

LIMA Programme

Road Construction

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NOT IF, BUT HOW



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and Construction
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Image: Munich Re

01

Introduction



Source: [Aerial view of highway interchange](#)

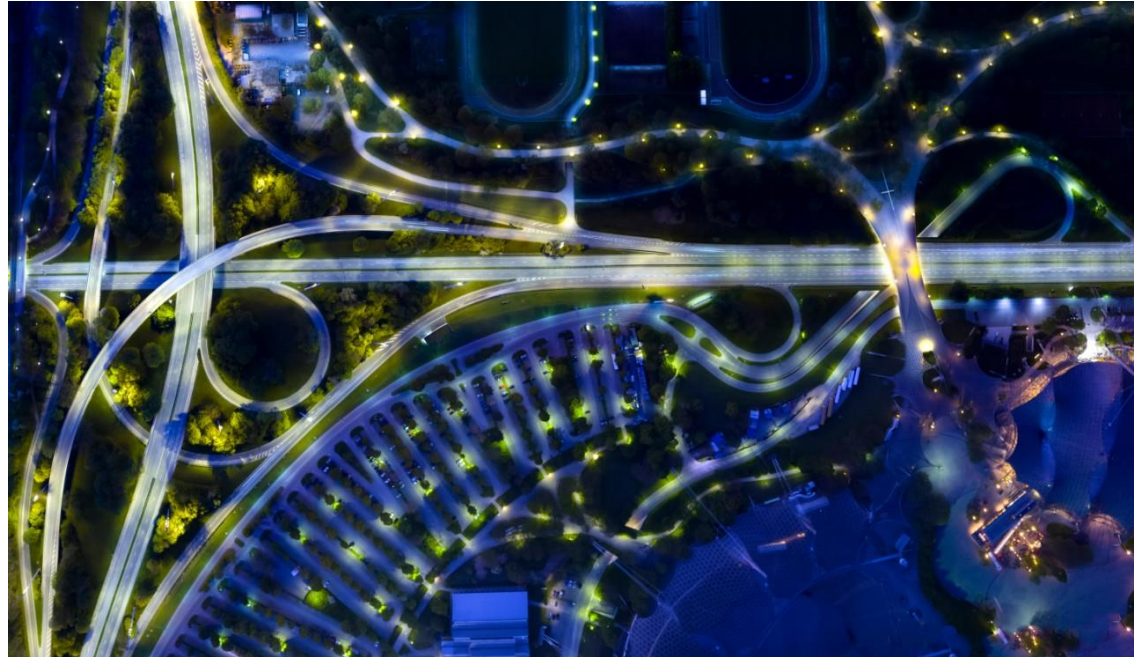
The movement of people and goods is fundamental to economic and social prosperity everywhere.

And when it comes to movement, roads are the most essential and basic form of transport there is, as they knit all other transport modes together.

They are the first and the last mile of every movement, be it of people or goods.

Source: IRU

- **Roads**
- Railways
- Bridges
- Tunnels
- Water supply
- Sewer
- Electrical Grids
- Telecommunication
- Airports
-



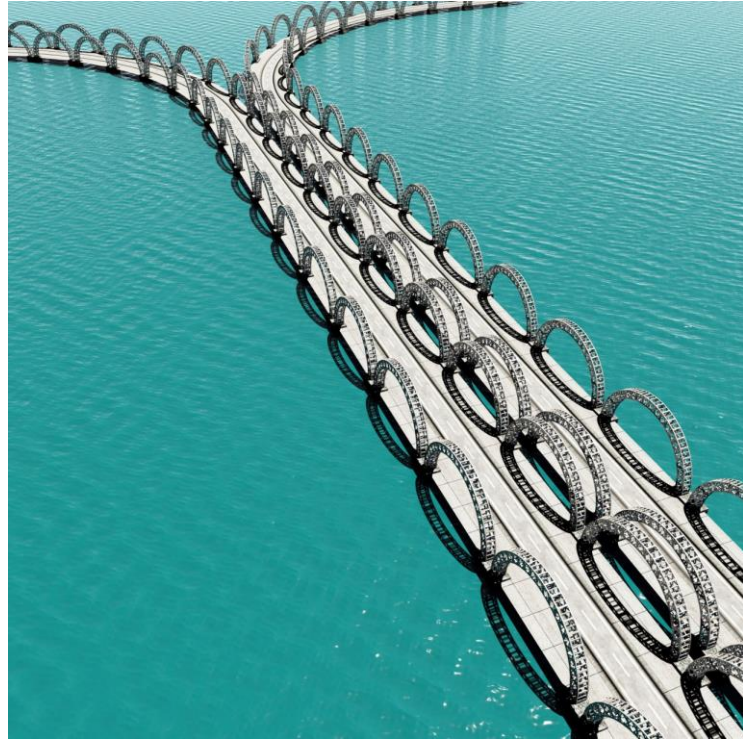
Source: [Malorny / Getty Images](#)

Introduction

Project and Insurance set-up

- **Public investment**
- **Public Privat Partnership (PPP)**
- **Privat investment**

- **Owner controlled**
- **Contractor controlled**



Source: nicholashan / iStockphot



Image: Munich Re

01

Technical Details and Construction Methods

Technical Details and Construction Methods

Development and Special Features

- Complex structures often including tunnels, bridges, water management systems, etc.
- Linear projects over long distances
- Roads are directly connected to the ground / surface
- Large amounts of earthworks possible
- Highly exposed to weather, climate and natural hazards
- Very machinery intensive construction method (Fire Exposure)
- Logistical challenge – Supply of material and equipment.
- Can be exposed to public traffic

Similar for Railway lines and Runways

Technical Details and Construction Methods

Types of construction

Gravel
Road

Cobble-
stone
Pavement

Concrete
Pavement

Asphalt
Pavement

Technical Details and Construction Methods

Types of construction

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How to build a road ? - Construction steps

- **Investigate**: actual locations of pipes / supply lines (known/unknown)
- Preparation of construction / **site clearance**
- Removal of top soil
- **Earthworks**, cuttings and sloping
- Putting **drainage** in place
- Compaction of sub base if required **soil improvement** or exchange
- Placing of **frost protection layer / sub base**
- Placing of **base course**
- Placing of **wearing course**

Technical Details and Construction Methods

Design and Construction

Optimum moisture content



Source: [shutterstock.com/image-photo/complex-detailed-sand-castle-on-beach](https://www.shutterstock.com/image-photo/complex-detailed-sand-castle-on-beach)

Oversaturation



Source: [Huge hillside collapses, covers Formosa Freeway](#)

Substructure – earthwork / supporting structure

- Ground soil / sub base / cuttings / embankments
- Water drainage
- Soil improvement (grouting) / stabilization / exchange
- Embankment

Similar to railway tracks and airport runways

Superstructure – base course, covering, wearing course, paving

- Frost protection layer
- Base course
 - Gravel, crushed stones
 - Asphalt or concrete layer
- Wearing course
 - Binding course - asphalt or concrete layer
 - Stone sett (block) pavement including bedding / cobble pavement

Technical Details and Construction Methods

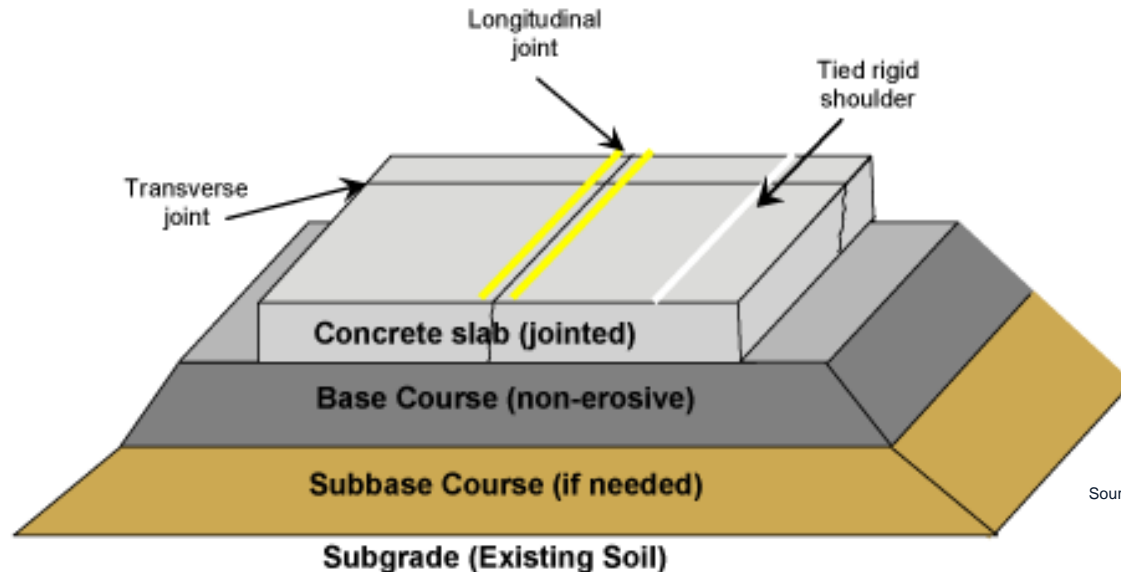
Design and Construction

Cross section of a Highway – Asphalt Pavement

Technical Details and Construction Methods

Design and Construction

Cross section of a Highway – Concrete Asphalt Pavement



Source: The Constructor



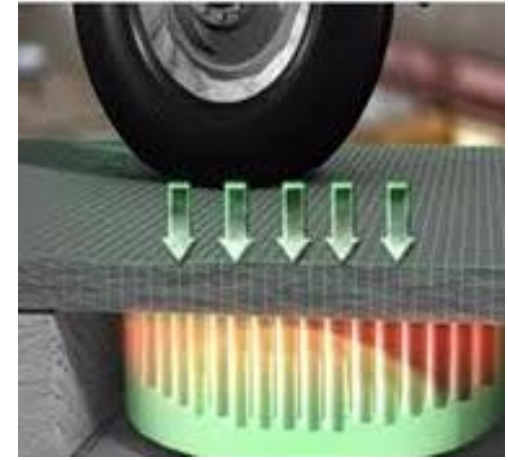
Source: The Constructor

Automated Construction Equipment



Source: ailwayfx / stock.adobe.com

Intelligent Transport Systems (ITS)



Source: Innovatech

Piezoelectric roads



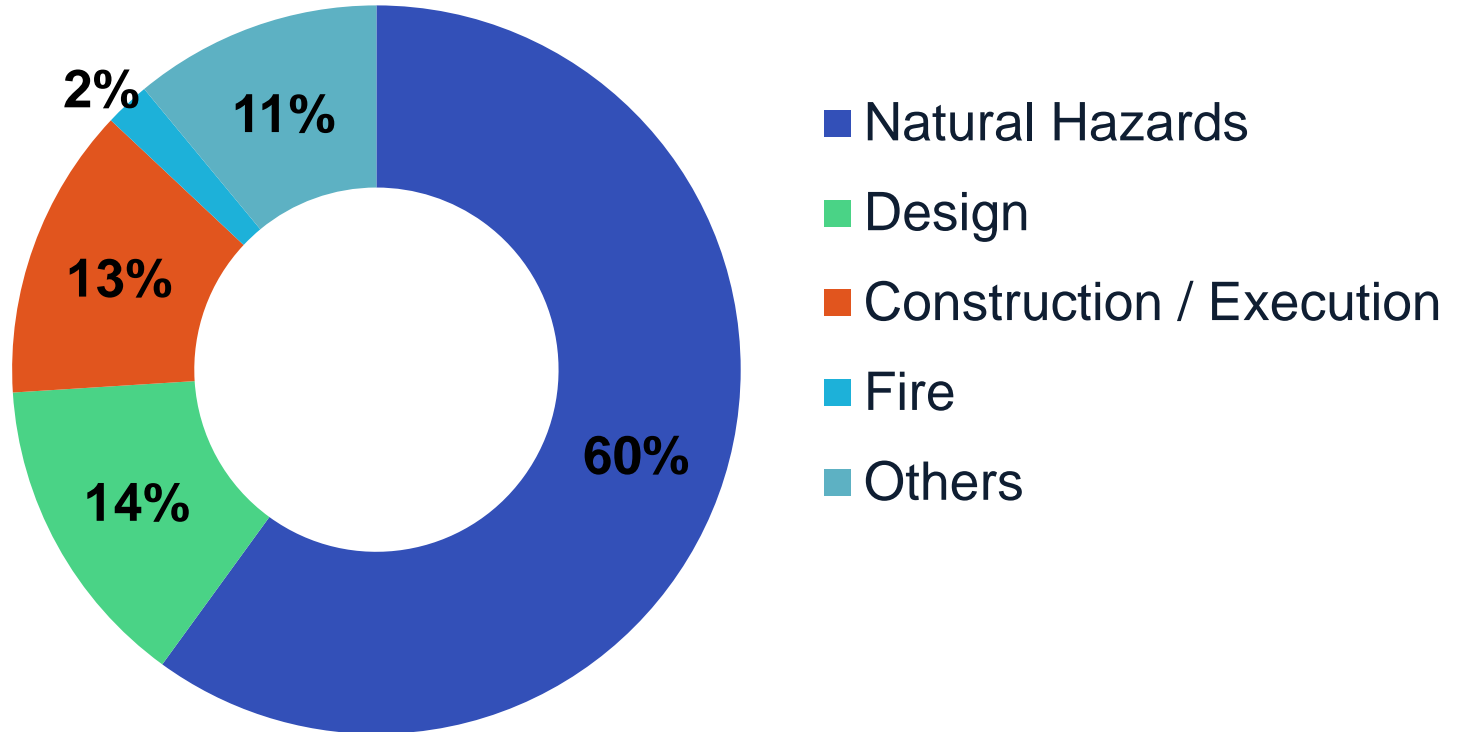
Image: Munich Re

03

Major Challenges and Loss Examples

Major Challenges and Loss Examples

Main Exposures / Hazards



Major Challenges and Loss Examples

Main Exposures / Hazards

Natural Hazards

- Flood / Inundation / Heavy Rainfall
- Hurricane / Typhoon / Windstorm / (Sand and other materials)
- Earthquake
- Tsunami (Close to coast)

Major Challenges and Loss Examples

Loss Examples



Flood in Germany

Source: [Germany's Ahr Valley floods in summer 2021](#)

Major Challenges and Loss Examples

Loss Examples



Earthquake in Japan

Source: [Earthquakes strike Ecuador and Japan](#)

Major Challenges and Loss Examples

Loss Examples



Source: Chile is recovering from the disaster. There are already over 700 dead

Earthquake in Chile

Major Challenges and Loss Examples

Loss Examples



Source: 2010 Chile Earthquake

Earthquake in Chile

Major Challenges and Loss Examples

Loss Examples



Hurricane Jeanne, Florida

Source: [Hurricane Jeanne](#)

Major Challenges and Loss Examples

Loss Examples



Cyclone Gonu, Oman

Source: [Cyclone Gonu, 2007](#)

Major Challenges and Loss Examples

Loss Examples



Cyclone Gonu, Oman

Source: [Oman's Qurum-Al Sarooj beach road, badly damaged by Cyclone Gonu.](#)

Major Challenges and Loss Examples

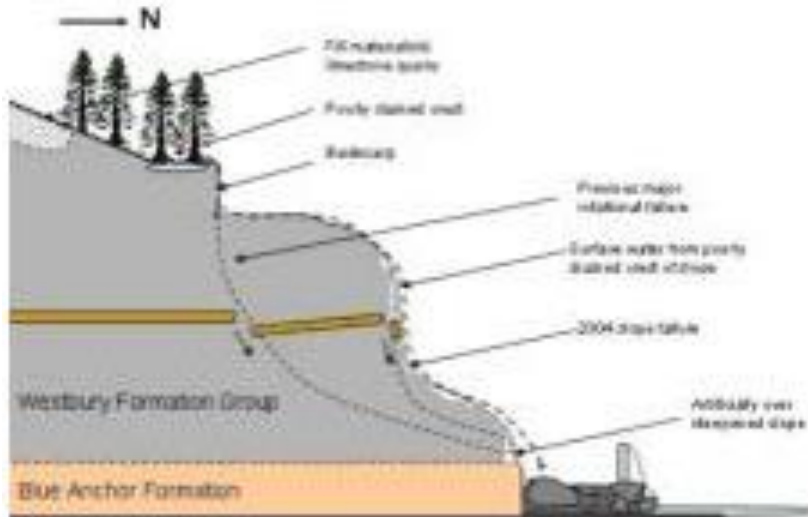
Main Exposures / Hazards

Natural Hazards

- Landslides
- Frost and heat
- Geographical and geological situation

Major Challenges and Loss Examples

Loss Examples



Source: [Landslide](#)

Major Challenges and Loss Examples

Loss Examples

Spain



Source: [Climate change impacts](#)

Brasil



Source: [Mudslide in Morro dos Prazeres, Brazil](#)

Switzerland



South Italy



Source: [Massive landslide in Italy](#)

Taiwan



Source: [Huge hillside collapses, covers Formosa Freeway](#)

Major Challenges and Loss Examples

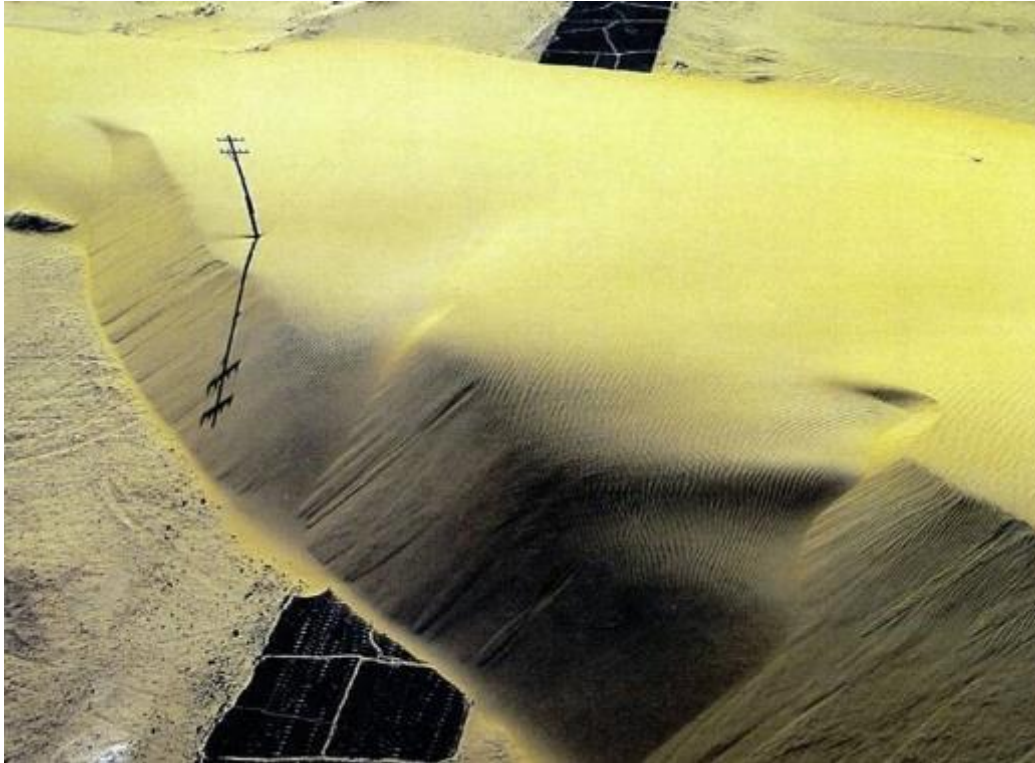
Loss Examples



Source:[Cracked black asphalt road](#)

Major Challenges and Loss Examples

Loss Examples



Source: theworldgeography.com/2012/04/beautiful-unusual-desert-image

Major Challenges and Loss Examples

Main Exposures / Hazards

Other Hazards

1. Quality of workmanship and material used
2. Lack in compaction (water content / bad workmanship / material)
3. Length of roads under construction (section limit)
4. Time schedule of construction (raining season / frozen ground)
5. Traffic during construction (TPL exposure / safety / accidents)
6. Housekeeping at construction site / Experience of construction company
7. Design – dimension of drainage
8. Fire? (site installations / stores / workshops / machinery)



Image: Munich Re

04

Underwriting

Required Information:

1. SI (Sum Insured) / break down of SI / required scope of cover /sublimits
2. Company / description of works / construction method / type of road
3. Location and natural hazards
4. Geological situation / topography of site and surrounding area
5. Time schedule / layout of site installations
6. Design and construction companies / loss history
7. Alignment of road / layout drawings and cross sections
8. Section lengths / sections handed over after completion

Roads

Underwriting



- Climatic – rainfall, weather
- Soil/geological situation / topography of site and surrounding area
- Alignment/route of road / layout drawings and cross sections
- Section lengths / sections handed over after completion

Roads

Underwriting



- SI (Sum Insured) / break down of SI / required scope of cover /sublimits
- Description of works / construction method / type of road
- Location and natural hazards
- Time schedule / layout of site installations

Underwriting

Terms & Conditions based on what is covered

Source: [Rion - Antirion Bridge](#)



Bridges

Source: [Highway](#)



Roads



Source: [Mountain road tunnel](#)

Tunnels



Source: [Water dam, Austria stock photo](#)

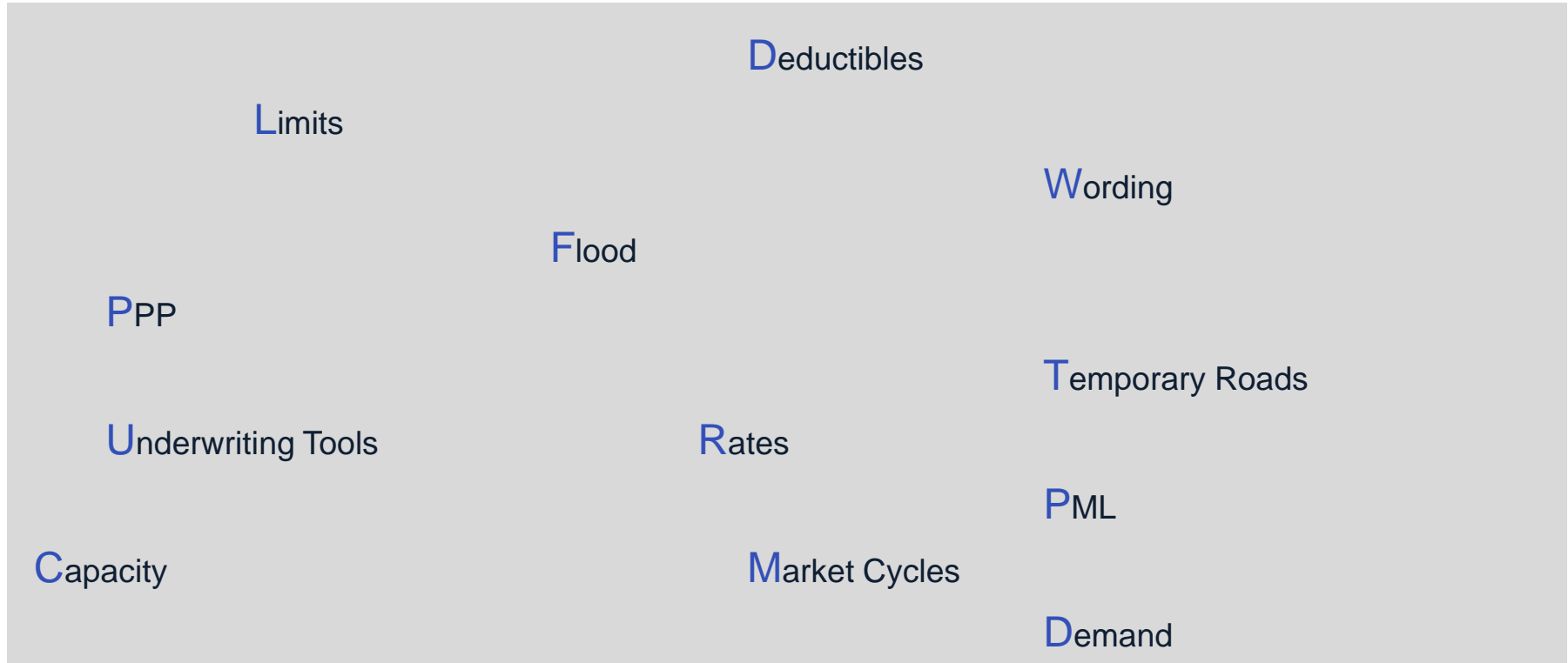
Dams

MR Policies and Endorsements

Most important Endorsements	CPI	CAR	CEAR
1. Time Schedule/deviations		Endo 1260	Endo 005 Endo 14005
2. Section Limit	Endo 1248	Endo 106	Endo 14106
3. Underground services and facilities	Endo 1262	Endo 102	Endo 14102
4. Safety measures flood/inundation(20yr)	Endo 1265	Endo 110	Endo 14110
5. Open trenches, pipes, cables, etc.	Endo 1264	Endo 117	Endo 14117
6. Removal of debris from landslides(in xs)	Endo 1235	Endo 111	

Survey Reports and Site visits

1. General info
2. Executive Summary
3. Situation & Progress on Site
4. Exposures & Hazards (on site, workshops, stores, offices, etc. ...)
5. Loss prevention measures in place?
6. Recommendations
7. Pictures



Thank you for your attention!

Falko Schwaetter
Thomas Kibet

NOT IF, BUT HOW

