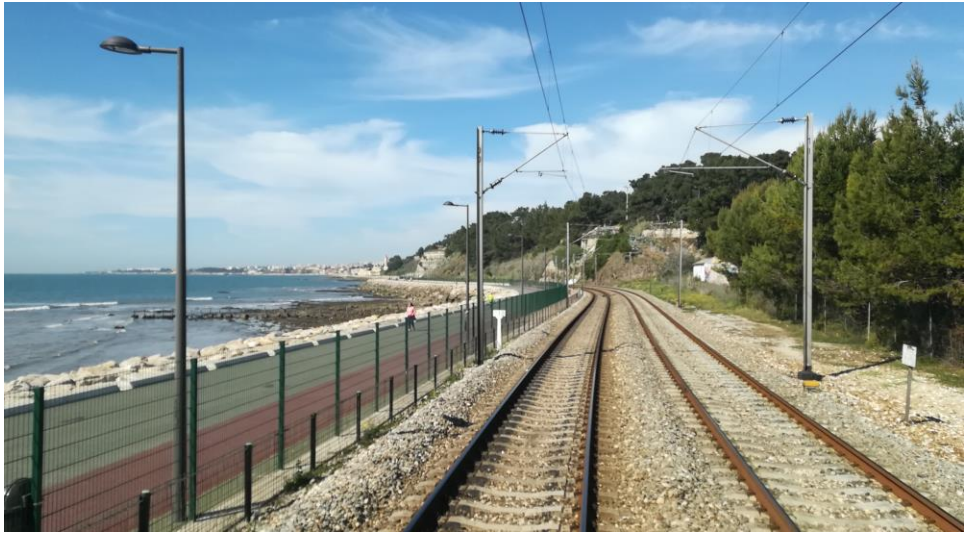
Severity \ Probability		Rare 1	Unlikely 2	Possible 3	Likely 4	Almost Certain 5
Insignificant	1			Fog		
Minor	2		Landslide	Extreme temperatures (maximum)		
Moderate	3		Maritime flooding / Fluvial and rain floods	Extreme winds		
Major	4					
Catastrophic	5					

Extreme winds present a moderate risk. Landslides, extreme (maximum) temperatures, sea/river flooding, and rainwater flooding have a low risk, while fog poses a negligible risk.

1-3	Negligible Risk
4-6	Low Risk
7-10	Medium Risk
11-17	High Risk
18-25	Extreme Risk

Cascais railway line – Case Study

- One of the major urban transport axes of the Lisbon Metropolitan Area
- Located in a seismic risk zone → Risk of tsunamis
- Increased seismic risk due to the influence of Climate Change (https://www.publico.pt/2024/08/28/azul/noticia/alteracoes-climaticas-vao-influencia-risco-sismico-cientistas-2102184)



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INVESTIGAÇÃO CIENTÍFICA

Alterações climáticas vão ter influência no risco sísmico, dizem cientistas

O aquecimento global está a derreter as calotas de gelo, fazendo subir o nível do mar. Sismólogos alertam que a água a mais irá pressionar as falhas geológicas, o que pode adiantar ou adiar os sismos.

Nicolau Ferreira
28 de Agosto de 2024, 21:22

risk assessment conclusions

Coastal flooding:

Negligible risk

Infrastructure was built at a higher elevation → Greater resilience

Tsunamis:

High severity but very low probability

Risk = Severity x Probability → Very low risk

adaptation and climate resilience

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Adaptation measures:

- Execution / Structural Project
- Rail traffic / Operational Management
- Other Actions / Monitoring

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Obrigada
Thank you for your attention

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