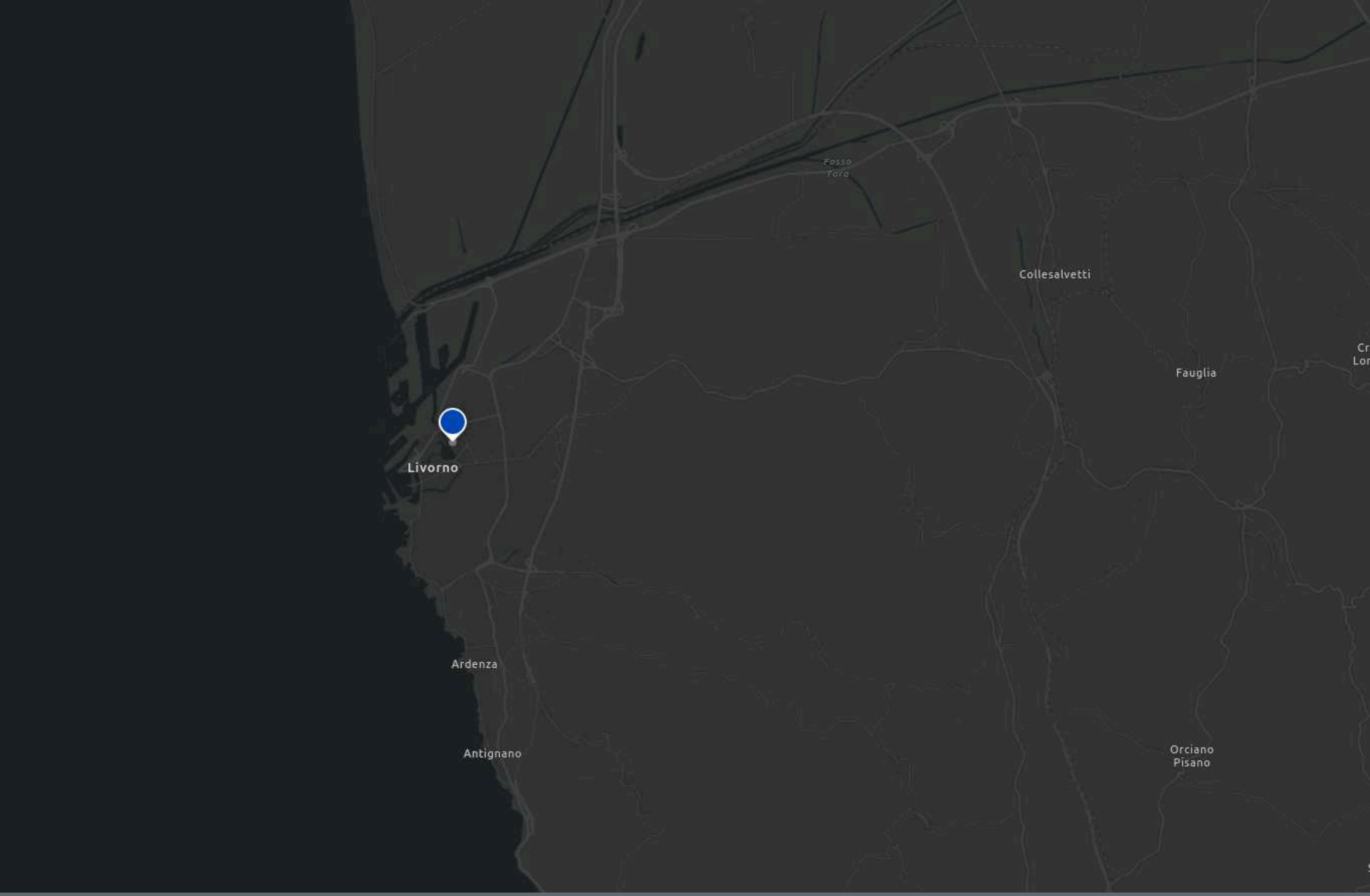


Asset Risk Report

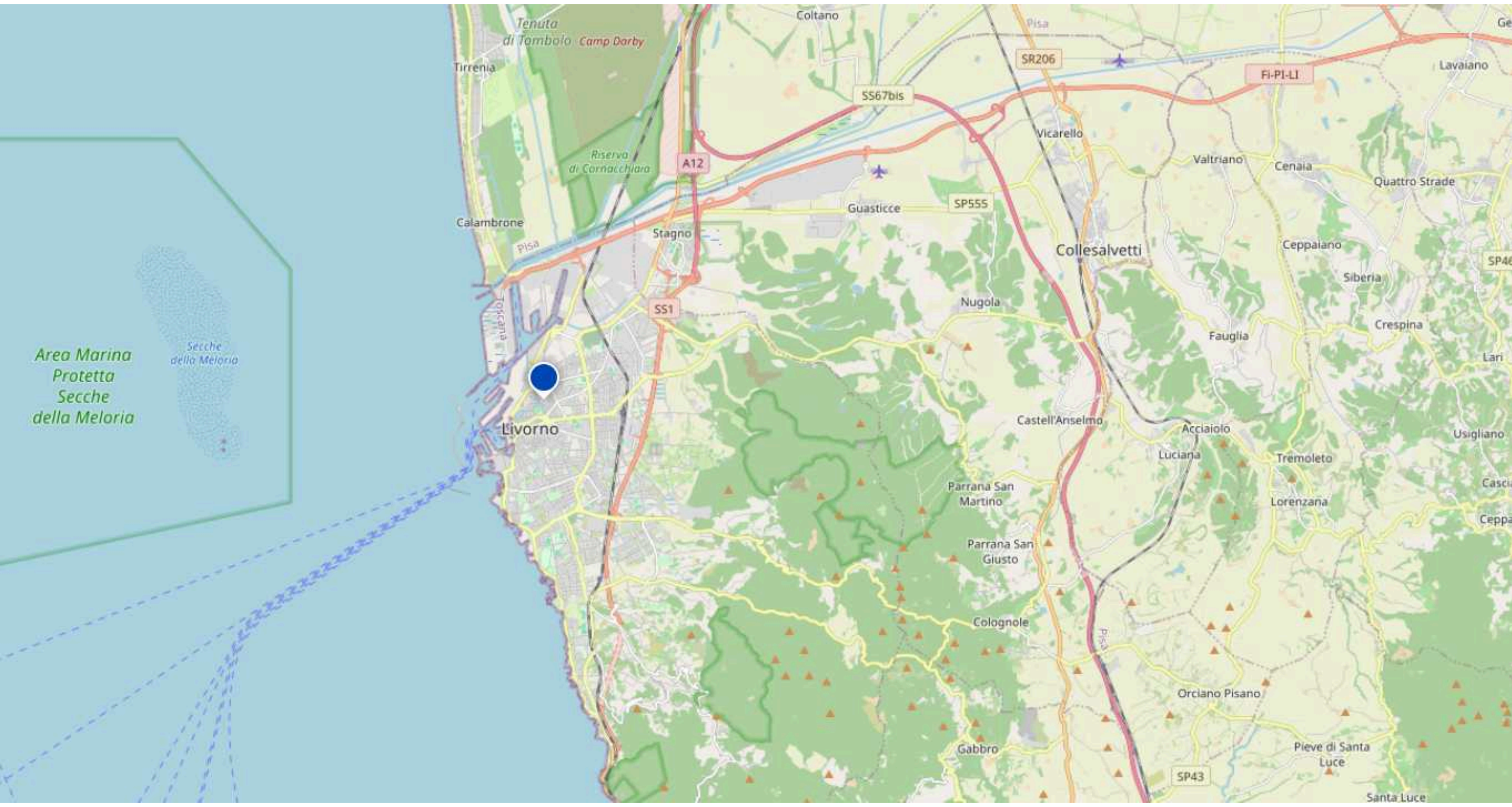
Sample Report - Asset Livorno, Italy

17 January 2025

Latitude:	43.556841
Longitude:	10.313105
Geocoding quality:	100 (Coordinates)

Table of Contents

Asset Info



Elevation	8	Class: 6 - 10 m
Worldcover 2020	50	Built-up
Population Density	5	Class 5: ≥ 200
World Settlement Footprint Evolution	1985	1985 and older
Distance to Coast	773	Class: 501 - 1000 m
JBA Flood Defense Zones, Standard of Protection	100	51 - 100

Scenario Description

Climate Change Scenarios

In its latest Assessment Report (AR6), the Intergovernmental Panel on Climate Change (IPCC) analyses the results of climate models participating in the Coupled Model Intercomparison Project Phase 6 (CMIP6), which include improved representations of physical processes and higher resolutions compared to the CMIP5 generation of climate models. One of the key changes: CMIP6 models make use of climate change scenarios based on “Shared Socioeconomic Pathways” (SSPs), which include socio-economic factors, instead of the previous “Representative Concentration Pathways” (RCPs). The SSP framework provides a novel set of detailed narratives describing different paths society could take during the 21st century in response to climate change, with regard to economic, technological, social and geopolitical factors. As these narratives are used to derive development pathways, not only for greenhouse gas (GHG) emissions but also for economic measures such as population growth and per capita GDP, they can help companies anticipate risks to their business in an integrated, holistic manner.

The release of additional GHGs affects the atmosphere’s level of radiative forcing (a metric which describes the change in the Earth’s energy balance due to factors like greenhouse gases) and therefore the extent of global warming. SSP-based scenarios are referred to as SSPx-y, where ‘SSPx’ refers to the Shared Socioeconomic Pathway describing the socioeconomic trends underlying the scenarios, and ‘y’ refers to the level of radiative forcing (in watts per square metre, W/m^2 resulting from the scenario by the year 2100[i] (like in the RCP scenarios). For example, in the SSP1–2.6 scenario, humanity must work together to forge a more equitable, sustainable future, which results in additional radiative forcing of 2.6 W/m^2 by 2100, like in the RCP2.6 scenario.

As not all of the underlying data required as model inputs is currently available for SSP scenarios, we still offer future projections based on RCP scenarios for selected perils. Accordingly, we use a naming convention that includes both the SSP and corresponding RCP scenario. However, it’s important to note that while the SSP and RCP scenarios are based on the same radiative forcing by 2100, the pathways differ across time and could result in different risk levels. Therefore, the available climate change scenarios are denoted on the individual peril level.

Scenario descriptions

SSP1-/ RCP2.6: SSP1, known as the “Sustainability” or “Taking the Green Road” pathway, describes an increasingly sustainable world. Global commons are preserved and the limits of nature are respected. The focus is more on human well-being than on economic growth. Income inequalities between and within states are reduced. Consumption is oriented towards minimising material resource and energy usage. These efforts result in the net-zero CO_2 emissions target being reached by around 2075. The SSP1–2.6 scenario is associated with radiative forcing of 2.6 W/m^2 by 2100, while global mean surface temperature is estimated to increase by 1.8°C (1.3–2.4°C).[ii] For the corresponding RCP2.6 scenario, the CMIP5 models estimate a mean temperature increase of 1.6°C by 2100.[iii]

SSP2-/ RCP4.5: SSP2, called the “Middle of the Road” or medium pathway, extrapolates the past and current global development into the future. Income trends in different countries diverge significantly. Though there is a certain degree of cooperation between states, it barely improves. Global population growth is moderate, levelling off in the second half of the century. Environmental systems are somewhat degraded. CO_2 emissions remain around current levels until 2050, then decline but fail to reach net zero by 2100. The SSP2–4.5 scenario is associated with radiative forcing of 4.5 W/m^2 by 2100 and a rise in global mean surface temperature is estimated to increase by 2.7°C (2.1–3.5°C).[ii] For the corresponding RCP4.5 scenario, the CMIP5 models estimate a mean temperature increase of 2.4°C by 2100.[iii]

Scenario Description

SSP3-/ RCP7.0: SSP3, known as the "Regional Rivalry" or "A Rocky Road" pathway, sees a revival of nationalism and regional conflicts that push global issues into the background. Policies increasingly focus on questions of national and regional security. Over time, the gap widens between an internationally connected society that contributes to knowledge- and capital-intensive sectors of the global economy, and a fragmented collection of lower-income, poorly educated societies that work in a labour-intensive, low-tech economy. Investments in education and technological development decrease. Inequalities worsen. Some regions suffer drastic environmental damage and CO_2 emissions are expected to double by 2100 compared to 2015. The SSP3–7.0 scenario is associated with radiative forcing of 7.0 W/m² by 2100 and an increase in global mean surface temperature is estimated to increase by 3.6°C (2.8–4.6°C).[ii,iv]

SSP5-/ RCP8.5: In SSP5, known as the "Fossil-Fuelled Development" or "Taking the Highway" pathway, global markets are increasingly integrated, leading to innovations and technological progress. This social and economic development, however, is based on an intensified exploitation of fossil fuel resources with a high percentage of coal use and the prevalence of energy-intensive lifestyles worldwide, leading CO_2 emissions to triple by 2075 compared to 2015. The SSP5–8.5 scenario is associated with radiative forcing of 8.5 W/m² by 2100 and a rise in global mean surface temperature is estimated to increase by 4.4°C (3.3–5.7°C).[ii] For the corresponding RCP8.5 scenario, the CMIP5 models estimate a mean temperature increase of 4.3°C by 2100.[iii]

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[i] IPCC, 2023: Summary for Policymakers. In: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, p.9.

[ii] Compared to the reference period 1850–1900 with very likely range in parentheses, based on AR6 Climate Change 2021: The Physical Science Basis — IPCC.

IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[iii] Compared to the reference period 1850–1900, based on AR5 Climate Change 2013: The Physical Science Basis — IPCC.

Collins, M., R. Knutti, J. Arblaster, J.-L. Dufresne, T. Fichefet, P. Friedlingstein, X. Gao, W.J. Gutowski, T. Johns, G. Krinner, M. Shongwe, C. Tebaldi, A.J. Weaver and M. Wehner, 2013: Long-term Climate Change: Projections, Commitments and Irreversibility. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[iv] Note: The RCP framework does not include a scenario corresponding to SSP3–7.0.

Sample Report - Asset Livorno, Italy

Risk Scores

Overall (Defended)

The Overall Risk Score combines the Earthquake Risk Score, Storm Risk Score, Flood Risk Score as well as the locations risk to wildfire, giving an normalized reflection of an annual loss value for standard industrial business for the overall risk to physical damage of a location.

Extreme

Risk Index: **39**

Earthquake

Earthquake Risk Score quantifies a location's risk of physical damage caused by Earthquakes, Volcanos and Tsunamis.

Medium

Risk Index: **15**

Storm

Storm Risk Score quantifies a location's risk of physical damage caused by Tropical cyclones, Extratropical storms, Hail, Tornadoes and Lightning.

Medium

Risk Index: **8**

Flood (Defended)

Flood Risk Score quantifies a location's risk of physical damage caused by River flood, Flash flood and Storm surge.

High

Risk Index: **16**

Sample Report - Asset Livorno, Italy

Natural Hazards

NATHAN Hazards	Score	Low Hazard / High Hazard
Earthquake	Zone 2 (MM VII)	2
Volcanoes	Zone 1 (Zone 1: Minor Hazard)	1
Tsunami	No Hazard	-1
Tropical Cyclone	No Hazard	-1
Extratropical Storm	Zone 2 (121 - 160 km/h)	2
Hail	Zone 4	4
Tornado	Zone 2 (0.6 – 2.0 (per 10.000 km² and year))	2
Lightning	Zone 3 (4.1 - 10.0 (per km² and year))	3
River Flood (Defended)	Zone 500 (year return period)	500
Flash Flood	Zone 4	4
Storm Surge (Defended)	No Hazard	-1
Wildfire	No Hazard	-1

Solid-mass Hazards	Score	Low Hazard / High Hazard
Subsidence	Zone 5 (High)	5
Avalanche	Zone 1 (No or Very Low)	1
Landslide	Zone 1 (Very Low)	1

Supplementary Hazards	Score	Low Hazard / High Hazard
Peak Ground Acceleration	Zone 8 (0.201 - 0.350)	8

Natural Hazards

Supplementary Hazards	Score	Low Hazard … High Hazard
Soil & Shaking	Class 4 (stiff soil)	4
Distance to Active Faults	5001 - 25000 m (Class: 5001 - 25000 m)	8578

Natural Hazards (Legends)

NATHAN Hazards

Earthquake	Zone 0: MM V and below Zone 1: MM VI Zone 2: MM VII Zone 3: MM VIII Zone 4: MM IX and above	Probable maximum intensity (MM: modified Mercalli scale) with an exceedance probability of 10% in 50 years (equivalent to a „return period" of 475 years) for medium subsoil conditions.
Volcanoes	No Hazard Unclassified Zone 1: Minor Hazard Zone 2: Moderate Hazard Zone 3: High Hazard	The hazard score is based on volcanic activities, which are classified depending on their VEI (Volcano Explosivity Index) and annual return periods. Secondary effects that can occur as a result of the large-scale distribution of volcanic particles (e.g. climate impacts, supraregional ash deposits) are not considered. Zone 1: > 15,000-year return period, Zone 2: 200 to 15,000-year return period, Zone 3: ≤ 200-year return period
Tsunami	No Hazard Zone 0: minimal flood risk Zone 1000: year return period Zone 500: year return period Zone 100: year return period	Zones based on 100m SRTM (Version 4.1) elevation model, taking into account height above sea level and distance from coasts.
Tropical Cyclone	No Hazard Zone 0: 76 - 141 km/h Zone 1: 142 - 184 km/h Zone 2: 185 - 212 km/h Zone 3: 213 - 251 km/h Zone 4: 252 - 299 km/h Zone 5: ≥ 300 km/h	The Tropical cyclone hazard score is derived from globally consistent, basin-specific models for tropical cyclones, and is based on probable maximum wind intensities with a return period of 100 years.
Extratropical Storm	No Hazard Zone 0: ≤ 80 km/h Zone 1: 81 - 120 km/h Zone 2: 121 - 160 km/h Zone 3: 161 - 200 km/h Zone 4: > 200 km/h	Probable maximum intensity with an average exceedance probability of 10% in ten years (equivalent to a „return period" of 100 years). Areas were examined in which there is a high frequency of extratropical storms (approx. 30°–70° north and south of the equator).
Hail	Zone 1: Low Zone 2 Zone 3 Zone 4 Zone 5 Zone 6: High	Frequency and intensity of hailstorms. The hail zoning expresses the location-specific hail potential, which is derived from lightning frequency, drop length, evapotranspiration and temperature. The hail zoning is based on the representation of atmospheric conditions that can lead to a hailstorm, and does not allow frequency (or return period) attributions for hailstorms of certain intensities and vice versa.
Tornado	Zone 1: 0.1 – 0.5 (per 10.000 km² and year) Zone 2: 0.6 – 2.0 (per 10.000 km² and year) Zone 3: 2.1 – 10.0 (per 10.000 km² and year) Zone 4: > 10.0 (per 10.000 km² and year)	The Tornado Zones are based on frequency and intensity interpolated from meteorological data (Tornadoes per 10.000 km² and year).

Sample Report - Asset Livorno, Italy

Natural Hazards (Legends)

NATHAN Hazards

Lightning	Zone 1: 0.2 - 1.0 (per km^2 and year) Zone 2: 1.1 - 4.0 (per km^2 and year) Zone 3: 4.1 - 10.0 (per km^2 and year) Zone 4: 10.1 - 20.0 (per km^2 and year) Zone 5: 20.1 - 40.0 (per km^2 and year) Zone 6: 40.1 - 80.0 (per km^2 and year)	Global frequency of lightning strokes per km^2 and year. Lightning frequency is determined by counting the total number of lightning flashes independently of whether they strike the ground or not.
River Flood (Defended)	Zone 0: minimal flood risk Zone 500: year return period Zone 100: year return period Zone 50: year return period	Areas threatened by floods. JBA flood maps with return periods of 50, 100 and 500 years. Includes information on local flood protection measures.
Flash Flood	Zone 1: Low Zone 2 Zone 3 Zone 4 Zone 5 Zone 6: High	Frequency and intensity of flash floods. The flash flood hazard score describes the hazard level, based on meteorological data, soil sealing information as well as terrain and hydrographic data (slope and flow accumulation).
Storm Surge (Defended)	No Hazard Zone 1000: year return period Zone 500: year return period Zone 100: year return period	Coastal areas threatened by storm surges for return periods 100, 500 and 1000 years, based on 30m FABDEM Digital Elevation Model (DEM). Does consider flood defenses.
Wildfire	No Hazard Zone 1: Low Zone 2 Zone 3 Zone 4: High	The wildfire hazard zones describe potential wildfire hazard levels, which are mainly driven by physical drought/dryness conditions and the existence of burnable material, following an empirical approach. While the drought/dryness conditions are determined by temperature and precipitation as key parameters, a vegetation parameter is incorporated based on vegetation and landcover/land-use data. This does not allow frequency estimates for wildfire. The effects of wind, arson and fire-prevention measures are not considered.

Solid-mass Hazards

Subsidence	Zone 1: Very Low Zone 2: Low Zone 3: Moderate Zone 4: Medium High Zone 5: High Zone 6: Very High	The Subsidence Score describes the hazard of gradual sinking or sudden collapse of the ground. It accounts for natural shrink-swell subsidence in clay soils due to seasonal variations in soil moisture and water balance as well as anthropogenic subsidence due to groundwater depletion, groundwater depletion-related sinkholes and ground collapses in mining areas.
Avalanche	No Zone: Coverage Zone 1: No or Very Low Zone 2: Low Zone 3: Medium	The Avalanche Score describes the threat posed by snow avalanches and is derived from potential avalanche starting zones and likely flow paths considering elevation and land-use data.

↑ Table of Contents

Natural Hazards (Legends)

Solid-mass Hazards

	Zone 4: High Zone 5: Very High	
Landslide	Zone 1: Very Low Zone 2: Low Zone 3: Medium Zone 4: High	The Landslide Score is based on the World Bank's "Global landslide hazard map", which describes the landslide hazard at a global scale, combining rainfall-triggered and earthquake-triggered landslide hazard. While rainfall-triggered landslide is modelled using rainfall data, the earthquake-trigged landslide hazard considers the peak ground acceleration of seismic events with a return period of 475 years.

Supplementary Hazards

Peak Ground Acceleration	Zone 1: 0.000 - 0.010 Zone 2: 0.011 - 0.020 Zone 3: 0.021 - 0.030 Zone 4: 0.031 - 0.050 Zone 5: 0.051 - 0.080 Zone 6: 0.081 - 0.130 Zone 7: 0.131 - 0.200 Zone 8: 0.201 - 0.350 Zone 9: 0.351 - 0.550 Zone 10: 0.551 - 0.900 Zone 11: 0.901 - 1.500 Zone 12: > 1.500	The Global Earthquake Model (GEM) Global Seismic Hazard Map (version update 2019) depicts the geographic distribution of the Peak Ground Acceleration (PGA) with a 10% probability of being exceeded in 50 years, computed for reference rock conditions (shear wave velocity, V , of 760-800 m/s). The map was created by collating maps computed using national and regional probabilistic seismic hazard models developed by various institutions and projects, and by GEM Foundation scientists.
Soil & Shaking	Class 1: Low, hard bedrock Class 2: rock Class 3: soft rock/dense soil Class 4: stiff soil Class 5: soft soil Class 6: High, reclaimed land	The Soil and Shaking hazard shows underground conditions that influence earthquake intensity. This hazard score, which combines geological, soil and hydrological information, complements the interpretation of the earthquake perils by elaborating information about how fast earthquake waves move through the ground based on the soils natural composition and its impact on the area of interest.
Distance to Active Faults	Class: > 50000 m Class: 25001 - 50000 m Class: 5001 - 25000 m Class: 1001 - 5000 m Class: 501 - 1000 m Class: 101 - 500 m Class: <= 100 m	The distance to active fault indicates how far the location is from the nearest active geological fault. The distance is calculated up to a maximum distance of 50 kilometers and the value is returned in meters. If the distance is further than 50 kilometers, the value -1 is returned.

Sample Report - Asset Livorno, Italy

Climate Change Overview

Scenario: SSP1-/ RCP2.6

Climate Change Scenario Matrix	Current	**2030**	**2040**	**2050**	**2100**
Tropical Cyclone	No Hazard	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
River Flood (Defended)	Zone 500	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
Storm Surge (Defended)	No Hazard	No Hazard	No Hazard	No Hazard	No Hazard
Subsidence	Zone 5	Zone 5	Zone 5	Zone 5	Zone 5
Heat Stress Index	3.1 - 4.5	4.6 - 6.0	4.6 - 6.0	4.6 - 6.0	4.6 - 6.0
Heat-Humidity Stress Index	3.1 - 4.5	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5
Cold Stress Index	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0
Fire Weather Stress Index	1.6 - 3.0	3.1 - 4.5	3.1 - 4.5	3.1 - 4.5	3.1 - 4.5
Precipitation Stress Index	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5
Drought Stress Index	3.1 - 4.5	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
Sea Level Rise	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled	Zone 3
Water Scarcity	3.1 - 4.0	4.1 - 5.0	4.1 - 5.0	4.1 - 5.0	4.1 - 5.0
Permafrost Extent	No Hazard	Data is not modelled	Data is not modelled	No Hazard	No Hazard

Sample Report - Asset Livorno, Italy

Climate Change Overview

Scenario: SSP2-/ RCP4.5

Climate Change Scenario Matrix	Current	**2030**	**2040**	**2050**	**2100**
Tropical Cyclone	No Hazard	No Hazard	Data is not modelled	No Hazard	No Hazard
River Flood (Defended)	Zone 500	Zone 500	Data is not modelled	Zone 500	Zone 500
Storm Surge (Defended)	No Hazard	No Hazard	No Hazard	No Hazard	No Hazard
Subsidence	Zone 5	Zone 5	Zone 5	Zone 5	Zone 6
Heat Stress Index	3.1 - 4.5	4.6 - 6.0	4.6 - 6.0	4.6 - 6.0	4.6 - 6.0
Heat-Humidity Stress Index	3.1 - 4.5	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	7.6 - 9.0
Cold Stress Index	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0
Fire Weather Stress Index	1.6 - 3.0	1.6 - 3.0	3.1 - 4.5	3.1 - 4.5	3.1 - 4.5
Precipitation Stress Index	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5
Drought Stress Index	3.1 - 4.5	4.6 - 6.0	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5
Sea Level Rise	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled	Zone 3
Water Scarcity	3.1 - 4.0	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
Permafrost Extent	No Hazard	Data is not modelled	Data is not modelled	No Hazard	No Hazard

Climate Change Overview

Scenario: SSP3-/ RCP7.0

Climate Change Scenario Matrix	Current	**2030**	**2040**	**2050**	**2100**
Tropical Cyclone	No Hazard	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
River Flood (Defended)	Zone 500	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
Storm Surge (Defended)	No Hazard	No Hazard	No Hazard	No Hazard	No Hazard
Subsidence	Zone 5	Zone 5	Zone 5	Zone 5	Zone 6
Heat Stress Index	3.1 - 4.5	4.6 - 6.0	4.6 - 6.0	4.6 - 6.0	6.1 - 7.5
Heat-Humidity Stress Index	3.1 - 4.5	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5	9.1 - 10.0
Cold Stress Index	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	0.0 - 1.5
Fire Weather Stress Index	1.6 - 3.0	1.6 - 3.0	3.1 - 4.5	3.1 - 4.5	3.1 - 4.5
Precipitation Stress Index	4.6 - 6.0	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5
Drought Stress Index	3.1 - 4.5	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled
Water Scarcity	3.1 - 4.0	4.1 - 5.0	4.1 - 5.0	4.1 - 5.0	4.1 - 5.0
Permafrost Extent	No Hazard	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled

Climate Change Overview

Scenario: SSP5-/ RCP8.5

Climate Change Scenario Matrix	Current	2030	2040	2050	2100
Tropical Cyclone	No Hazard	No Hazard	Data is not modelled	No Hazard	No Hazard
River Flood (Defended)	Zone 500	Zone 500	Data is not modelled	Zone 500	Zone 500
Storm Surge (Defended)	No Hazard	No Hazard	No Hazard	No Hazard	No Hazard
Subsidence	Zone 5	Zone 5	Zone 5	Zone 6	Zone 6
Heat Stress Index	3.1 - 4.5	4.6 - 6.0	4.6 - 6.0	4.6 - 6.0	6.1 - 7.5
Heat-Humidity Stress Index	3.1 - 4.5	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	9.1 - 10.0
Cold Stress Index	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	1.6 - 3.0	0.0 - 1.5
Fire Weather Stress Index	1.6 - 3.0	3.1 - 4.5	3.1 - 4.5	3.1 - 4.5	4.6 - 6.0
Precipitation Stress Index	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5	6.1 - 7.5
Drought Stress Index	3.1 - 4.5	4.6 - 6.0	6.1 - 7.5	6.1 - 7.5	9.1 - 10.0
Sea Level Rise	Data is not modelled	Data is not modelled	Data is not modelled	Data is not modelled	Zone 4
Water Scarcity	3.1 - 4.0	4.1 - 5.0	4.1 - 5.0	4.1 - 5.0	4.1 - 5.0
Permafrost Extent	No Hazard	Data is not modelled	Data is not modelled	No Hazard	No Hazard

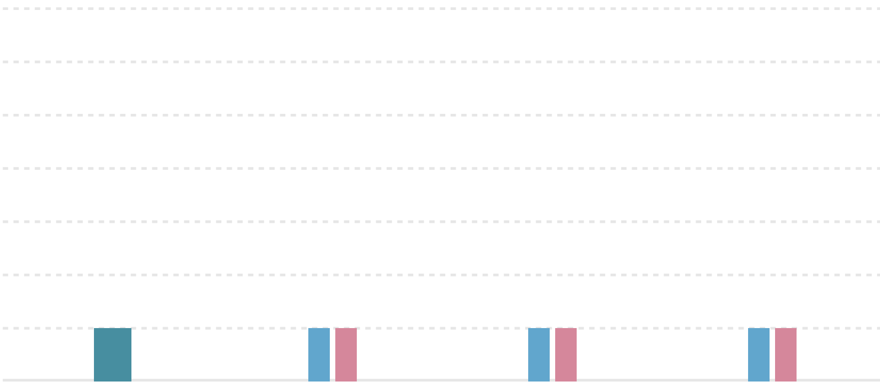
Sample Report - Asset Livorno, Italy

Climate Change

Tropical Cyclone

The Tropical cyclone hazard score is derived from globally consistent, basin-specific models for tropical cyclones, and is based on probable maximum wind intensities with a return period of 100 years. Current and for respective projection year and RCP scenario.

- Zone 5 (≥ 300 km/h)
- Zone 4 (252 - 299 km/h)
- Zone 3 (213 - 251 km/h)
- Zone 2 (185 - 212 km/h)
- Zone 1 (142 - 184 km/h)
- Zone 0 (76 - 141 km/h)
- No Hazard

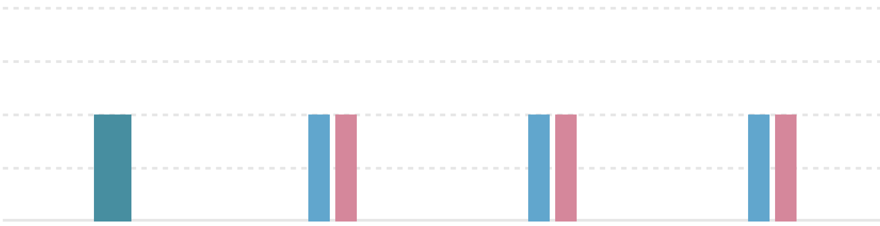


Hazard Zone:	Current	2030	2050	2100
SSP2-/ RCP4.5	-1	-1	-1	-1
SSP5-/ RCP8.5		-1	-1	-1

River Flood (Defended)

Areas threatened by floods. JBA flood maps with return periods of 50, 100 and 500 years. Includes information on local flood protection measures.

- Zone 50 (year return period)
- Zone 100 (year return period)
- Zone 500 (year return period)
- Zone 0 (minimal flood risk)



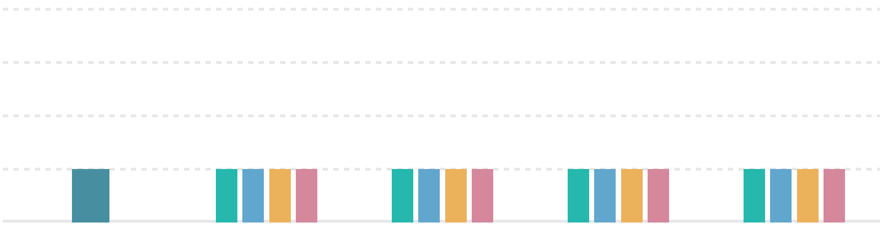
Return Period:	Current	2030	2050	2100
SSP2-/ RCP4.5	500	500	500	500
SSP5-/ RCP8.5		500	500	500

Climate Change

Storm Surge (Defended)

Coastal areas threatened by storm surges for return periods 100, 500 and 1000 years, based on 30m FABDEM Digital Elevation Model (DEM). Does consider flood defenses.

- Zone 100 (year return period)
- Zone 500 (year return period)
- Zone 1000 (year return period)
- No Hazard

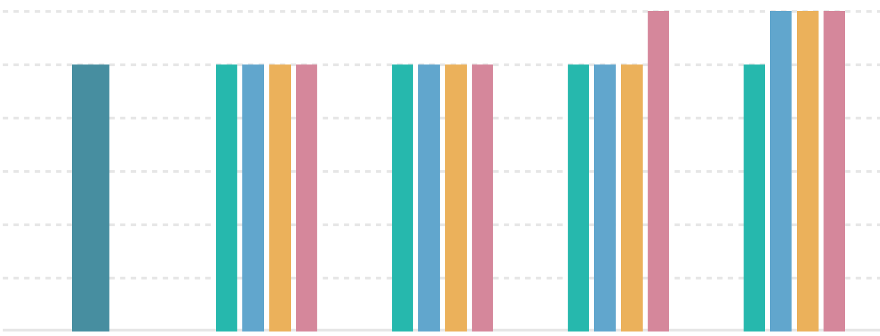


Return Period:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	-1	-1	-1	-1	-1
SSP2-/ RCP4.5		-1	-1	-1	-1
SSP3-/ RCP7.0		-1	-1	-1	-1
SSP5-/ RCP8.5		-1	-1	-1	-1

Subsidence

The Subsidence Score describes the hazard of gradual sinking or sudden collapse of the ground. It accounts for natural shrink-swell subsidence in clay soils due to seasonal variations in soil moisture and water balance as well as anthropogenic subsidence due to groundwater depletion, groundwater depletion-related sinkholes and ground collapses in mining areas.

- Zone 6 (Very High)
- Zone 5 (High)
- Zone 4 (Medium High)
- Zone 3 (Moderate)
- Zone 2 (Low)
- Zone 1 (Very Low)



Hazard Zone:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	5	5	5	5	5
SSP2-/ RCP4.5		5	5	5	▲ 6
SSP3-/ RCP7.0		5	5	5	▲ 6
SSP5-/ RCP8.5		5	5	▲ 6	▲ 6

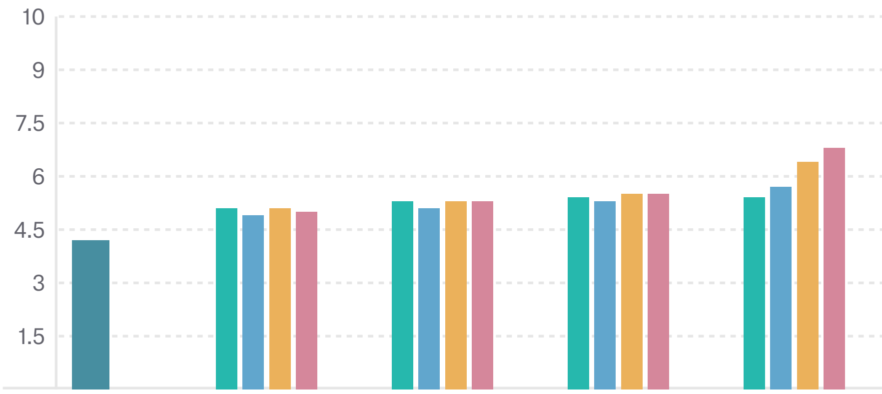
Sample Report - Asset Livorno, Italy

Climate Change

Heat Stress Index

Heat Stress Index combines several temperature-related parameters and classifies the climatological heat stress situation on a scale ranging from 0 (very low) to 10 (very high).

- 9.1 - 10.0 (Extreme)
- 7.6 - 9.0 (Very High)
- 6.1 - 7.5 (High)
- 4.6 - 6.0 (High Medium)
- 3.1 - 4.5 (Low Medium)
- 1.6 - 3.0 (Low)
- 0.0 - 1.5 (Very Low)

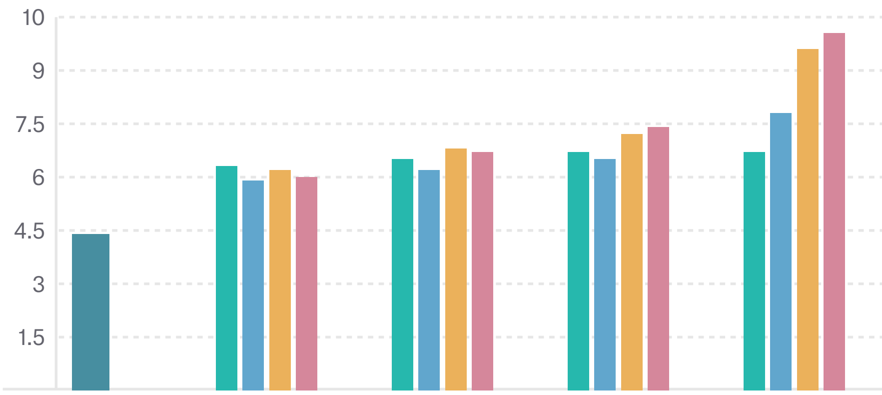


Stress Index:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	4.2	▲ 5.1	▲ 5.3	▲ 5.4	▲ 5.4
SSP2-/ RCP4.5		▲ 4.9	▲ 5.1	▲ 5.3	▲ 5.7
SSP3-/ RCP7.0		▲ 5.1	▲ 5.3	▲ 5.5	▲ 6.4
SSP5-/ RCP8.5		▲ 5.0	▲ 5.3	▲ 5.5	▲ 6.8

Heat-Humidity Stress Index

Heat-Humidity Stress Index combines heat-humidity-related parameters based on the Wet-Bulb Temperature to classify the severity of extreme heat-humidity events on a scale ranging from 0 (very low) to 10 (very high).

- 9.1 - 10.0 (Extreme)
- 7.6 - 9.0 (Very High)
- 6.1 - 7.5 (High)
- 4.6 - 6.0 (High Medium)
- 3.1 - 4.5 (Low Medium)
- 1.6 - 3.0 (Low)
- 0.0 - 1.5 (Very Low)



Stress Index:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	4.4	▲ 6.3	▲ 6.5	▲ 6.7	▲ 6.7
SSP2-/ RCP4.5		▲ 5.9	▲ 6.2	▲ 6.5	▲ 7.8
SSP3-/ RCP7.0		▲ 6.2	▲ 6.8	▲ 7.2	▲ 9.4
SSP5-/ RCP8.5		▲ 6.0	▲ 6.7	▲ 7.4	▲ 9.7

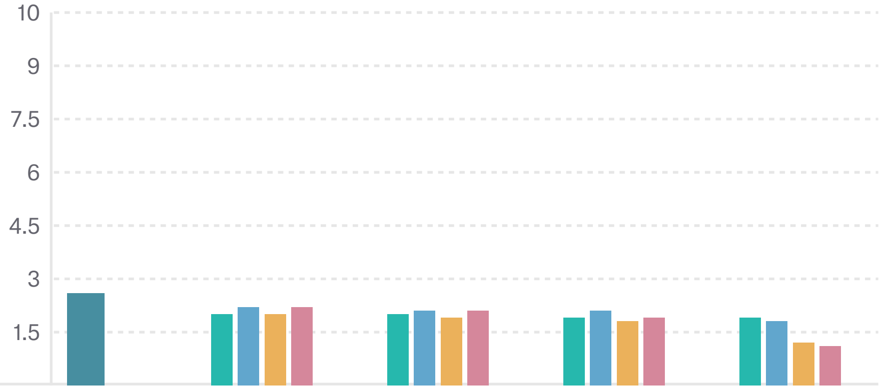
Sample Report - Asset Livorno, Italy

Climate Change

Cold Stress Index

Cold Stress Index combines several temperature-related parameters and classifies climatological cold stress on a scale ranging from 0 (very low) to 10 (very high).

- 9.1 - 10.0 (Extreme)
- 7.6 - 9.0 (Very High)
- 6.1 - 7.5 (High)
- 4.6 - 6.0 (High Medium)
- 3.1 - 4.5 (Low Medium)
- 1.6 - 3.0 (Low)
- 0.0 - 1.5 (Very Low)

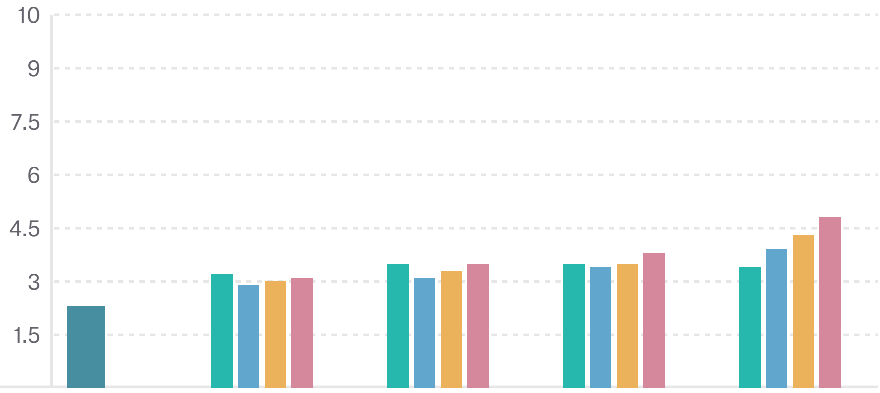


Stress Index:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	2.6	▾ 2.0	▾ 2.0	▾ 1.9	▾ 1.9
SSP2-/ RCP4.5		▾ 2.2	▾ 2.1	▾ 2.1	▾ 1.8
SSP3-/ RCP7.0		▾ 2.0	▾ 1.9	▾ 1.8	▾ 1.2
SSP5-/ RCP8.5		▾ 2.2	▾ 2.1	▾ 1.9	▾ 1.1

Fire Weather Stress Index

Fire Weather Stress Index describes the potential influence of atmospheric conditions on a wildfire, based on the climate variables of temperature, wind, precipitation, and relative humidity on a scale ranging from 0 (very low) to 10 (very high).

- 9.1 - 10.0 (Extreme)
- 7.6 - 9.0 (Very High)
- 6.1 - 7.5 (High)
- 4.6 - 6.0 (High Medium)
- 3.1 - 4.5 (Low Medium)
- 1.6 - 3.0 (Low)
- 0.0 - 1.5 (Very Low)

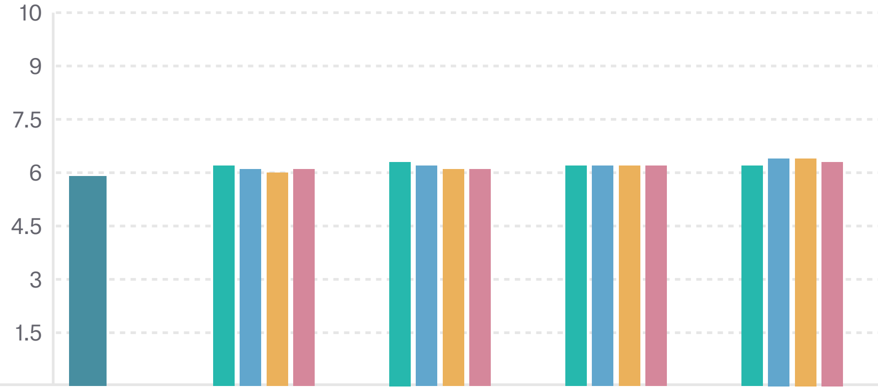


Stress Index:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	2.3	▴ 3.2	▴ 3.5	▴ 3.5	▴ 3.4
SSP2-/ RCP4.5		▴ 2.9	▴ 3.1	▴ 3.4	▴ 3.9
SSP3-/ RCP7.0		▴ 3.0	▴ 3.3	▴ 3.5	▴ 4.3
SSP5-/ RCP8.5		▴ 3.1	▴ 3.5	▴ 3.8	▴ 4.8

Precipitation Stress Index

Precipitation Stress Index combines several heavy-precipitation-related parameters and classifies climatological precipitation stress on a scale ranging from 0 (very low) to 10 (very high).

- 9.1 - 10.0 (Extreme)
- 7.6 - 9.0 (Very High)
- 6.1 - 7.5 (High)
- 4.6 - 6.0 (High Medium)
- 3.1 - 4.5 (Low Medium)
- 1.6 - 3.0 (Low)
- 0.0 - 1.5 (Very Low)

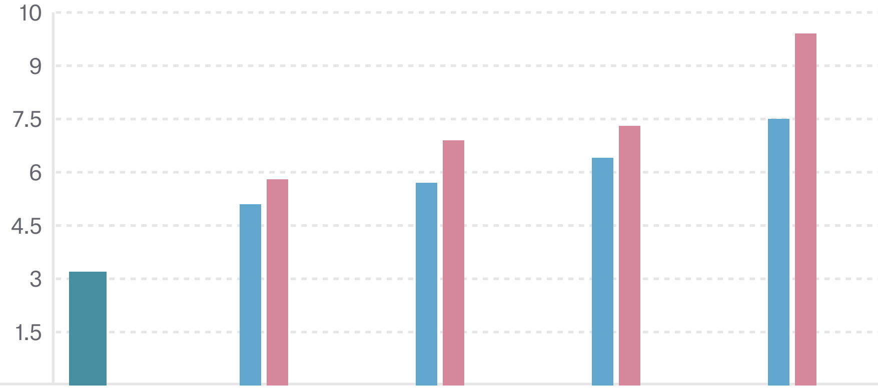


Stress Index:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	5.9	▲ 6.2	▲ 6.3	▲ 6.2	▲ 6.2
SSP2-/ RCP4.5		▲ 6.1	▲ 6.2	▲ 6.2	▲ 6.4
SSP3-/ RCP7.0		▲ 6.0	▲ 6.1	▲ 6.2	▲ 6.4
SSP5-/ RCP8.5		▲ 6.1	▲ 6.1	▲ 6.2	▲ 6.3

Drought Stress Index

Drought Stress Index based on SPEI (Standardised Precipitation-Evapotranspiration Index) and dry-spell conditions. SPEI is a multi-scalar drought index that is used to determine the onset, duration and magnitude of drought conditions in relation to normal conditions, where the climatic water balance over the second half of the 20th century is considered as reference conditions.

- 9.1 - 10.0 (Extreme)
- 7.6 - 9.0 (Very High)
- 6.1 - 7.5 (High)
- 4.6 - 6.0 (High Medium)
- 3.1 - 4.5 (Low Medium)
- 1.6 - 3.0 (Low)
- 0.0 - 1.5 (Very Low)



Stress Index:	Current	2030	2040	2050	2100
SSP2-/ RCP4.5	3.2	▲ 5.1	▲ 5.7	▲ 6.4	▲ 7.5
SSP5-/ RCP8.5		▲ 5.8	▲ 6.9	▲ 7.3	▲ 9.6

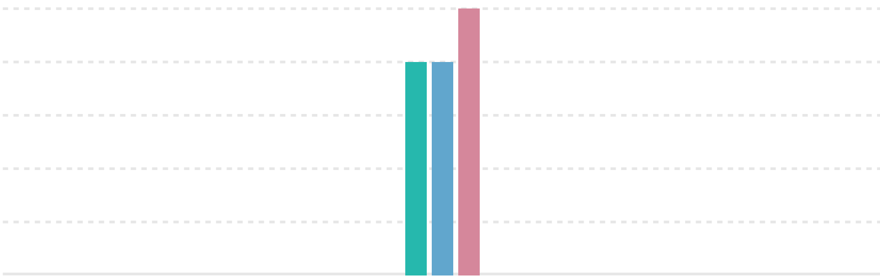
Sample Report - Asset Livorno, Italy

Climate Change

Sea Level Rise

Hazard zones derived from IPCC sea-level rise data and high-resolution elevation data for respective projection year and RCP scenario. Model is based on storm surge events with 100 years return period.

- Zone 4 (Extreme)
- Zone 3 (High)
- Zone 2 (Medium)
- Zone 1 (Low)
- No Hazard

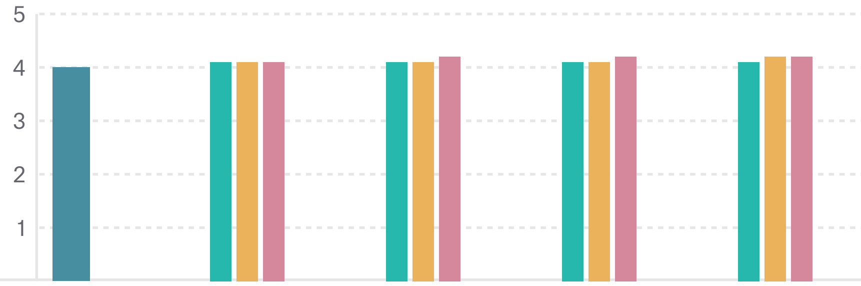


Hazard Zone:	2100
SSP1-/ RCP2.6	3
SSP2-/ RCP4.5	3
SSP5-/ RCP8.5	4

Water Scarcity

The Water Scarcity index describes the hazard of a location facing a deficit in the availability of freshwater supply on a scale from 1 (very low) to 5 (very high).

- 4.1 - 5.0 (Very High)
- 3.1 - 4.0 (High)
- 2.1 - 3.0 (Medium)
- 1.1 - 2.0 (Low)
- 0.0 - 1.0 (Very Low)

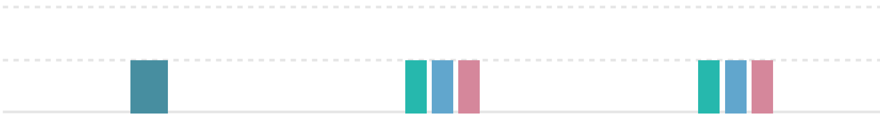


Index:	Current	2030	2040	2050	2100
SSP1-/ RCP2.6	4.0	▴ 4.1	▴ 4.1	▴ 4.1	▴ 4.1
SSP3-/ RCP7.0		▴ 4.1	▴ 4.1	▴ 4.1	▴ 4.2
SSP5-/ RCP8.5		▴ 4.1	▴ 4.2	▴ 4.2	▴ 4.2

Permafrost Extent

The Permafrost Extent describes the existence and spatial distribution of permanently frozen ground for the northern hemisphere.

- predominant Hazard
- No Hazard (Outside Extent (No Hazard))



Extent:	Current	2050	2100
SSP1-/ RCP2.6	-1	-1	-1
SSP2-/ RCP4.5		-1	-1
SSP5-/ RCP8.5		-1	-1

Sample Report - Asset Livorno, Italy

Data Sources

Risk Scores	Data Source
Overall (Defended)	Munich Re (MR)
Earthquake	Munich Re (MR)
Storm	Munich Re (MR)
Flood (Defended)	Munich Re (MR)

Natural Hazards - NATHAN Hazards	Data Source
Earthquake	Munich Re (MR)
Volcanoes	Munich Re (MR)
Tsunami	Munich Re (MR)
Tropical Cyclone	Munich Re (MR)
Extratropical Storm	Munich Re (MR)
Hail	Munich Re (MR)
Tornado	Munich Re (MR)
Lightning	Munich Re (MR)
River Flood (Defended)	Munich Re (MR), JBA Risk Management Limited (JBA)
Flash Flood	Munich Re (MR)
Storm Surge (Defended)	Munich Re (MR)
Wildfire	Munich Re (MR)

Natural Hazards - Solid-mass Hazards	Data Source
Subsidence	Munich Re (MR)

Sample Report - Asset Livorno, Italy
Data Sources

Natural Hazards - Solid-mass Hazards	Data Source
Avalanche	Munich Re (MR)
Landslide	World Bank

Natural Hazards - Supplementary Hazards	Data Source
Peak Ground Acceleration	Globale Earthquake Model (GEM), M. Pagani, J. Garcia-Pelaez, R. Gee, K. Johnson, V. Poggi, R. Styron, G. Weatherill, M. Simionato, D. Viganò, L. Danciu, D. Monelli (2018). Global Earthquake Model (GEM) Seismic Hazard Map (version 2018.1 - December 2018), DOI: 10.13117/GEM-GLOBAL-SEISMIC-HAZARD-MAP-2018.1 https://www.globalquakemodel.org/gem https://www.globalquakemodel.org/hazard-model-documentation
Soil & Shaking	Munich Re (MR), United States Geological Survey (USGS) Global Vs30 model based on topographic slope, with custom embedded maps.
Distance to Active Faults	Munich Re (MR), Global Earthquake Model (GEM)

Climate Change	Data Source
Tropical Cyclone	Munich Re (MR)
River Flood (Defended)	Munich Re (MR), JBA Risk Management Limited (JBA)
Storm Surge (Defended)	Munich Re (MR)
Subsidence	Munich Re (MR)
Heat Stress Index	Munich Re (MR)
Heat-Humidity Stress Index	Munich Re (MR)
Cold Stress Index	Munich Re (MR)
Fire Weather Stress Index	Munich Re (MR)

Data Sources

Climate Change	Data Source
Precipitation Stress Index	Munich Re (MR)
Drought Stress Index	Munich Re (MR)
Sea Level Rise	Munich Re (MR)
Water Scarcity	Munich Re (MR), World Resources Institute (WRI)
Permafrost Extent	ESA Climate Change Initiative (ESA CCI)

General Information	Data Source
Elevation	Japan Aerospace Exploration Agency (JAXA), United States Geological Survey (USGS)
Worldcover 2020	European Space Agency (ESA)
Population Density	Oak Ridge National Laboratory
World Settlement Footprint Evolution	German Aerospace Center (DLR), Earth Observation Center (EOC)
Distance to Coast	Munich Re (MR)
JBA Flood Defense Zones, Standard of Protection	JBA Risk Management Limited (JBA)

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