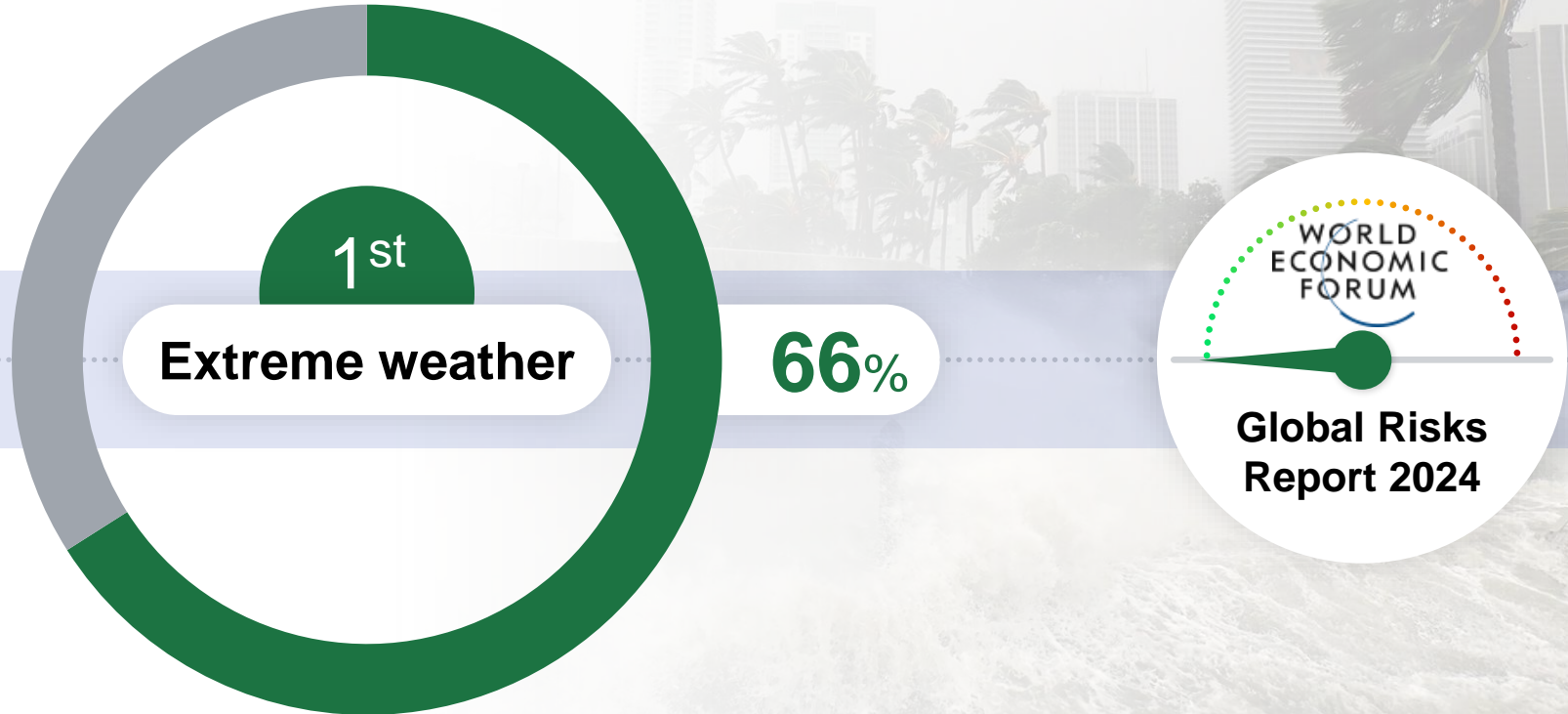


Influence of climate change on the railway industry – Risk Management from a reinsurance perspective

[Thomas Walter](#)

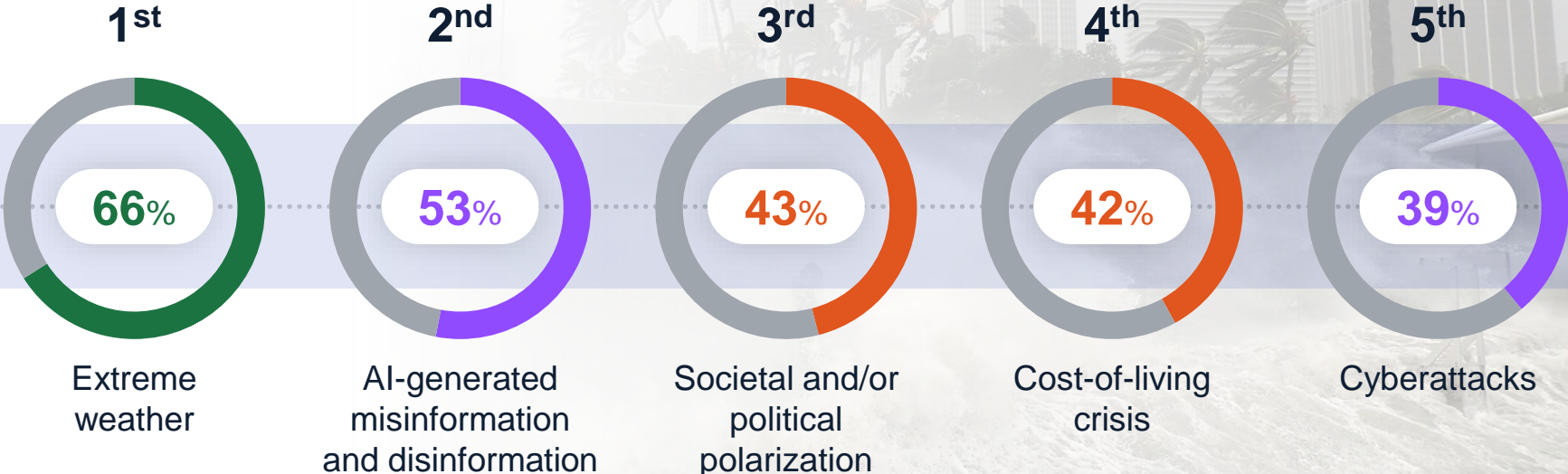
[Munich Re – Risk Management Partners](#)

Global risks 2024: Top risk

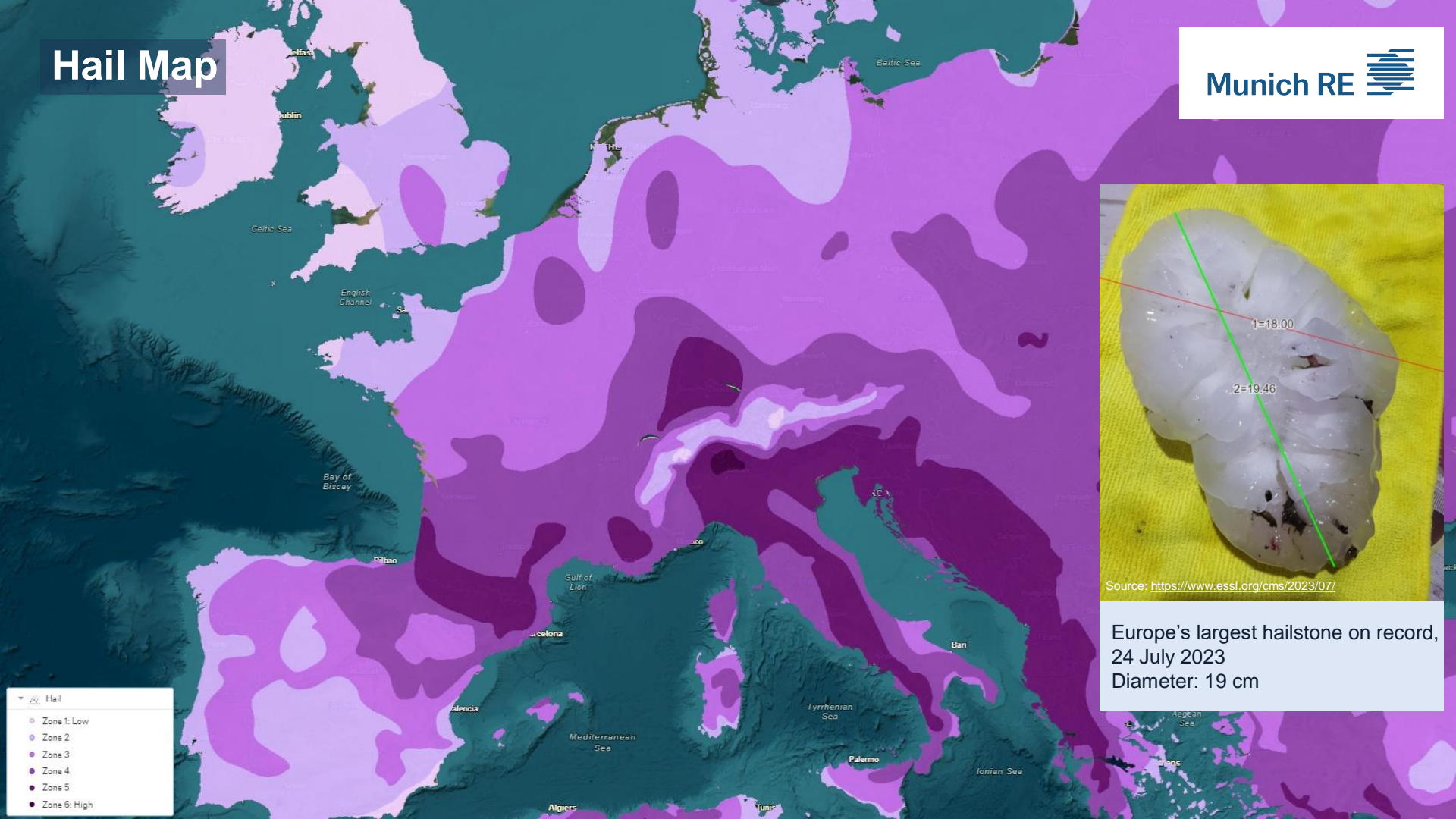


Global risks 2024: Current risk landscape

“Please select up to five risks that you believe are most likely to present a material crisis on a global scale **in 2024.**”



Hail Map

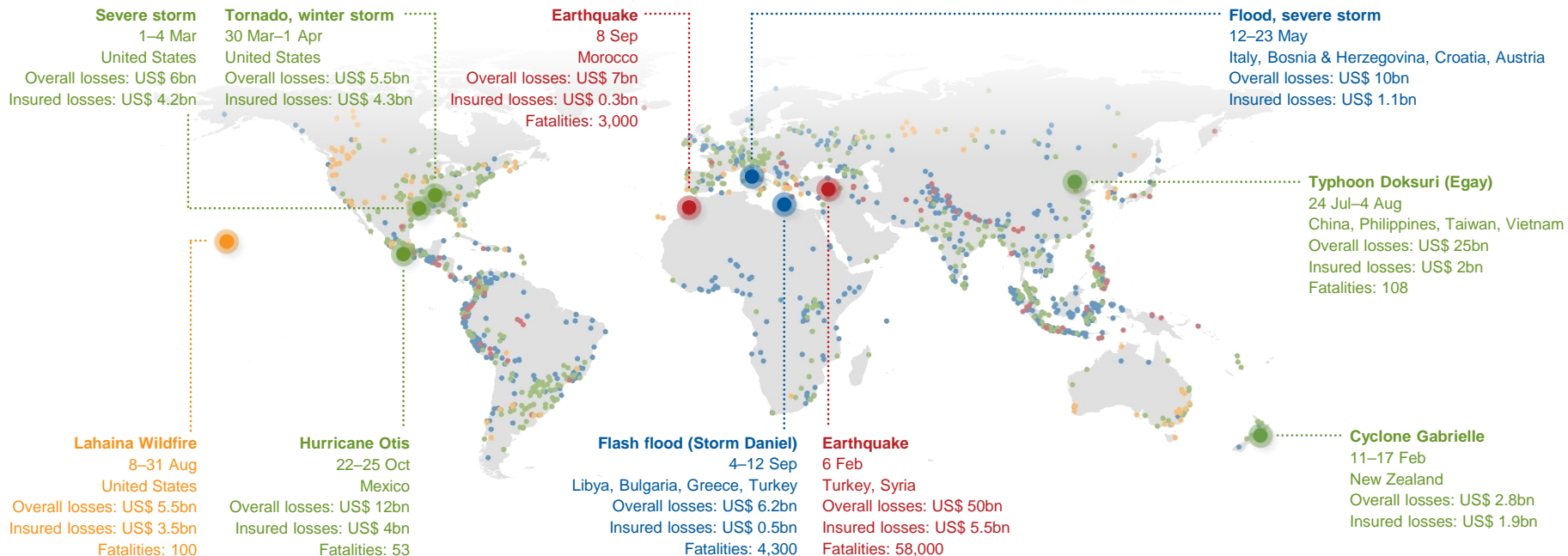



Source: <https://www.essl.org/cms/2023/07/>


Europe's largest hailstone on record,
24 July 2023
Diameter: 19 cm


Natural disaster loss events in 2023

Natural catastrophes caused overall losses of US\$ 250bn worldwide





 **Geophysical events**
Earthquake, tsunamis, volcanic activity

 **Meteorological events**
Tropical storm, extratropical storm, convective storm, local storm

 **Hydrological events**
Flood, mass movement

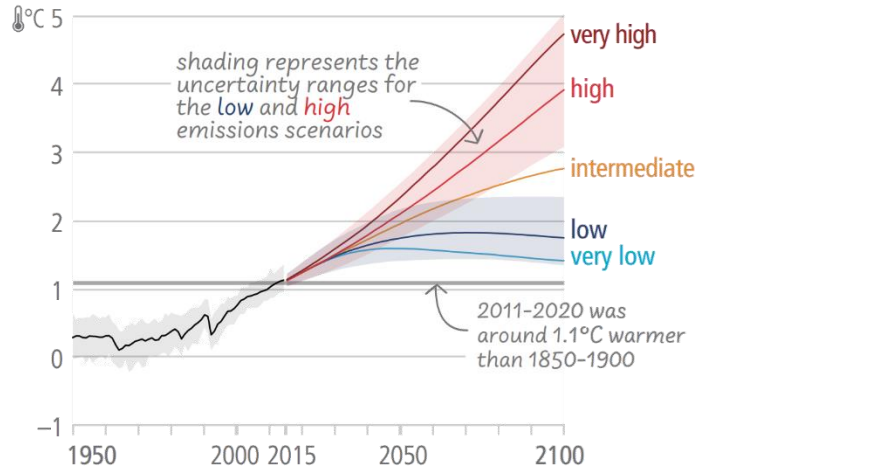
 **Climatological events**
Extreme temperature, drought, wildfire

 Significant catastrophes (based on the number of fatalities, overall and insured losses)
 All loss events (based on property damage and/or fatalities)

What does climate risk mean?

Change of Risk

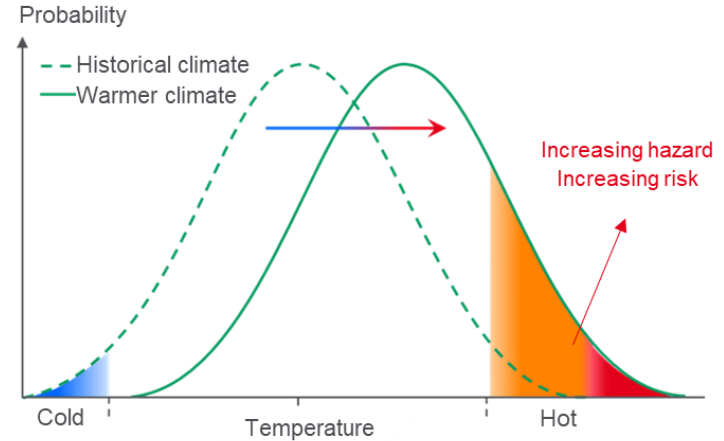
Global temperatures are increasing



Global Average Surface Temperature Change relative to 1850-1900*

*Source: IPCC 2023

A small increase in average temperatures leads to a large increase in probability of extremes



Probabilities of Extreme Weather Events Increase

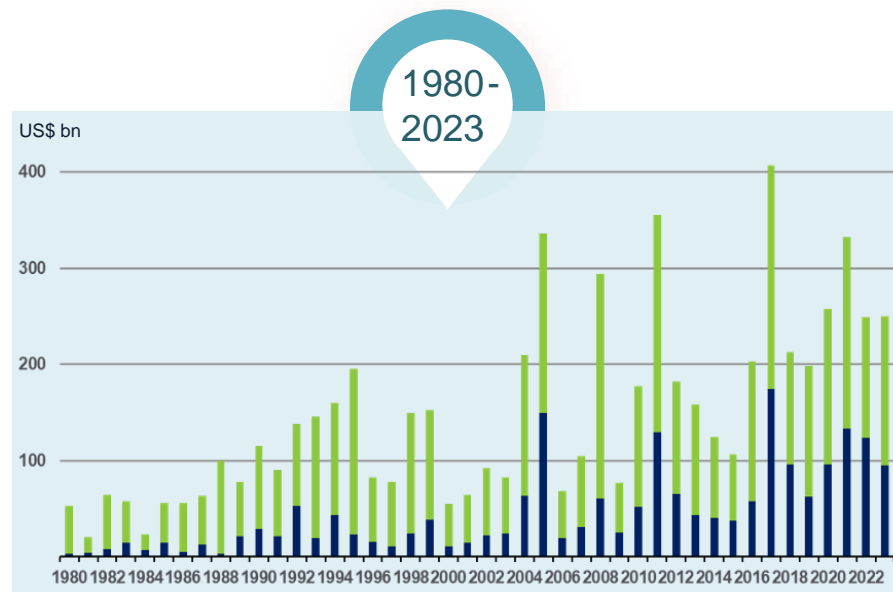
The probability of extreme (tail) weather events is significantly increased by climate change

How natural disasters and climate change affect your business

Losses caused by natural disasters across the world



Overall losses



- Overall losses (in 2023 values)
- Thereof insured losses (in 2023 values)

Inflation adjusted via country-specific consumer price index and consideration of exchange rate fluctuations between local currency and US\$.

Source: Munich Re, NatCatSERVICE, as of January 2024

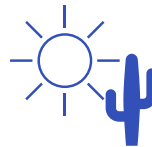
Effect of global warming: Increase in frequency and/or intensity of natural perils



More frequent
temperature extremes



Increase in wildfire
hazard



Increase in extreme
drought conditions



Sea level rise and
increase in storm
surge risk



Environments favorable to severe
thunderstorms, shifts in tornado activity and
severe hail (“Severe Convective Storms”)



Increase in frequency
and intensity of heavy
rainfall events



More intense tropical
cyclones with more rain
and higher storm surges



Longer persistence of weather
patterns due to slowdown in
west-east movement

Munich Re at a glance and our Climate journey

Munich Re in a nutshell

144

years of risk expertise*

#1

Global Reinsurer**

42,812

Employees*

€57.9bn

Insurance revenue*

Reinsurance

Munich RE



new/re



Primary Insurance

ERGO

DKV

nexible



Asset Management

MEAG

1973

MR's first global warming alert

1978

First edition of World Map of Natural Hazards

2007

Climate change defined as strategic topic → Founding Corporate Climate Centre

2011

NATHAN Risk Suite

2017

Risk Management Partners

2020

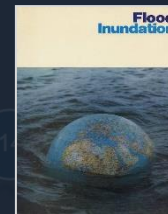
Climate Risk Analysis Tool

2022

Climate Financial Metrics

2024

Physical risk data for Reporting



* as at 31.12.2023; ** Source: Beinsure.com 2024, based on gross reinsurance premiums written

Munich Re's
Location Risk Intelligence
enables you to

**understand, measure
and manage**

risks from natural
hazards and climate
change around the world.



How railway operators are affected by climate risk



Image: Getty Images

Physical damage to railway infrastructure such as tracks, signaling, electrical systems or buildings



Image: Getty Images

Top and bottom-line financial damage caused by increased repair cost and lowered bookings



Image: Adobe Stock

Reputational damage caused by increased passenger and staff discomfort in non-air-conditioned cars or delays



Image: Getty Images

Increasing demand that operators incorporate climate resilience into reporting such as CSRD or TCFD reporting



Increase your performance by incorporating physical climate risks into decision-making and reporting

Understand

Granular assessment of risk exposure.
Identify key climate risk concentrations.



Concentration Analysis

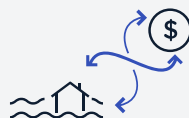


Measure

Measure the financial impact of climate change on your assets and investments for current and future scenarios.



Financial Impact



Manage

Develop solutions to manage and transfer the climate risk.



Risk Management Solutions



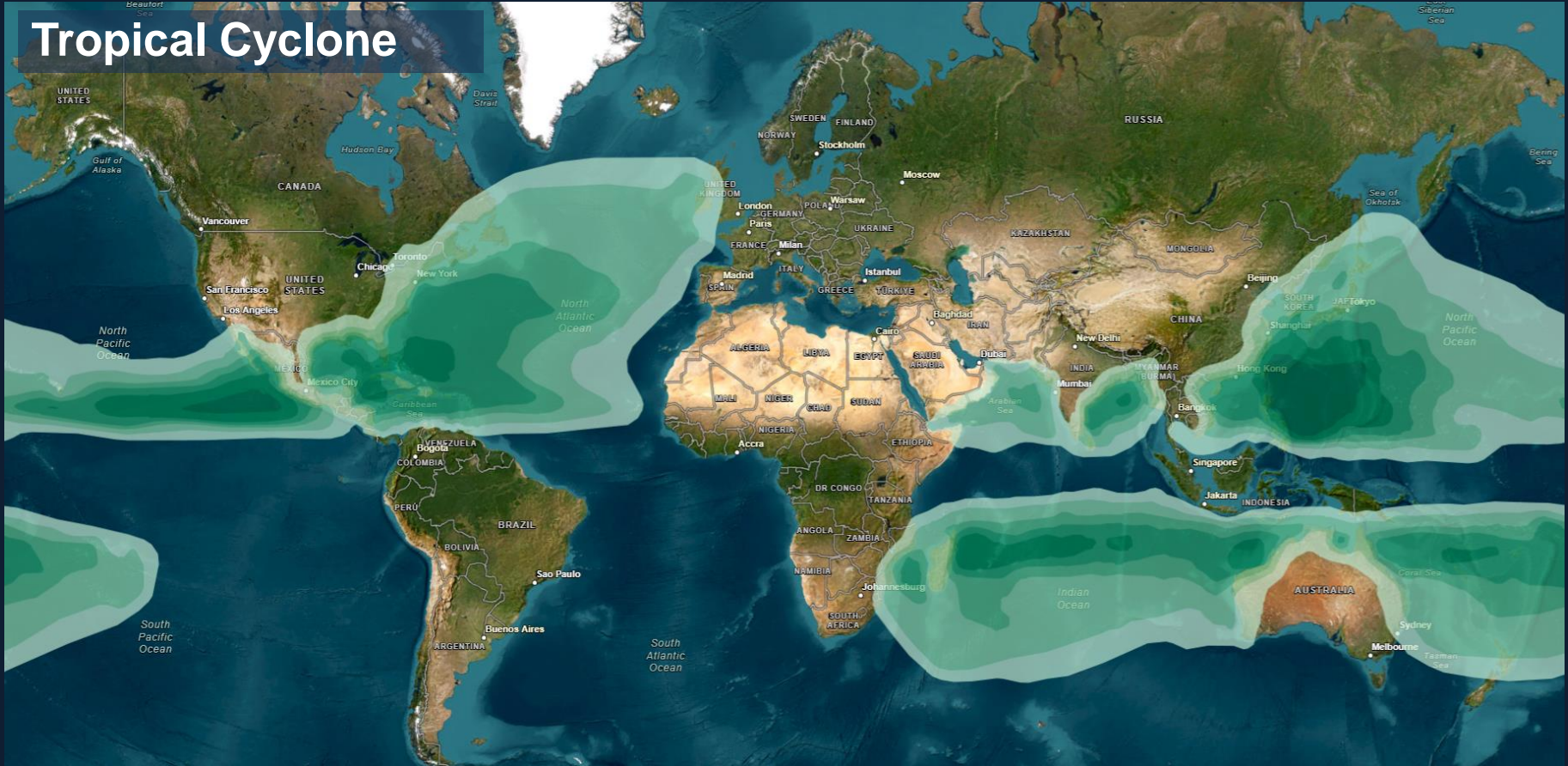
Understand

Munich RE 



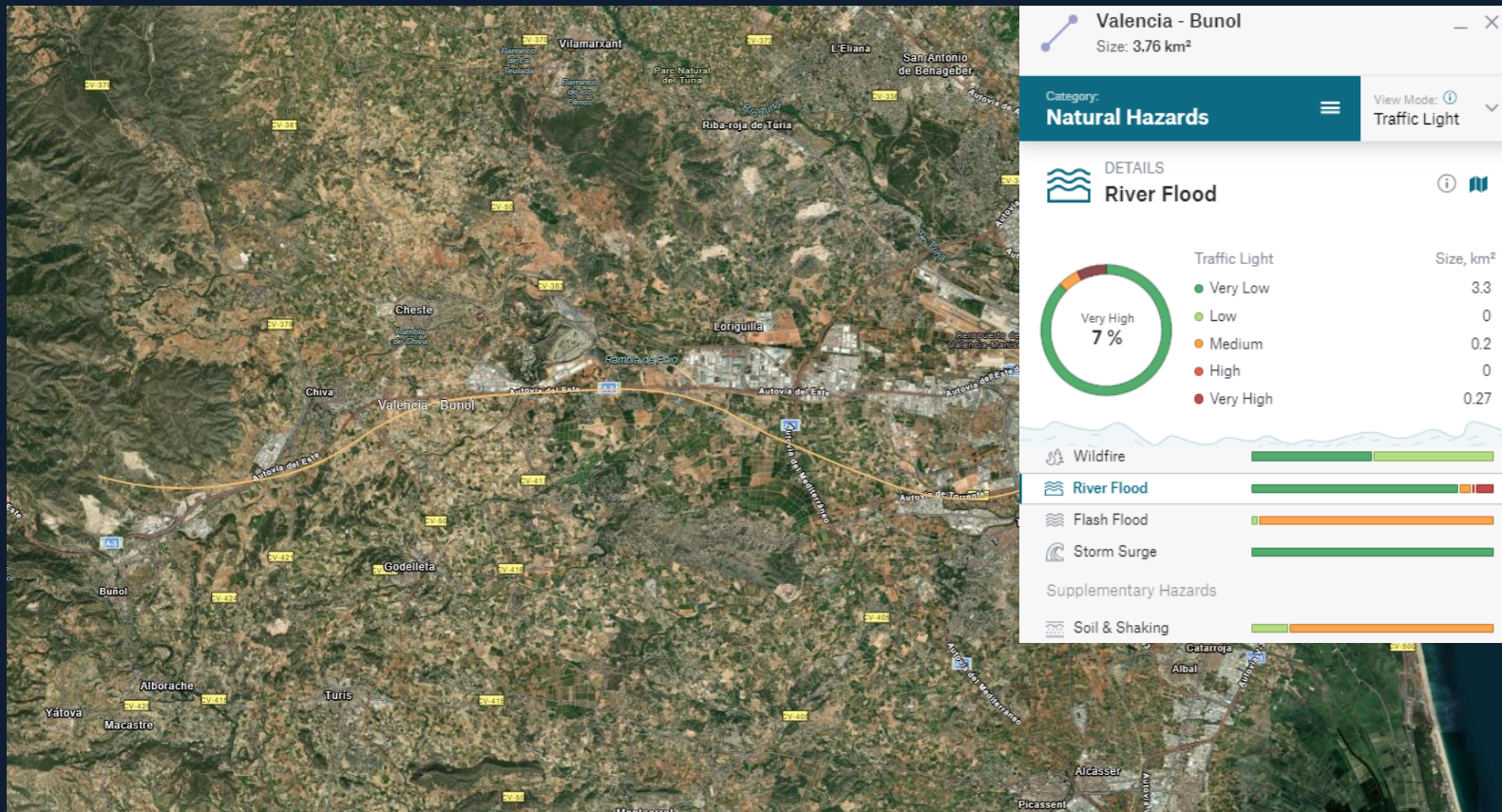
Image: Getty images

Understand the physical risk of your railway infrastructure - globally



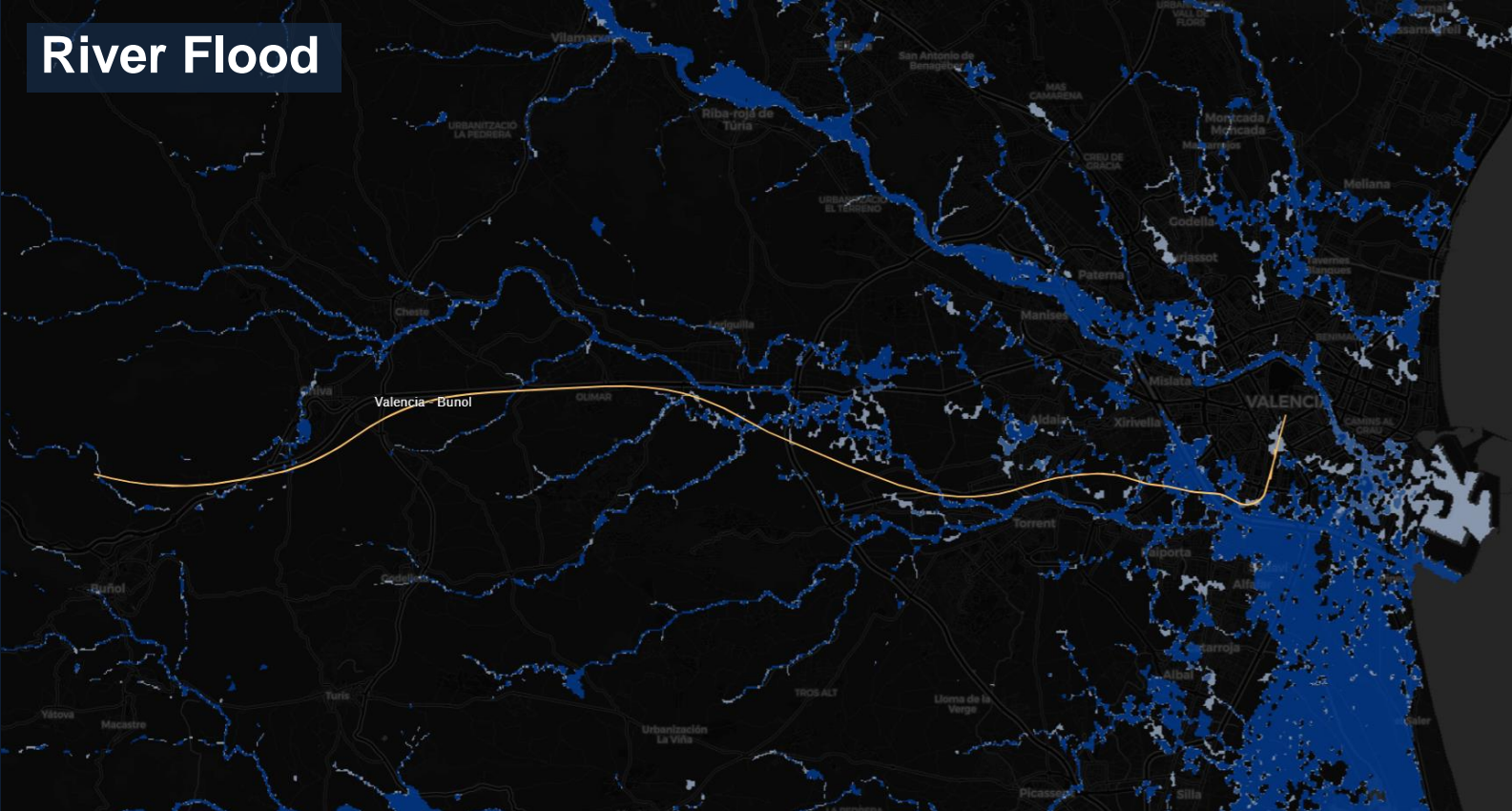
Tropical Cyclone

Understand the physical risks along your infrastructure



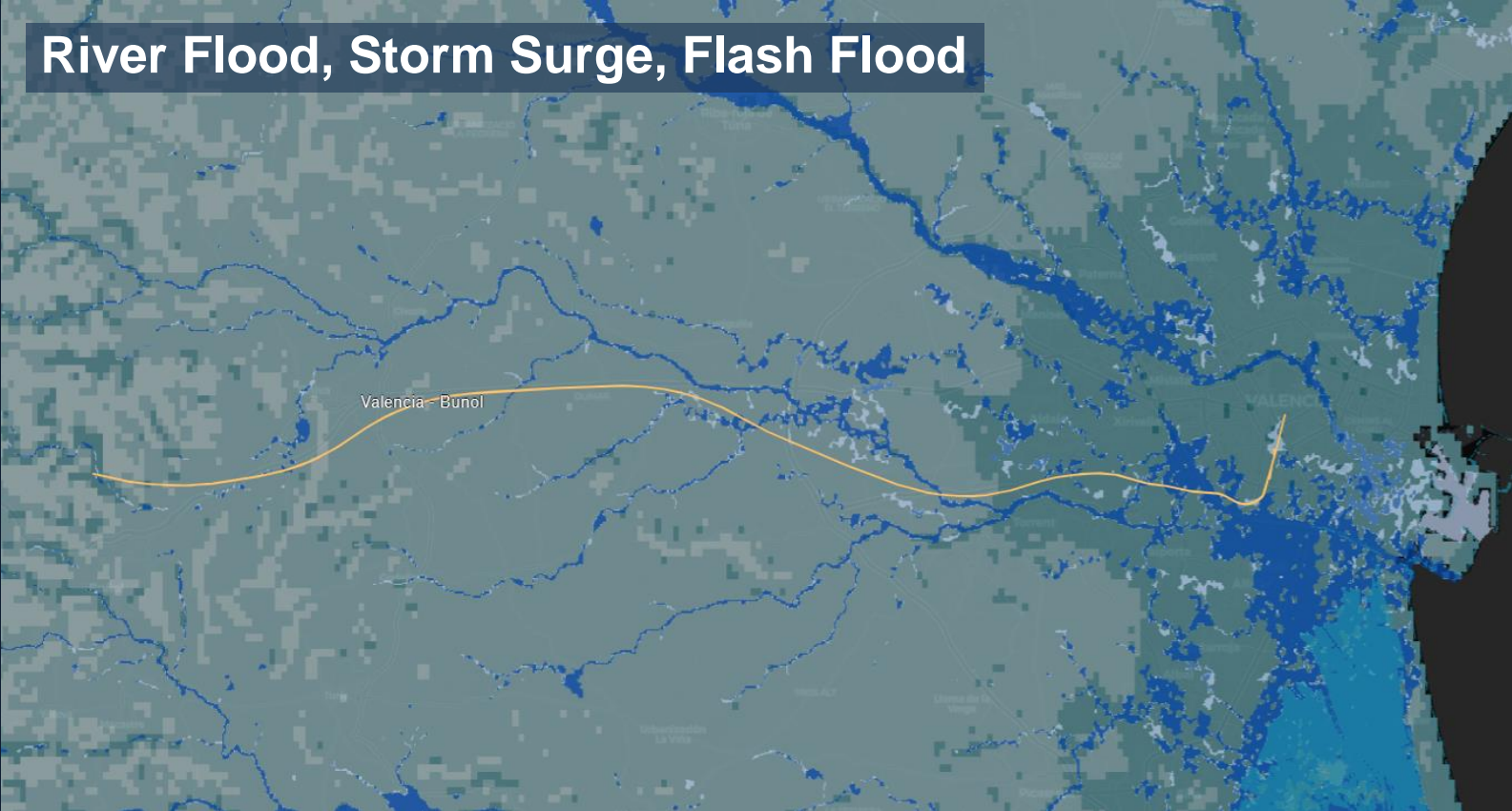
Understand the River Flood risk along your infrastructure

River Flood

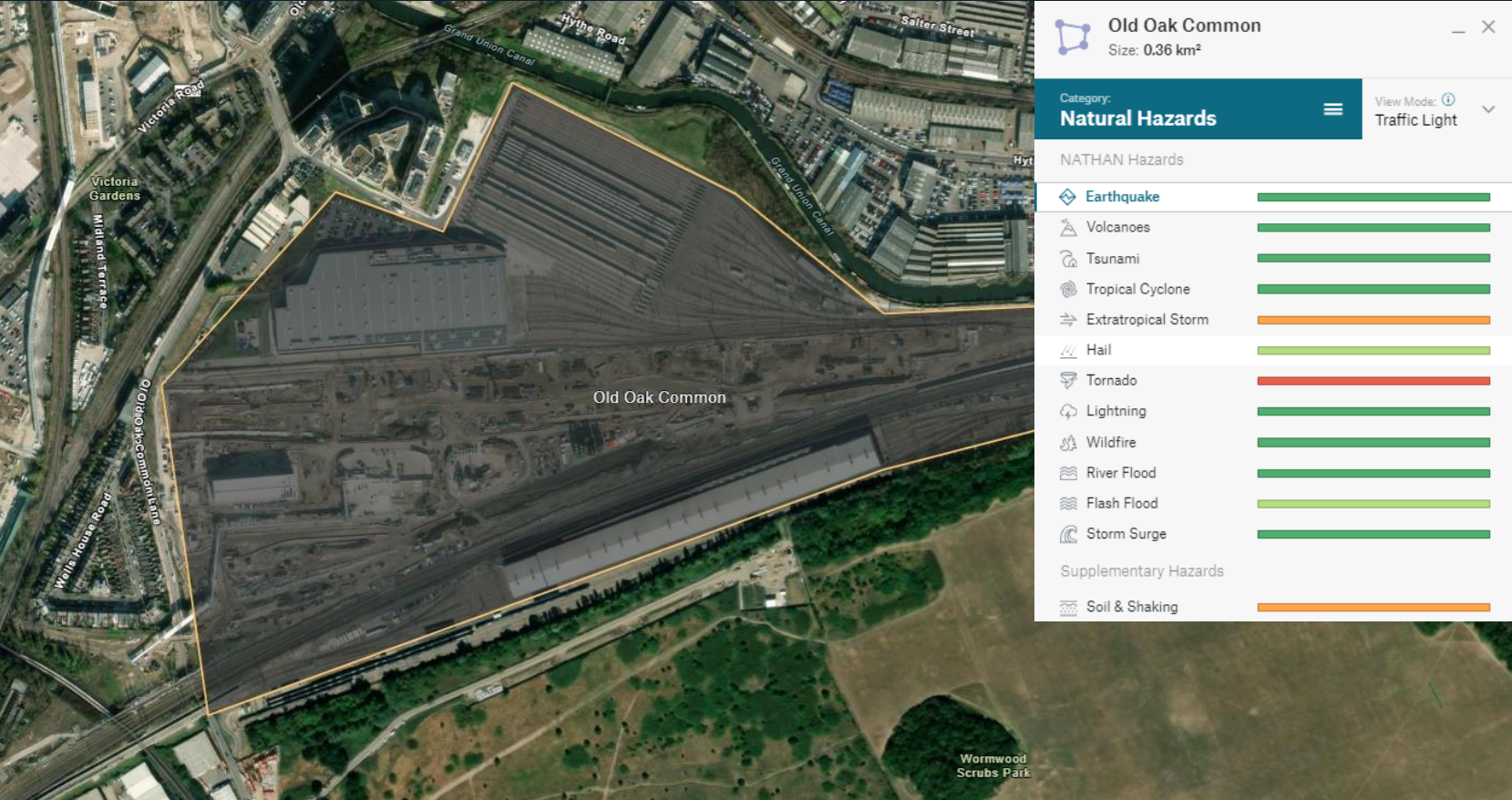


Understand the water-related risk along your infrastructure

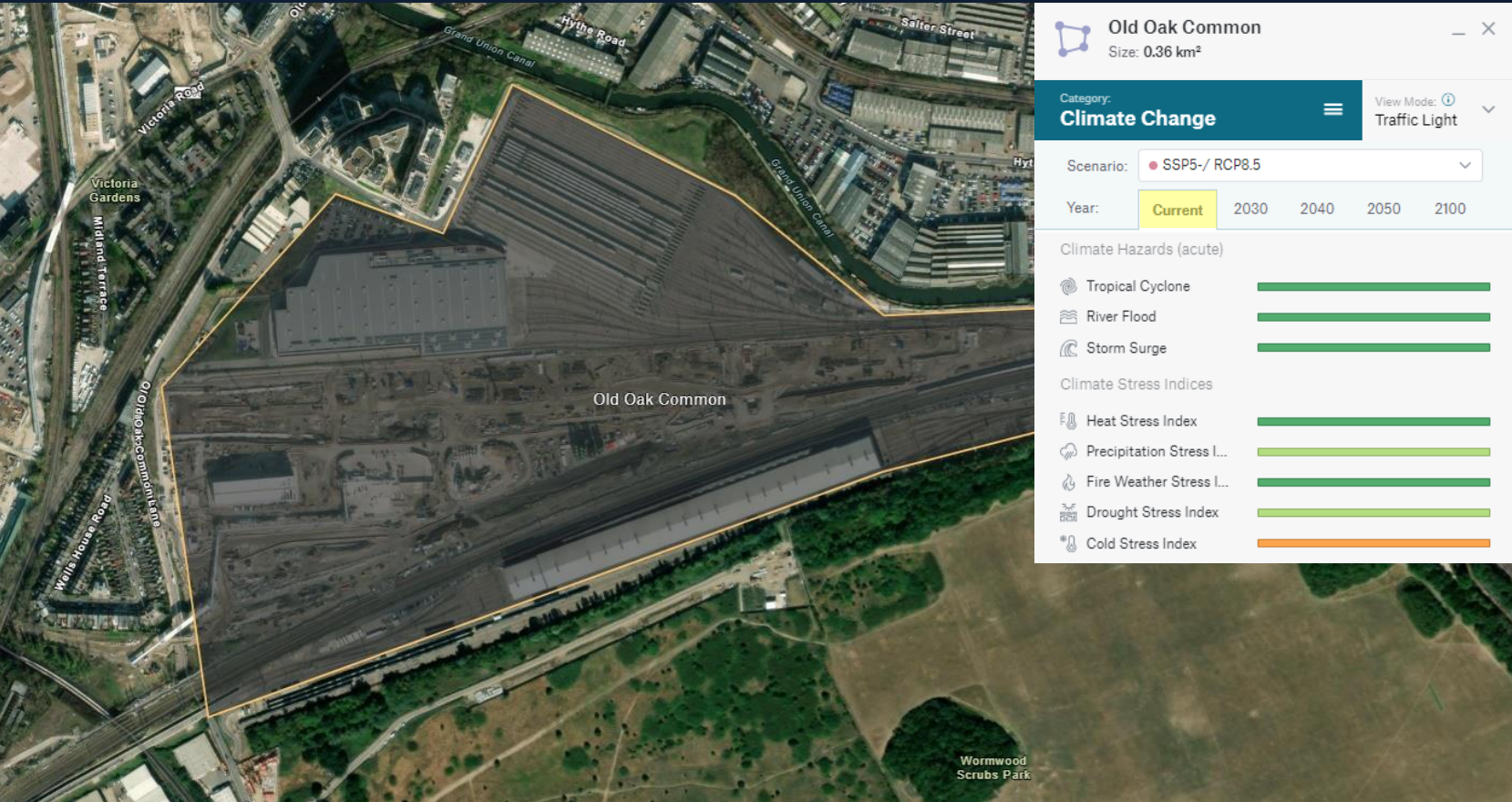
River Flood, Storm Surge, Flash Flood



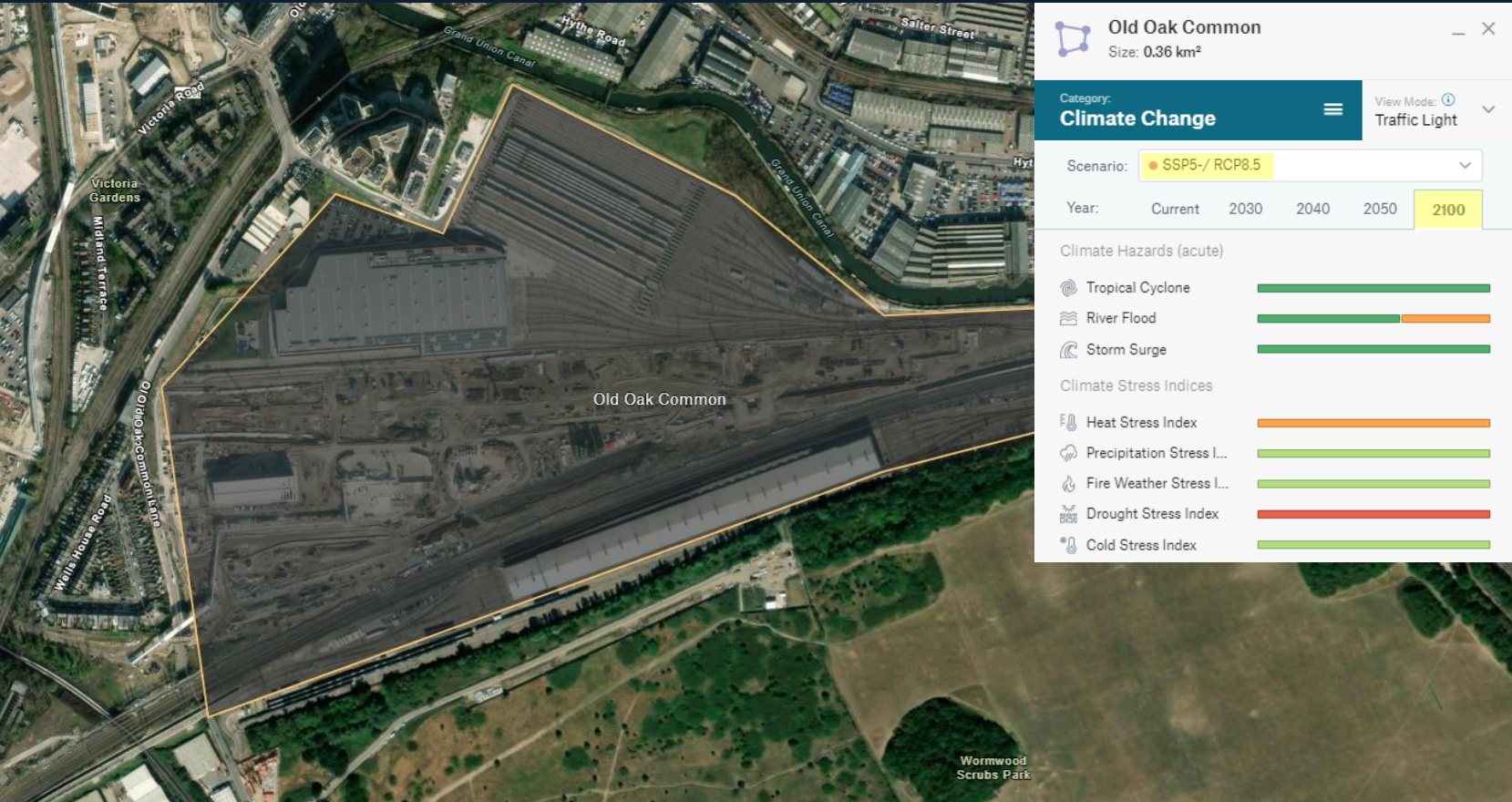
Understand the current risk exposure to entire areas



Understand the future risk exposure to entire areas

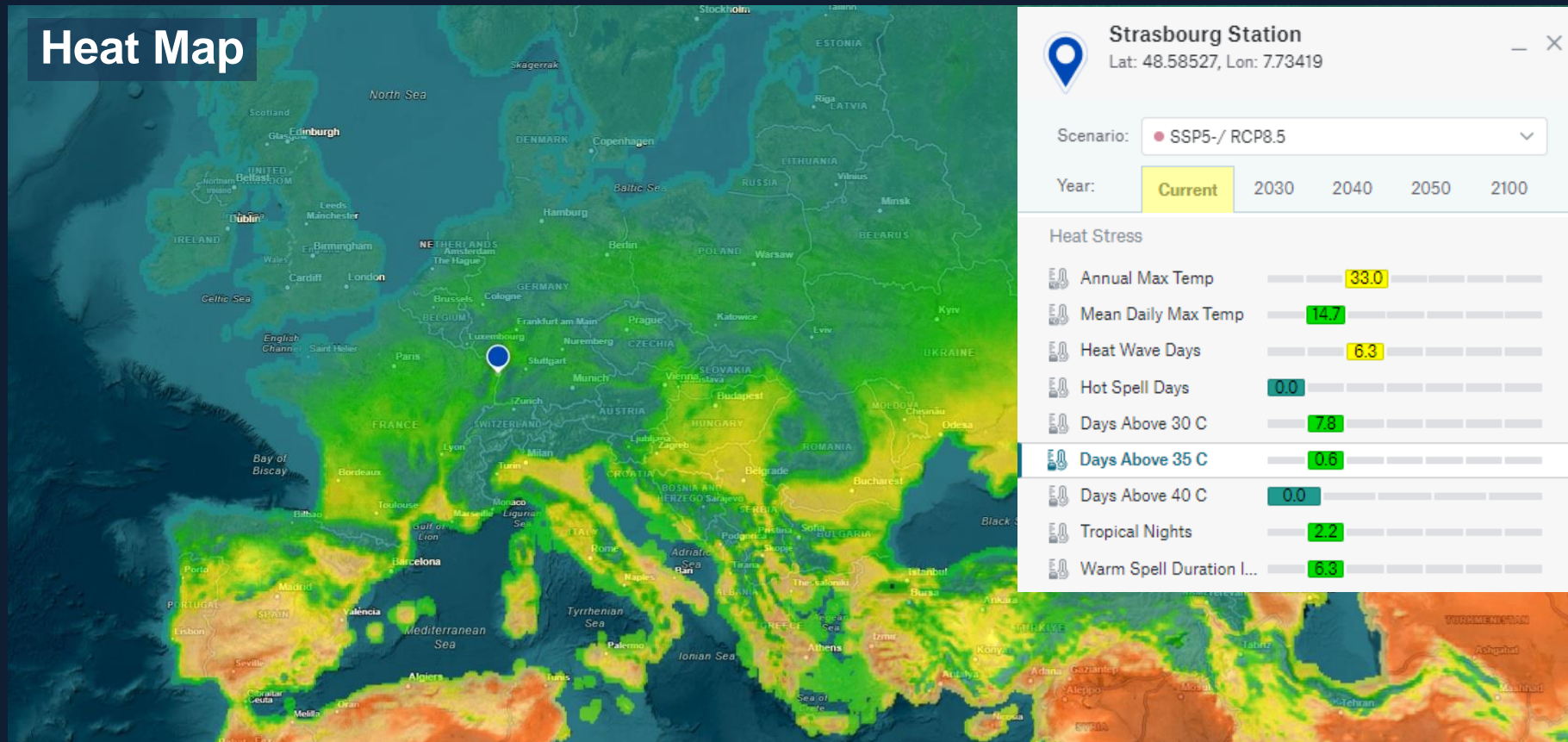


Understand the future risk exposure to entire areas



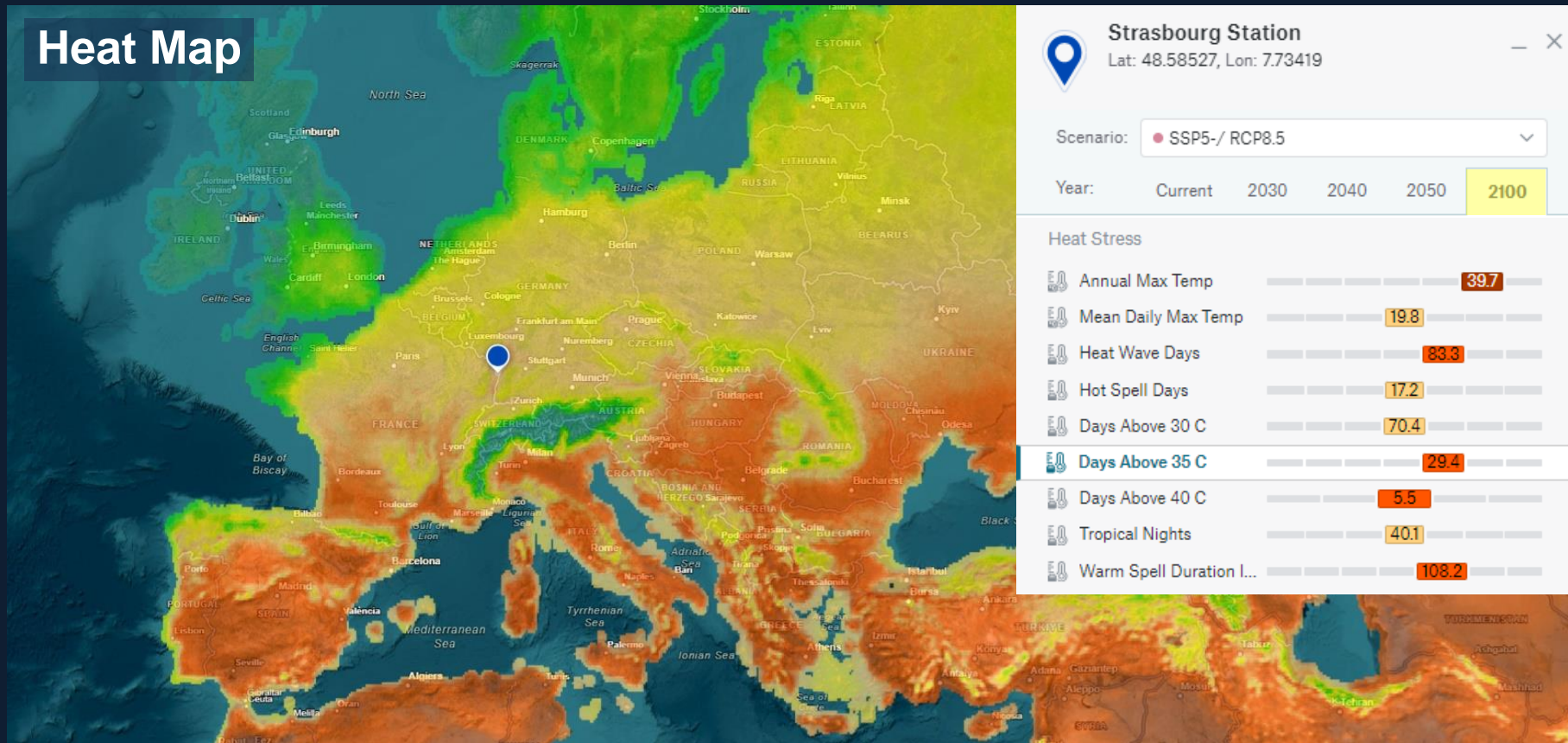
Understand the impact of heat to your infrastructure

Heat Map



Understand the impact of heat to your infrastructure

Heat Map



Measure



How to measure the financial impact of climate change



Climate Expected Loss (CEL),
indicates the average annual loss

Understand the expected asset
value deterioration per year



1-in-100 Year Damage
measures the damage degree

Estimate the potential financial
impact of natural events



1-in-100 Year Hazard Intensities
measures the severity of events

Assess the potential impact on
your assets and investments

Value at risk – Example Cork Train Station, Ireland

Cork Station
Lat: 51.90140, Lon: -8.45815

Category: **Climate Expected Loss**

Scenario: **SSP5-/RCP8.5**

Year: **Current** 2030 2040 2050 2100

Storm

Tropical Cyclone 0.05

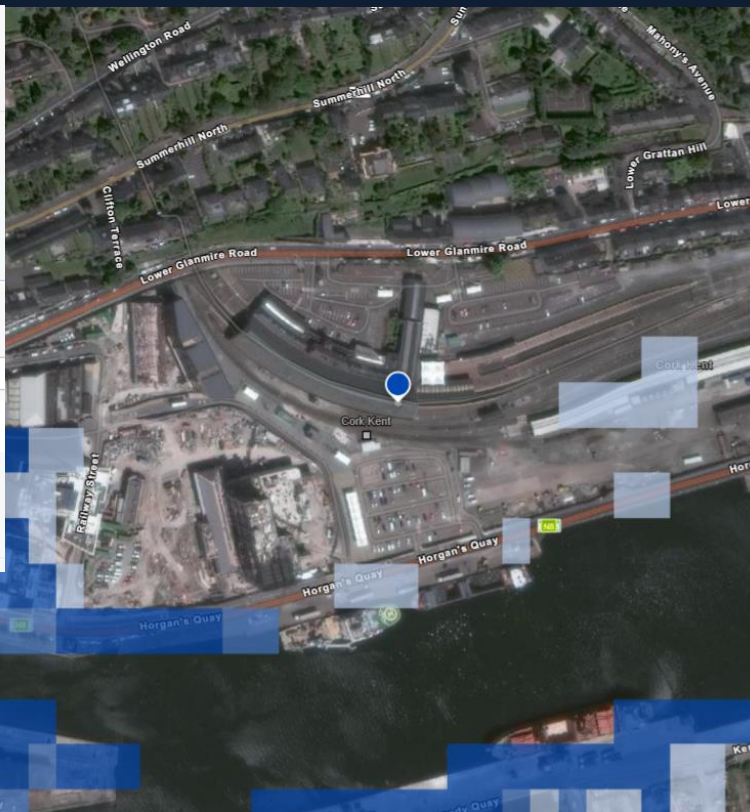
Extratropical Storm 0.2

Expected Loss Rate: **0.20 %**

Flood

River Flood (Defended) 0.0

Storm Surge (Defended) 0.0



Cork Station
Lat: 51.90140, Lon: -8.45815

Category: **1-in-100 Year Intensity ...**

DETAILS
Tropical Cyclone, Wind Speed

Intensity - Storm

Tropical Cyclone, Wind... 140

Extratropical Storm, Wi... 170

Intensity - Flood

River Flood, Water Depth 0.0

Storm Surge, Water De... 0.0

Damage - Storm

TropicalCyclone, Damage 0.1

Extratropical Storm, Da... 0.2

Damage - Flood

River Flood, Damage 0.0

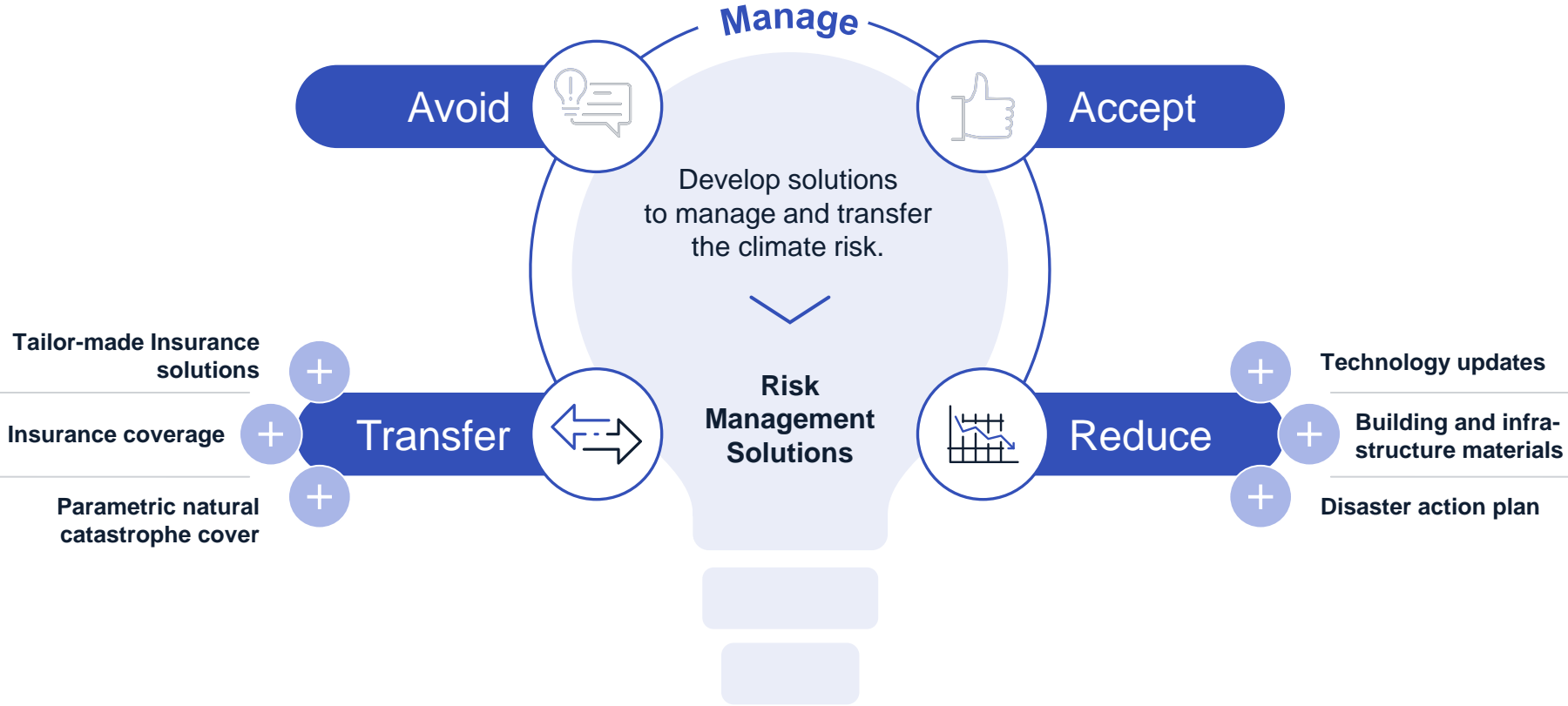
Storm Surge, Damage 0.0

Manage



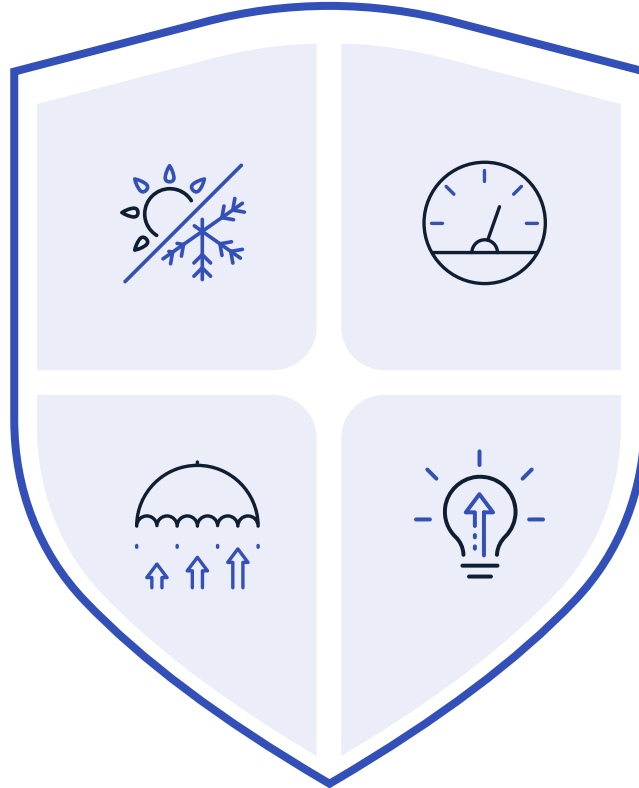
Munich RE 

Manage physical climate risk through risk transfer



Major takeaways

Climate risks are on the rise



Understand and measure your exposure

→ [Location Risk Intelligence](#)

Risks can be managed

Turn risk into opportunity

STAY ON TRACK

Connect via LinkedIn

Thomas Walter

