KA Köln.Assekuranz Agentur
Ein Unternehmen der ERGO

07/08/2020

K.A.R.L.-PRO REPORT

NATURAL HAZARD AND RISK ANALYSIS

K.A.R.L. analyzes are used exclusively for loss prevention and early detection of risks. They are based on scientific data, facts and correlations. It also takes account of the potential damage levels that may arise as a function of the specific physical sensitivity of certain goods under external impact.

Loss statistics of the insurance industry are not included in the analyzes. Therefore, risk figures calculated by K.A.R.L. are not suitable as a basis for insurance premiums.

TASK

Task No.: 0
Task-ID: StandortAnalyse
Analysis of location dated: 08.07.2020 10:52:03
by: KA Köln.Assekuranz Agentur GmbH
Version: K.A.R.L.-08-2019.2

LOCATION UNDER SURVEY

Piazza San Marco, Venice, Italy

GEOGRAPHICAL SITUATION

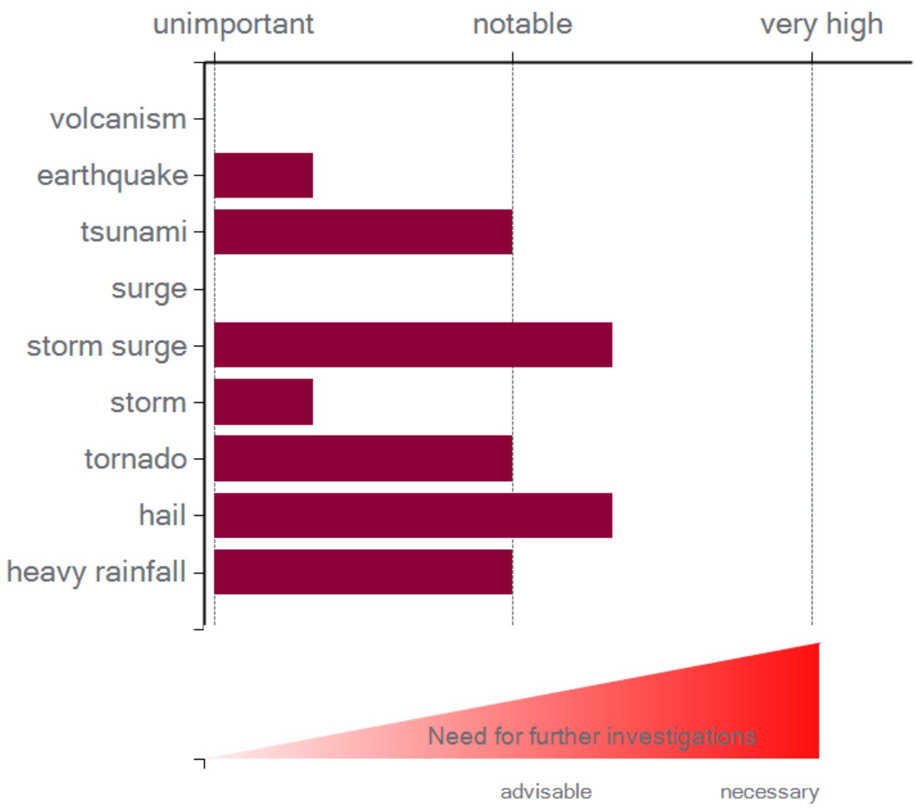
Latitude / Longitude (decimal):	45,434144 12,338474
Estimated Elevation (m above sea level):	1,00
Elevation from Digital Elevation Model (m above sea level):	1,00
Type of Landscape:	lowlands
Lowest Elevation within 1 km (m above sea level):	0,00
Highest Elevation within 1 km (m above sea level):	4,76
Approximate Distance to Coast (km):	0,5

This data was transferred partly automatically from a global digital elevation model, which is based on radar survey. Deviations from the real elevation are possible at places where the radar signal has been reflected by roofs or trees. (Source: NASA, SRTM V4)

NB: The assumed local elevation has been interpolated from the elevation model under worst-case aspects. It may be lower than the real ground elevation.

The specified distance from the coast corresponds to the straight line to the nearest point of the elevation model, which has not been defined as mainland. Therefore, under certain circumstances also estuaries or large river mouths can be interpreted as marine areas.

SUMMARY OF THE RISK ANALYSIS



Location: Piazza San Marco, Venice, Italy

VULNERABILITIES AND VALUES AT RISK

Values at Risk

TOTAL (%):	100

This risk analysis concerns the following goods / facilities / buildings:

NOT SPECIFIED

RISK FIGURES

PERIL	RISK as % p.a.
Volcanism:	0,0000 (-)
Earthquake:	0,0223 (very low)
Tsunami:	0,2088 (notable)
Surge / River Flood:	0,0000 (-)
Storm Surge:	0,6932 (increased)
Storm:	0,0325 (very low)
Tornado:	0,1055 (notable)
Hail:	0,4871 (increased)
SUM (without Heavy Rainfall):	1,5494 (very high)

Heavy Rainfall:	0,1199 (notable)

The risk analysis has been calculated considering the vulnerabilities (sensivity of the goods / facilities / buildings that could be threatened by the examined natural hazards) defined by the user mentioned below.

The risks detected by K.A.R.L. are calculated by numerical modelling. First of all the potential losses are calculated for statistical return periods of between 1 and max. 10.000 years. From this a mean annual loss is deduced as a significant figure for the Risk at the location.

Example (simplified): Should a total loss of 1 Mio. EUR be expected due to flooding only once a century then the mean annual loss (= RISK) is 10.000 EUR p.a.. The identical risk would result from the occurrence of e.g. 4 single events causing damage of 0,1 Mio., 0,3 Mio., 0,4 Mio. and 0,2 Mio. EUR collectively. The average then is also 10.000 EUR p.a..

Regardless of the object’s value the risk can be expressed as a yearly percentage which would be, in the above example, 1 % of the total value of the object per year (i.e. RELATIVE RISK).

It is possible that singular claims may significantly exceed the calculated risks. Therefore they are separately listed below together with the corresponding statistical return periods. The CALCULATED MAXIMUM LOSS states the highest possible single loss for each model calculated. For this figure no statistical return period will be given.

RECOMMENDATIONS AND FURTHER STEPS

Some risks have been identified as notable or above. Further investigations are necessary. Due to this it’s recommended to clarify the following issues:

LOCAL ELEVATION:

Try to find out the exact elevation of your site (m above sea level) and carry out the risk analysis again. The best references are official maps with a scale of 1:5000 to 1:25000, where elevations are given. Construction or site plans also contain relevant elevation data. If necessary a surveying office must be consulted. ATTENTION: Elevation data from mobile GPS devices or smartphones are not precise enough for this purpose.

TSUNAMI:

Check locally for protection walls or dykes with a height of at least 2,3 meters above mean sea level. This figure was used for this current risk analysis.

HEAVY RAINFALL:

Check if the local sewer network is designed for extreme heavy rainfall. To clear that question it may be necessary to hire a competent expert. Also check that the drainage systems are clean or that they can not be blocked by leaves or other contaminants. Also, check for risk potentials such as IT systems and valuable archive documents in basements or outdoors stored water-sensitive goods.

STORM SURGE:

Check locally for protection walls or dykes, flood barriers or any other technical protection measures to deflect a storm surge of an annual return period of 100 years. This figure was used for this current risk analysis. Possible information sources: Local environmental authorities, port authorities, water and dyke construction authorities, water and shipping authorities, local emergency services etc.

STORM AND/OR TORNADO:

Check if there are objects and /or building parts which can be torn down or blown about by storm and cause damage at site or its neighbourhood. Check further if the construction of the roof, doors, windows and gates can withstand a high wind pressure. If necessary experts must be contacted for further investigation. Clarify if there are any emergency and evacuation plans in case of catastrophy.

HAIL:

Please avoid placing valuable and vulnerable goods unprotected in the open. Should this not be possible we recommend the installation of hail nets or sheds. Please note that drainage systems for melting and rain water can become blocked which could lead to local flooding.

Last but not least there is a danger that, due to the regional climate conditions, drainage systems can become blocked by ice after a hailstorm and cause local flooding.

NOTES FOR INTERPRETATION

The calculated results by K.A.R.L. and the statements in this report are to be considered as a guide only. They only INDICATE which perils can cause specific risks and where further action might be necessary. Their purpose is to prioritize further research and installation of protective devices. In no way can they replace a detailed and scientific analysis of the location itself by an expert.

Please note further: Is a risk identified and named, there is always an endangerment which, under certain circumstances, might cause severe damage. The classification of a risk as “VERY LOW” or “LOW” therefore only means, that such an extreme event occurs very seldom and not that it is impossible. Whether further protection is necessary even in a low risk situation depends on the value and the vulnerability of the goods at the location. Are the risks classified as “NOTABLE” to “VERY HIGH”, further investigation of the situation is always advisable in order to define the level of risk more precisely.

Such an investigation can be conducted by a detailed analysis of the location (K.A.R.L.-EXPERT) by our own experts if requested.

This risk analysis was generated automatically. It was not checked for plausibility by an expert. Certain facts only visible in maps, air or satellite reconnaissance pictures, which might have influenced the risk evaluation, could not be taken into account.

In case of any question please contact:

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CLIMATIC CONDITIONS

Mean Annual Temperature:	14,2 °C
Coldest Month:	Jan. with 0,9 °C
Warmest Month:	Jul. with 28,7 °C
Number of days per year >= 20°C: (mean temperature)	102
Mean Elevation of Frost Line above sea level:	2086 m
Annual Precipitation:	851 mm
Quarter with Maximum Precipitation:	S-O-N with 241 mm
Quarter with Minimum Precipitation:	J-F-M with 170 mm

The climate data given here are dynamically adapted to the respective current year on the basis of a climate model (NCAR Community Climate System Model (CCSM), Scenario A1b).

Theoretical Availability of Water:	255 mm p.a.

Explanation: The availability of water is calculated as the difference between the annual precipitation and the evaporation. Theoretically, this amount of water is available as surface water or replenishes the groundwater storage. At the location under survey the amount exceeds 200 mm p.a.. A water shortage is therefore not to be expected, except in extremely hot and dry years.

Index of Severe Weather:	notable (1,47)

Explanation: Köln.Assekuranz has calculated the index of severe weather using various climatic parameters. With this index the frequency and degree of severe weather can be compared to the conditions in Western Europe. The following Indices of severe weather are characteristic for certain regions: Stockholm:0,6 London:0,7 Cologne:1,0 Munich:1,3 Milan:1,5 Osaka:2,3 Hong-Kong:4,2 Cayenne (French.Guayana):5,1 West-Columbia:11,7 Mumbay:12,7

Flash Frequency (Occurrences per sq. km p.a.):	10,8

Explanation: NASA satellites observe the flash frequency globally. The following flash frequencies (number p.a. and km2) are typical for certain regions: Stockholm:0,4 London:1,0 Cayenne (French Guayana):1,6 Cologne:2,0 Munich:2,0 Osaka:4,7 Mumbay:6,0 Milano:12,0 Hong-Kong:15,0 West-Colombia:25,0

Only about 10 % of all registered flashes actually hit the ground.

Calculated maximum Snow Load (kg/m2):	74

Classification: Low to mean snow loads are to be expected. The local climate conditions are similar to those in Paris (France), London (UK) or Tokyo (Japan).

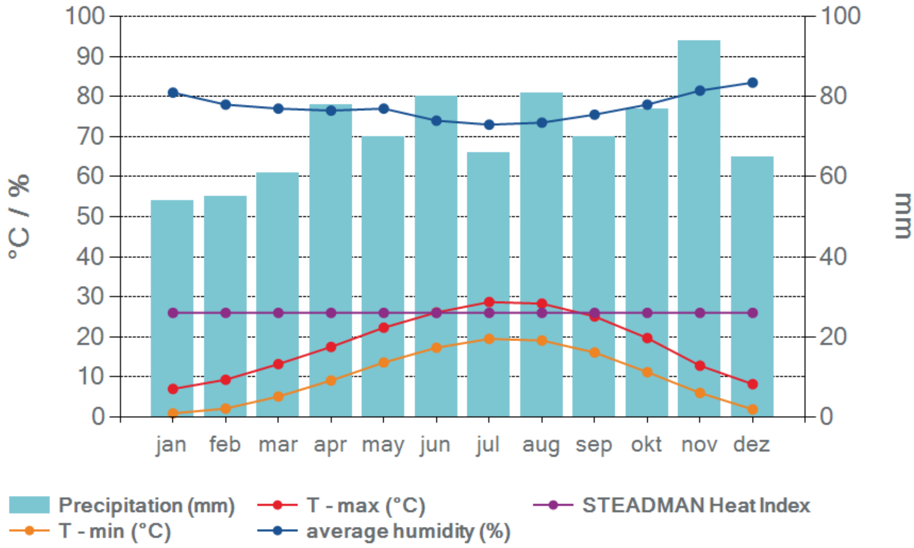
With 95 percent probability a lower limit load of 32 kg/m2 can be exceeded.

With 5 percent probability an upper limit load of 163 kg/m2 can be exceeded.

Explanation: The snow loads given here were calculated on the basis of globally available climate data. The modeling process used for this purpose has been calibrated on the basis of numerous specific local building codes and recommendations that come from different climate zones and topographical altitudes around the world. The calculated figures should therefore be understood only as a guide. They are not suitable as a basis for the structural design of buildings.

FOR THE STRUCTURAL DESIGN OF BUILDINGS ONLY SNOW LOADS ARE ALLOWED WHICH ARE PUBLISHED BY THE LOCAL AUTHORITIES. CONTACT YOUR MUNICIPAL BUILDING DEPARTMENT.

Climate Diagram



Explanation: The STEADMAN heat index reflects the perceived temperature in the higher temperature range. The long-term average values of real temperatures and humidity are included in his calculation. A perceived temperature of up to 26 ° C is defined as not critical to health. At the location under survey, this value is never exceeded in any month. This means that a pleasant climate for Europeans can be expected throughout the seasons.

HAZARD AND RISK ANALYSIS

The following HAZARDS are recalculated by K.A.R.L. for each individual evaluation on the basis of scientific data. Existing hazard maps (see section Data Sources) are only used for control and comparison purposes. The RISKS derived from the hazards also depend on local factors (terrain height, existing protective measures, building quality, etc.) and the vulnerabilities predefined by the user specified below (specific sensitivities of the potentially affected goods / plants / buildings to the natural hazards investigated).

1. Volcanism

No known recent volcanic activity within 200 km radius from the location under survey.

2. Earthquake

The site is located in an area where a low earthquake hazard is to be expected.

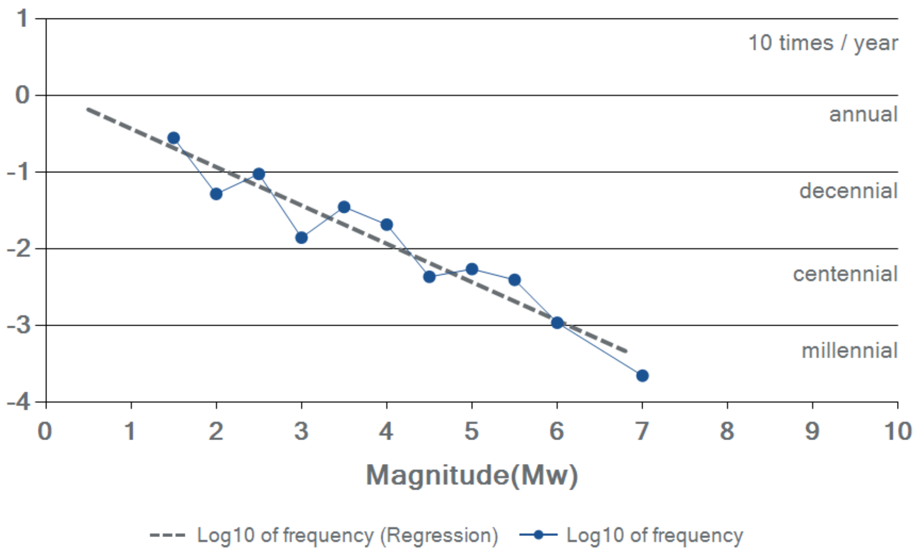
Due to unfavorable geological conditions (possibly problematic ground, short distance to historically known hypocentres etc.) a locally increased degree of hazard has to be expected additionally.

There have been a total of 133 earthquakes since the year 745 within a radius of 50 km from the location under survey. Their hypocentres were comparably close to the surface at a depth of less than 100 km. The mean depth of the hypocentres was 16 km.

This data was evaluated statistically leading to the following results:

Frequency of Earthquakes

The sample of earthquakes has been categorized according to their magnitudes and occurrence probabilities. The latter have been normed to a reference area of 7854 km2 (R = 50 km). The Gutenberg-Richter-relation (see diagram below) shows the occurrence probabilities (Y) for different magnitudes (X).



The strongest earthquake registered so far occurred on 31.5.802 at a distance of 31 km from the location under survey. According to historical reports the only fact known about this earthquake is that there a probable MM-Intensity of X (intense, well built structures and constructions destroyed) could be noticed in its epicentre. Compared to earthquakes from more recent times the magnitude of this earthquake has been reconstructed to have been about Mw = 6,8.

The classification of the earthquake hazard is usually done with a 475 year event taken from statistical frequency analysis. In this case this would mean a magnitude of Mw = 5,5 and an MM-Intensity of VII (very strong, medium damage at buildings possible) at the location under survey. When determining the intensity of the earthquake normal soil conditions were presumed (e.g. subsoil from sediments with a mean to a high degree of compactness and only a moderate degree of moisture). We recommend verification of this presumption at the location.

Expected MM-Intensities at the location

Return Period 10 years:	(-)
Return Period 20 years:	I-II
Return Period 50 years:	III
Return Period 100 years:	IV
Return Period 200 years:	V-VI
Return Period 475 years:	VII
Return Period 1000 years:	VIII
Return Period 2000 years:	IX-X

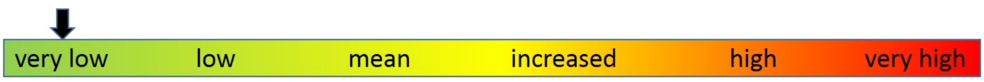
MM-Intensities (Modified Mercalli Scale)

I. Instrumental	Not felt by many people unless in favourable conditions.
II. Weak	Felt only by a few people at best, especially on the upper floors of buildings. Delicately suspended objects may swing.
III. Slight	Felt quite noticeably by people indoors, especially on the upper floors of buildings. Many do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV. Moderate	Felt indoors by many people, outdoors by few people during the day. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rock noticeably. Dishes and windows rattle alarmingly.
V. Rather Strong	Felt outside by most, may not be felt by some outside in non-favourable conditions. Dishes and windows may break and large bells will ring. Vibrations like large train passing close to house.
VI. Strong	Felt by all; many frightened and run outdoors, walk unsteadily. Windows, dishes, glassware broken; books fall off shelves; some heavy moved or overturned; a few instances off fallen plaster. Damage slight.
VII. Very Strong	Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well built ordinary structures; considerable damage in poorly built badly designed structures; some chimneys broken. Noticed by people driving motor cars.
VIII. Destructive	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.
IX. Violent	General panic; damage considerable in specially designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X. Intense	Some well built wooden structures destroyed; most masonry and frame structures destroyed with foundation. Rails bent.
XI. Extreme	Few, if any masonry structures remain standing. Bridges destroyed. Rails bent greatly.
XII. Cataclysmic	Total destruction - Everything is destroyed. Lines of sight an level distorted. Objects thrown into the air. The ground moves in waves or ripples. Large amounts of rock move positions. Landscape altered, or levelled by several meters. In some cases, even the routs of rivers are changed.

The risk analysis relates to storage of goods in the open.

Vulnerability Earthquake

The vulnerability has been defined as loss percentage depending on the MM-Intensity at the location under investigation and refers to "K.A.R.L., Standard-Annahme". It has been used to calculate the following risk figures.



Risk Figures Earthquake

Probable Maximum Loss, Return Period 50 years (%):	0
Probable Maximum Loss, Return Period 100 years (%):	0,053
Probable Maximum Loss, Return Period 200 years (%):	0,26
Probable Maximum Loss, Return Period 500 years (%):	2,3
Probable Maximum Loss, Return Period 1000 years (%):	7,2
Calculated Max. Loss (%):	19
Relative Risk (%/year):	0,0223

For further explanations see section RISK FIGURES.

According to these conditions the earthquake risk is classified as very low.

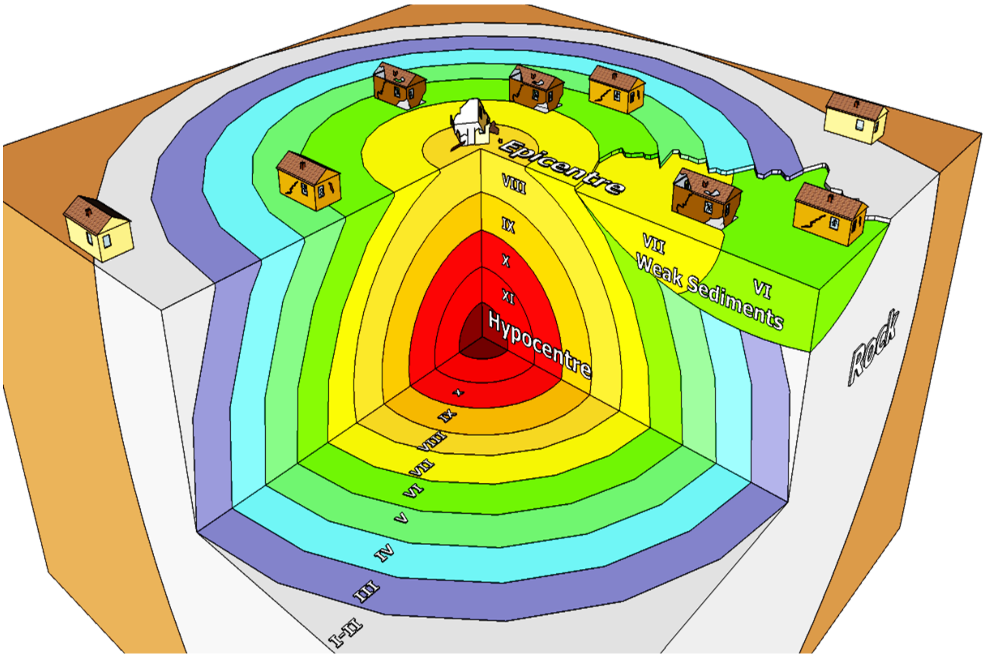
Further Explanations:

The MAGNITUDE is generally an index for the energy released during an earthquake at its hypocentre and could therefore also be given in Joule or Watt seconds. Various methods of measuring the magnitude of earthquakes are in use, leading to different scales of magnitudes (e.g. Mb, MS, Mw etc.). Nowadays, the moment magnitude (Mw) is commonly in use. The released energy can be best described by this method. We converted for our statistical evaluation as far as possible all the different magnitude figures into the Mw scale.

The INTENSITY on the other hand does not describe the force of an earthquake but its effects noticeable and visible on the surface. It is given in a scale of 12 steps, written in Roman figures. Alternatively it could be given as the ground acceleration at the location of observation. The intensity decreases strongly with the distance from the epicentre. Furthermore, the intensity very much depends on the local condition of the geological ground. Soft ground consisting of fine grained sediments and in addition water saturated can significantly increase the intensity of the earthquake, particularly in the case of artificially filled in ground.

Relationship between Magnitude and Intensity (schematic)

The MAGNITUDE is generally an index for the energy released during an earthquake at the hypocentre. The INTENSITY on the other hand describes its effects noticeable and visible on the surface. It is given in a scale of 12 steps, written in Roman figures.



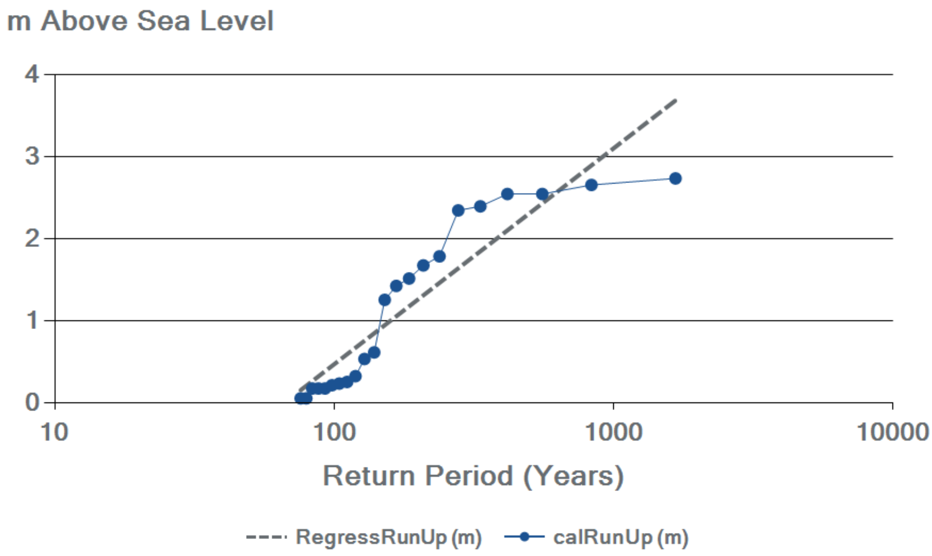
3. Tsunami

The location under survey is less than 30 km away from the coast line and at an elevation of 1,00 m above sea level. In principle, therefore, a latent tsunami hazard can be assumed.

Since the year 342 a total of 22 tsunami occurrences have been registered on the coast lines near the location. (For historical occurrences with no detailed information we assumed a wave height of between 2 and 3 m maximum for this evaluation). The highest wave reported in the wider environment was 2,6 meters. The analysable data was standardised for the location under survey and afterwards underwent a statistical frequency analysis.

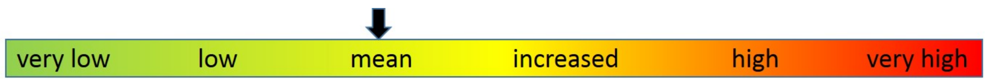
Frequency of Tsunami Events

For the location under investigation the diagram below shows the runups (wave heights of tsunamis) corresponding to their return periods. The given heights relate to the mean sea level. The risk analysis is based on the regression line shown in the diagram.



Vulnerability Tsunami

The vulnerability has been defined as loss percentage under the impact of salt water depending on the possible flood height on top of the surface at the location under investigation and refers to "K.A.R.L., Standard-Annahme". It has been used to calculate the following risk figures.



When calculating the risk we assumed that in the coastal area in question there must be dykes or protective walls with a height of at least 2,3 meters above sea level. As this is only an estimation by K.A.R.L. we urgently recommend a verification of this matter at the location.

Risk Figures Tsunami

Probable Maximum Loss, Return Period 50 years (%):	0
Probable Maximum Loss, Return Period 500 years (%):	100
Relative Risk (%/year):	0,2088

For further explanations see section RISK FIGURES.

According to these conditions the tsunami risk is classified as notable.

NB: The exact elevation was not given, but is most important for a correct classification of the tsunami risk. It is strongly recommended to find out the exact elevation and repeat this analysis.

4. Surge (River Flood, Flash Flood, Drainage Failure)

The hazard analysis based upon the digital elevation model came to the following conclusion:

The location under survey is in a coastal area within an area with a slight slope. Natural drainage is hardly influenced. However, strong precipitation and/or blockage of the sewage system might lead to rare occasions of surge. Therefore, the POSSIBILITY of surge is marginal considering the local landscape.

The location at an elevation of 1,00 m above sea level is 0,76 m higher than the maximum water level of 0,24 m above sea level calculated by K.A.R.L. from the digital elevation model.

Under these conditions no immediate risk of surge can be identified from the given facts.

However, local floods can also be triggered by heavy rainfall events. The associated risk is discussed in the following section (Heavy Rainfall).

Apart from that due to the regional climate conditions there is a danger of hailstones or ice blocking the drainage systems and hereby causing local flooding.

NB: The exact elevation was not given, but is most important for a correct classification of the risk of surge. It is strongly recommended to find out the exact elevation and repeat this analysis.

5. Heavy Rainfall

Heavy rainfall is usually a relatively limited phenomenon and can also occur in flood-safe zones. Conversely, floods or flash floods can be caused by heavy rainfall events which occur far away from the investigated location, but do not hit it directly. The hazard locations of a heavy rainfall event and the associated flash flood are therefore not identical. Hence, K.A.R.L. assesses flood and heavy rain risks separately, as these are independent risks.

Heavy rainfall can cause damage, which -unlike flooding- can occur under the influence of unfavorable conditions in the smallest possible space. In the first place, there is water inrush into cellars and underground garages as well as their entrances, inner courtyards closed on all sides, underpasses and small local depressions. All structures mentioned are often constructed and have only a small surface area. K.A.R.L. is therefore unable to recognize them on the basis of the digital elevation models used. In addition, there is possible damage caused by the ingress of rainwater into buildings, vehicles and means of transport (wagons, containers, boxes, packaging foils, etc.) as well as impairments caused by washed out infrastructure systems.

Furthermore, the risk of being affected or damaged by heavy rain depends highly on the absorption capacity of the local sewage systems. Due to economic considerations, these are normally only designed for rainfall that occurs at statistical intervals of 3 to 10 years (design rainfall). A higher degree of protection is rare to find and is therefore not used in this context. If the design rainfall is exceeded, it results in overflow, the leakage of sewer water on the surface and the associated consequential damage.

A model developed by KA based on globally available climate data and calibrated on the basis of measured precipitation data from more than 1,700 weather stations worldwide is used to calculate the heavy rain hazard and the resulting risk. For each point on earth (except Antarctica), this model provides the approximate values of the maximum daily precipitation to be expected for return periods between 1 and 10,000 years.

Maximum Daily Precipitation (calculated by K.A.R.L. model)

5-year (mm per day)	125
10-year (mm per day)	150
20-year (mm per day)	177
50-year (mm per day)	216
100-year (mm per day)	248
200-year (mm per day)	281
500-year (mm per day)	329
1000-year (mm per day)	367
MAX (mm per day)	507

There are no globally valid and comparable definitions of the terms design rain and heavy rain. What is perceived as heavy rain depends mainly on the regional climate. In addition, the local environmental conditions that make a heavy rainfall a damaging event can hardly be specified. Against this background, it is not possible to determine specific vulnerabilities on the one hand and, on the other hand, there is no global comprehensive information on the dimensioning of wastewater systems available. The following generalized assumptions are used in the present analysis:

1. The design rainfall is based on the local 5-yearly daily precipitation, to be stated as precipitation height in mm (from K.A.R.L. rounded up or down to the nearest full 50 mm/day). The maximum design rainfall is assumed to be 250 mm/day. Furthermore, it is assumed that the design rainfall calculated by K.A.R.L. is only included in the dimensioning of sewage systems with a probability of 25%. On the other hand, it is assumed with a probability of 75% that the design rainfall will hardly be higher than 100 mm/day.

2. Precipitation events below or at the level of the assumed design rainfall do not cause any damage.

3. Precipitation events exceeding the assumed design basis rainfall are regarded as heavy rainfall.

4. The factor by which a heavy rainfall of a given return period exceeds the assumed design rainfall is decisive for the potential degree of damage.

5. The highest possible damage is assumed by K.A.R.L. if a heavy rainfall event produces 5 times the amount of precipitation of the assumed design rainfall. It is equated with the maximum damage which, according to the vulnerability used, applies to floods. Between the first exceedance of the design rainfall and the potential maximum value, an exponential increase in the loss potential is assumed.

On this basis, it is assumed in the present case that the local drainage systems at the investigated site are (or should be) designed for a design rainfall of 100 mm per day and that no damage from heavy rainfall is to be expected up to this precipitation level. Under the regional meteorological conditions, precipitation can only be classified as heavy rain if it exceeds this value.

This results in the following risk figures.

Risk Figures Heavy Rainfall

Probable Maximum Loss, Return Period 50 years (%):	1,7
Probable Maximum Loss, Return Period 100 years (%):	2,5
Probable Maximum Loss, Return Period 200 years (%):	3,7
Probable Maximum Loss, Return Period 500 years (%):	6,7
Probable Maximum Loss, Return Period 1000 years (%):	11
Calculated Max. Loss (%):	62
Relative Risk (%/year):	0,1199

According to these conditions the risk of heavy rainfall is classified as notable.

6. Storm Surge

Due to the local elevation and / or very short distance to the coast line of less than 500 m, a storm surge hazard is generally to be expected. There is an urgent need for investigation.

The calculation of the hazard of storm surge and the resulting risks is based upon the analyses of possible wind speeds at the coastal sea area, regional tidal currents and the shape of the coast line. From these facts maximum water levels or wave heights were derived which are to be expected to occur during storm surges with different return periods.

Hydrographical Figures (Offshore Wave Heights)

HW-10 (m above sea level)	1,74
HW-20 (m above sea level)	1,89
HW-50 (m above sea level)	2,10
HW-100 (m above sea level)	2,26
HW-200 (m above sea level)	2,43
HW-500 (m above sea level)	2,65
HW-1000 (m above sea level)	2,82
HW-MAX (m above sea level)	3,41

When calculating the risk, it was assumed that there must be protective dams, dykes, walls or other technical measures in the region to protect the terrain from extreme waves resulting from a storm surge with a statistical return period of 100 years. Since this is only an estimation by K.A.R.L. we urgently recommend verification at the location.

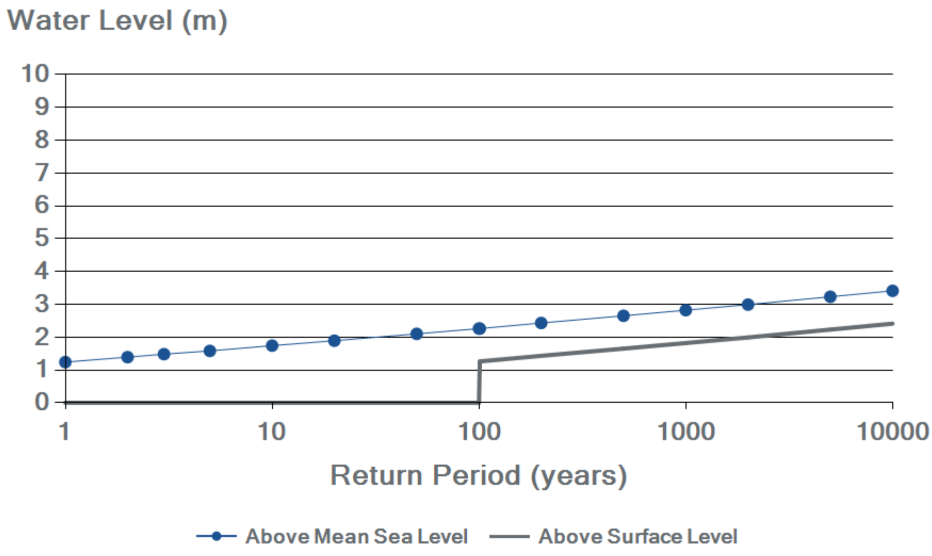
Failure of technical protection targets

In the immediate vicinity of the coast, the effect of technical protection targets in the case of a storm surge may be limited, since extremely high waves can overflow the protective walls or dike considerably. This fact is taken into account in the present risk analysis. Here it is assumed that the waves impacting on the shore can reach about twice the height of the water level rise caused by the storm surge.

The risk analysis in this case assumes that there will be no significant damage up to the 100 year event. Beyond that, however, much higher damage is to be expected.

Frequency of Storm Surge Events

The following diagram shows the expected offshore wave heights, which can occur close to the shore (less than 500 meters) during a storm surge, depending on its individual return period. These figures refer to the mean sea level. In addition, the associated possible heights at the location itself, up to which these waves could cause damage, are reported in meters above ground level.



Vulnerability Storm Surge

The vulnerability has been defined as loss percentage under the impact of salt water depending on the possible flood height on top of the surface at the location under investigation and refers to "K.A.R.L., Standard-Annahme". It has been used to calculate the following risk figures.

Risk Figures Storm Surge

Probable Maximum Loss, Return Period 50 years (%):	0
Probable Maximum Loss, Return Period 200 years (%):	69
Probable Maximum Loss, Return Period 500 years (%):	73
Probable Maximum Loss, Return Period 1000 years (%):	76
Calculated Max. Loss (%):	88
Relative Risk (%/year):	0,6932

For further explanations see section RISK FIGURES.

According to these conditions the risk of storm surge is classified as increased.

NB: The exact elevation was not given, but is most important for a correct classification of the risk of storm surge. It is strongly recommended to find out the exact elevation and repeat this analysis.

7. Storm

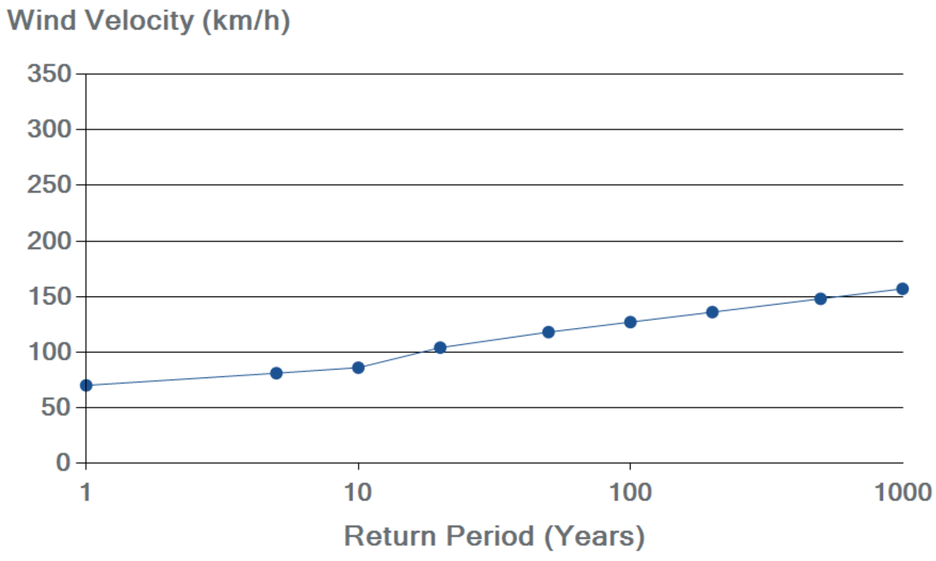
The site under investigation is located in a region where a low storm hazard can be assumed.

The calculation of the storm hazard with K.A.R.L. is based on KA's own analyzes of approximately 5000 weather stations worldwide. These stations provide relevant long term measurements of local wind speeds. In this context, no distinction is made between tropical cyclones and extratropical storms. Furthermore, we used the digital elevation model to examine whether the landscape morphology around the location might influence the maximum wind speed to be expected there.

Wind forces of >= 8 Bft (>=72 km/h) might occur about every 1 years according to the statistical analysis of the data. A 100 year storm event would mean a local maximum wind speed of 127 km/h.

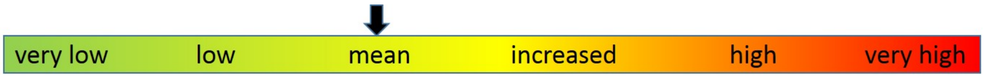
Frequency of Storms

The following diagram shows the wind speed of the maximum expected strong gusts depending on their individual return periods. Wind speeds are classified as follows : storms 89-102 km/h, severe storms 103-117 km/h, gales and tropical storms 118-177 km/h; severe tropical storms > 178 km/h



Vulnerability Storm

The vulnerability has been defined as loss percentage depending on the possible wind speed at the location under investigation and refers to "K.A.R.L., Standard-Annahme". It has been used to calculate the following risk figures.



Risk Figures Storm

Probable Maximum Loss, Return Period 50 years (%):	0,34
Probable Maximum Loss, Return Period 100 years (%):	0,56
Probable Maximum Loss, Return Period 200 years (%):	0,94
Probable Maximum Loss, Return Period 500 years (%):	1,8
Probable Maximum Loss, Return Period 1000 years (%):	2,9
Relative Risk (%/year):	0,0325

For further explanations see section RISK FIGURES.

According to these conditions the risk of storm is classified as very low.

8. Tornado

The site under investigation is located in a region where an increased tornado hazard can be assumed.

The calculation of the hazard of tornados by K.A.R.L. is based upon regional climatic parameters and geographical factors. Furthermore, within the model it was considered that large plains or slightly hilly landscapes would favour the occurrence of tornados. On the other hand, a strongly varied landscape prevents the formation of tornados or only permits tornados of a short duration. The model was calibrated using meteorological and climatic data from the USA. (Source: NOAA).

Therefore, in the region of the location under survey the statistical probability of 3,3 severe tornados p.a. is to be reckoned with on a reference area of 10.000 square km as a worst case.

Furthermore, it was presumed that significant damage only occurs when the location is directly hit by a tornado. In this case total loss is to be expected. A tornado normally only has a width of 500 m and hence, even in an area with a high hazard of tornados a direct hit occurs seldom. Therefore, in comparison to other natural risks the calculated tornado risks are generally relatively low.

The definition of vulnerability regarding tornados is based on a maximum loss potential of 100 %.

Risk Figures Tornado

Calculated Max. Loss (%):	100
Relative Risk (%/year):	0,1055

For further explanations see section RISK FIGURES.

According to these conditions the risk of tornados is classified as notable.

9. Hail

The site under investigation is located in a region where an increased hazard of hail can be assumed.

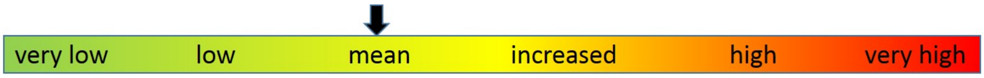
The calculation of the hazard of hail by K.A.R.L is based upon a model developed by KA. Regional climatic parameters were analysed whether they favour or hinder the formation of hail or how their effects might be mutually cancelled out. Furthermore, since hail is mostly coupled with thunderstorm, the frequency of flashes has been included in the model. The model was calibrated using meteorological and climatic data from the USA. (Source: NOAA).

Therefore, hailstones with an average diameter of < 1 cm have to be reckoned nearly every year, 2,1 ±0,9 cm with about every 10 years and hailstones with an average diameter of 3,7 ±1,0 cm have to be reckoned with about every 100 years.

No hail protection measures have been given. This information has been taken into consideration in the following risk analysis.

Vulnerability Hail

The vulnerability has been defined as loss percentage depending on the mean diameter of the hailstones and refers to "K.A.R.L., Standard-Annahme". It has been used to calculate the following risk figures.



Risk Figures Hail

Probable Maximum Loss, Return Period 50 years (%):	3,8
Probable Maximum Loss, Return Period 100 years (%):	8,0
Probable Maximum Loss, Return Period 200 years (%):	16
Probable Maximum Loss, Return Period 500 years (%):	38
Probable Maximum Loss, Return Period 1000 years (%):	45
Calculated Max. Loss (%):	50
Relative Risk (%/year):	0,4871

For further explanations see section RISK FIGURES.

According to these conditions the risk of hail is classified as increased.

METHODOLOGY

The risk and hazard classifications determined by K.A.R.L. are based on globally available geological, geographic and meteorological data sets that are stored, continuously maintained, extended and specified at KA. The methods of calculation are constantly being improved and adapted to the state of knowledge. Hence, the results refer solely to the state of knowledge at the time of this report.

The calculation methods are not based upon past claim events, they are only verified by them. This guarantees that the modelling of risks follows scientific principles and is not influenced by a random and sometimes incomplete collection of claim data.

Any missing or incomplete data is supplemented in the best plausible way by special estimation procedures developed by KA. These procedures follow generally the WORST CASE PRINCIPLE. Therefore, risk evaluations with a large amount of estimated parameters may lead to higher risk results.

IMPORTANT NOTICE:

This risk analysis was generated automatically. It was not checked for plausibility by an expert. Certain facts only visible in maps, air or satellite reconnaissance pictures which might have influenced the risk evaluation, could not be taken into account.

SOURCES OF DATA

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Data from the given sources are only evaluated and interpreted by KA. No data is passed on to third parties.

The analysis of risks made in this document is based upon data resources cited in the document and empirical values integrated in the IT-system “K.A.R.L.”. The summaries are carefully made and to the best of one’s current knowledge. Please note that risk analysis is not a forecast. Therefore, it cannot be excluded that perils which show by forecast no risk or only a minor risk may suddenly and unexpectedly cause damage on a large scale.

IMPRINT

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