# Arneken Galerie Hildesheim Climate-Related Risk Assessment Appendix

## Klépierre Projekt Arnekenstrasse Vermietung GmbH

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# GLOSSARY

| | |
|---|---|
| AR | Assessment Report |
| BMS | Building Management System |
| BREEAM | Building Research Establishment Environmental Assessment Method |
| CAPEX | Capital Expenditures |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | Carbon dioxide equivalent |
| COP | Conference of the Parties |
| CRREM | Carbon Risk Real Estate Monitor |
| DNSH | Do No Significant Harm |
| EPC | Energy Performance Certificate |
| ETS | Emissions Trading Scheme |
| EU ETS | European Union Emissions Trading Scheme |
| EV | Electric Vehicle |
| GHG | Greenhouse Gas |
| GIA | Gross Internal Area |
| GRESB | Global Real Estate Sustainability Benchmark |
| GWP | Global-warming potential |
| HCFCs | Hydrochlorofluorocarbons |
| HVAC | Heating, Ventilation and Air Conditioning |
| IPCC | Intergovernmental Panel on Climate Change |
| ISO | International Organisation for Standardisation |
| LED | Light emitting diode |
| LEED | Leadership in Energy and Environmental Design |
| OECD | Organisation for Economic Co-operation and Development |
| PAI | Principal Adverse Impact |
| PPA | Power Purchasing Agreements |
| PV | Photovoltaic |
| RCP | Representative Concentration Pathway |
| SDA | Sectoral Decarbonisation Approach |
| SFDR | The Sustainable Finance Disclosure Regulation |
| SSP | Shared Socioeconomic Pathway |
| TCFD | Task Force on Climate-Related Financial Disclosures |

# CONFIDENTIALITY

This document contains the findings and conclusions of a climate risk assessment for a commercial property, Arneken Galerie Hildesheim, located at Arnekenstraße 18, 31134 Hildesheim, Germany. The assessment was undertaken by Longevity Partners ('Longevity') on behalf of Klépierre ('the Client'). This document is private and confidential and is not to be shared without the Client or Longevity's prior approval.

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This risk assessment is a detailed approach to determining the overall potential impact that physical and transition climate-related risks might pose to the asset under evaluation. The prediction of future climate change is caveated with uncertainties. Whilst every effort has been made in predicting the situation and outcome at each location by the data provider, the very nature of climate-related risks is based on uncertainty and extreme variability, and therefore it is likely that extreme or highly unpredictable events may still occur which are outside the data provider and Longevity Partners' scope of responsibility or control. The results should therefore be interpreted as possible indications on how the climate may unfold over the future rather than certain fact. Moreover, percentage certainty in the datasets rapidly declines the further into the future the analysis is undertaken. The principal analysis of this report concludes with an evaluation of potential social and financial implications. Please note that this assessment is not a social impact or value assessment but does incorporate a qualitative analysis of the potential financial impact that the determined risks could pose on key areas of the business. Please note that this assessment is high level and should not be used as an indication of financial impact likelihood or severity. The Client should seek independent financial advice for a detailed monetary value of this risk.

References to Longevity Partners herein refer to Longevity Partners Limited and its affiliates.

# 1. INTRODUCTION

Longevity Partners was instructed by Klépierre to support the integration of climate risk analyses for selected commercial assets within the Klépierre portfolio.

Climate change has been recognised as one of the most significant risks of the 21st century to the global economy and environment. To avoid the most severe consequences of climate change, global temperature rise must be limited to below 2°C. From insurance to real assets and beyond, all sectors must incorporate contemporary knowledge of the climate risks posed to their assets into their overarching business plan and mitigate these risks accordingly.

Climate-related risks can be divided into two main categories: physical risks and transition risks. Physical risks are those which are caused by acute weather events and chronic weather patterns, whereas transition risks are associated with the transition towards a low-carbon economy, such as carbon taxation, imposed constraints on consumption or reputation risk.

The physical risk analysis uses climate information delivered by the Munich Re Location Risk Intelligence (Munich Re) climate platform. Munich Re unifies and processes the most up to date climate models to deliver information on 28 key climate hazards: heat wave, cold-frost, wildfire, changing temperature, heat stress, temperature variability, permafrost thawing, cyclone-hurricane-typhoon, storm, tornado, changing wind patterns, drought, heavy precipitation, flood, glacial lake outburst, changing precipitation patterns, precipitation variability, ocean acidification, saline intrusion, sea level rise, water stress, avalanche, landslide, subsidence, coastal erosion, soil degradation, soil erosion and solifluction. The data provided is high resolution, offering climate data up to a 30-metre grid resolution under different timescales and climate scenarios and Shared Socioeconomic Pathways (SSPs) from present day through to 2100. This allows for the appropriate analyses required to report in-line with the recommendations for the Taskforce on Climate-Related Financial Disclosures (TCFD). This report also assesses the risk of the asset to other climate and geophysical hazards via exposure data from other third-party data sources.

The transition risk assessment determines risk exposure through a review of relevant national climate legislation, technology, market conditions, and the asset's reputation followed by an analysis of asset vulnerability to these forcings. The transition risk assessment is supplemented by an evaluation of the carbon risk of the asset – misalignment year, carbon price of emissions, and cost of energy and carbon emissions – using the Carbon Risk Real Estate Monitor (CRREM).

The level of detail of this assessment is adequate for understanding the impact to the asset from the material physical and transition risks posed by climate change and the worst-case financial and social implications thereof. Following this assessment, Longevity advises that the recommendations made should be examined in finer detail when executing any risk reduction measures.

# 2. BACKGROUND

## 2.1. Asset Context

This report will address Arneken Galerie Hildesheim, owned by Klépierre Projekt Arnekenstrasse Vermietung GmbH.

Constructed in 2012, and most recently refurbished in 2018, the building is located in Hildesheim, Germany. The Gross Internal Area (GIA) is 62,995m$^2$. The asset, named Arneken Galerie Hildesheim (hereafter referred to as Arneken Galerie), includes 5 separate buildings. The main building features three floors of retail space above ground including rooftop parking whereas other 4 buildings have 2 floors of retail space above ground. All buildings are around 500 metres from the central train station Hildesheim which has connections around the city with trams and buses and has nationwide connections with trains. Many amenities are also in close proximity, including public park Magdalenengarten, the city market Marktplatz, the movie theatre Thega and a multitude of shops.

The asset energy consumption consists of electricity and heating from the district heating network. The building's technical services comprise heating, cooling and ventilation.

## 2.2. Climate Background

### 2.2.1. Shared Socioeconomic Pathways (SSPs)

The Shared Socioeconomic Pathways (SSPs) are a set of scenarios developed to explore different plausible futures of global development, considering a range of socioeconomic and environmental factors. These scenarios were created as part of the larger framework known as the Representative Concentration Pathways (RCPs), which are used in climate modelling to assess the potential impacts of different greenhouse gas concentration trajectories.

The SSPs were introduced in 2014 in the context of the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). They provide narratives of how the world could evolve in terms of demographics, economic development, technological innovation, energy use, and other key factors, which, in turn, influence greenhouse gas emissions and other drivers of climate change. The SSPs are numbered SSP1 through SSP5, each representing a distinct narrative about the future. They are designed to cover a broad range of possible futures, capturing different levels of challenges and opportunities related to climate change mitigation and adaptation. Here's a brief overview of each SSP:

- *SSP1 – Sustainability: A world with sustainable development, low population growth and strong efforts to address environmental issues. This scenario envisions a future where there is a focus on social equality, economic growth, and environmental stewardship.*
- *SSP2 – Middle of the Road: A future where historical trends continue, with moderate population growth, medium levels of economic development and gradual technological change. This scenario represents a 'middle of the road' pathway without extreme shifts in policies or practices.*
- *SSP3 – Regional Rivalry: A world characterised by high regional competition, fragmented international cooperation and slow economic growth. This scenario envisions a future with a focus on regional interests, leading to limited global collaboration.*
- *SSP4 – Inequality: A future marked by high economic inequality, both within and between countries. This scenario suggests a world where economic and social disparities widen, potentially leading to social and political tensions.*
- *SSP5 – Fossil-Fuelled Development: A future where high fossil fuel use and rapid economic growth drive increased greenhouse gas emissions. This scenario represents a pathway where current trends in energy use and economic development persist, resulting in higher emissions.*

### 2.2.2. Climate Change in the Germany

The climate in Germany is typically temperate with large-scale regional variability, ranging from more oceanic conditions in the north to more continental conditions in the east and southeast. Winters range from cold to mild and summers range from hot and dry to cool and rainy, with precipitation generally abundant but unevenly distributed due to topography. This variability is shaped by the interaction of Atlantic westerlies with continental air masses from north-eastern Europe, alongside strong elevation effects (e.g., uplands and the Alps versus lowland basins and river valleys). In recent years, extreme weather events have become increasingly commonplace in Germany. Climate phenomena such as heatwaves, droughts, forest fires, coastal flooding and flash flooding have increased in relevance as climate change progresses. These impacts are not solely the result of acute shocks but are also the consequence of long-term stressors such as incremental changes in temperature and precipitation patterns.

While Alpine and upland regions are among the coldest areas in winter, the south and sheltered basins can also experience some of the highest summer temperatures. The river valleys of the Rhine, Main, Neckar and Moselle are well known as summer heat hotspots. Heat risk is amplified in urban areas: due to the urban heat island effect, air temperatures in large cities can be several degrees higher than in surrounding rural areas and, under clear and calm conditions (especially at night), the difference can reach around 10°C or more. Monitoring based on German Weather Service datasets shows that hot days (days with a daily maximum temperature of 30°C or higher) have increased markedly since the mid-20th century – rising from roughly a few days per year in the 1950s to around low double digits per year on average across Germany today – indicating a clear upward trend in heat exposure.

Rainfall remains a defining feature of Germany's climate, but long-term observations indicate a shift in seasonal patterns. Overall annual precipitation has increased since the late 19th century, with winters becoming noticeably wetter while summer precipitation has tended to decline slightly on average. At the same time, heavy rainfall can occur anywhere in Germany and can produce localised flash flooding with short lead times. Flooding risk is driven by multiple mechanisms: more frequent wet winter periods, episodic extreme rainfall, and – in coastal areas – rising sea levels that increase exposure to storm surges and coastal flooding, particularly along low-lying stretches of the North Sea and Baltic Sea coasts. In addition, attribution research on the July 2021 flooding in western Germany indicates that human-induced climate change increased the intensity of extreme rainfall and made such events more likely, reinforcing flood risk as a material physical hazard for assets.

Drought is also a major climate-related threat for Germany. Consecutive drought years since 2018 have demonstrated how persistent soil-moisture deficits can affect agriculture, forestry, water management, energy systems and transport, while also increasing the likelihood and duration of wildfires during hot and dry periods. Reduced snowpack and earlier melt in Alpine regions can further influence seasonal water availability and summer low-flow conditions in downstream catchments. Heat is a direct risk to health and asset operation: the German Environment Agency (UBA), together with the Robert Koch Institute (RKI), estimated around 3,000 heat-related deaths in each of the summers of 2023 and 2024 in Germany, underlining the importance of preparedness for heat stress. The risk of thermal stress to an asset should therefore be carefully considered to ensure that appropriate measures are in place to protect tenants and asset users under increasingly frequent and intense heat conditions.

# 3. METHODOLOGY

## 3.1. Overview of Methodology

This risk identification and quantification process involves an analysis of climate-related physical and transition risks at the asset level. The analyses of the risk assessments consist of the following components, in accordance with industry standard methodology, ISO 14091:2021 Adaptation to Climate Change:

1) Exposure: An evaluation of the likelihood of the risk occurring or impacting at the asset's location. Therefore, no consideration for features or policies in place are included in exposure analysis.
2) Vulnerability**:** An analysis of the applicable resilience and vulnerability of the asset to the risks of climate change. Specific features of a building and management practises can protect against these risks, and so implementing additional specific features, or making changes to systems and processes, can therefore reduce vulnerability. This analysis is expressed as a combination of the Sensitivity (2a) and Adaptive Capacity (2b).
    a. Sensitivity: Elements of the building, or its surrounding areas, which would not be easily adaptable nor controllable with resilient implementations.
    b. Adaptive Capacity: Elements of the building or its management that can be more easily adapted or controlled to build resilience against identified risks.
3) Overall Risk and Recommendations: A conclusion of the overall risk calculated by weighting the exposure of the risk against the vulnerability (sensitivity and adaptive capacity) to determine the degree to which the asset may be impacted by the identified risk. This is complemented by a series of proposed actions which can be implemented to enhance the resilience of the asset, and the wider portfolio, to the risks.

Table 1 (adjacent) illustrates the key used to quantify exposure, sensitivity, adaptive capacity and overall hazard rating. This key utilises the scoring system provided by Munich Re to provide a uniform rating system throughout the assessment.

*Table 1. Risk Key.*

| Risk Rating | Risk Level |
|---|---|
| 1 | Very Low |
| 2 | Low |
| 3 | Medium |
| 4 | High |
| 5 | Very High |

## 3.2. Physical Risk Exposure

High-resolution climate data sourced from Munich Re Location Risk Intelligence was used to assess risks of the following: heat wave, cold-frost, wildfire, changing temperature, heat stress, temperature variability, permafrost thawing, cyclone-hurricane-typhoon, storm, tornado, changing wind patterns, drought, heavy precipitation, flood, glacial lake outburst, changing precipitation patterns, precipitation variability, ocean acidification, saline intrusion, sea level rise, water stress, avalanche, landslide, subsidence, coastal erosion, soil degradation, soil erosion and solifluction.

This data is notable for its granularity, extending down to the 30-metre grid resolution. Specific Shared Socioeconomic Pathway (SSP) scenarios – SSP2-4.5, SSP3-7 and SSP5-8.5 – and timescales – present-day, 2030, 2040, 2050, and 2100 – are available and utilised for this scope of assessment. The inclusion of such scenarios and timescales is crucial for enabling detailed analyses required to align with the Task Force on Climate-related Financial Disclosures (TCFD) and the European Union (EU) Taxonomy. By incorporating this level of detail, the assessment ensures that it not only captures trends but also provides an understanding of the potential physical risks associated with climate change.

The physical risk assessment focuses on hazard variables, allowing for a robust analysis of the direct impacts of climate-related hazards. The absolute data metrics, employed in this analysis, contribute to the determination of hazard ratings – quantitative values from 1 (very low exposure) to 5 (very high exposure). In some instances, multiple absolute data metrics are considered, reflecting the complex interplay of various factors influencing the hazard ratings.

## 3.3. Transition Risk Exposure

The exposure of Arneken Galerie to climate-related transition risks is broken down into four methods of analysis.

### 3.3.1. Policy and Regulation

The interrelated nature of policy and regulation means that considering them under the same risk has been deemed necessary. A national-level legislative review of relevant climate policies is conducted and illustrated in the form of a collated list of pertinent regulations and current climate-related trends that may affect the operations of the asset. An exposure risk score is provided based on its perceived or potential impact on the asset. For example, an asset located within a country with stringent legislation regarding climate change adaptation and resilience, energy consumption, and transparency and reporting would be considered at high exposure risk.

### 3.3.2. Market - CRREM Analysis

CRREM has developed decarbonisation pathways for commercial real estate assets in collaboration with the Science-Based Targets Initiative using the statistical framework of the Sectoral Decarbonisation Approach (SDA). These pathways can be used to benchmark the current and future performance of commercial real estate assets against the long-term international targets. Pathways are provided for both energy and greenhouse gas intensity, based on asset floor area. The SDA approach considers the capacity for each sector to achieve emissions reductions, based on energy use patterns, and the capacity of each national grid to decarbonise, based on planned policies and forecasted projections of future grid energy mix. This results in differing national and asset type pathways.

Energy reductions are often required by an asset, in light of the decarbonisation of the national grid, in order to reach the required greenhouse gas emissions reductions. Some regional grids already have a large share of renewable energy in their electricity mix, which results in assets requiring less decarbonisation to reach the necessary targets, and thus a lower risk. However other grids have much slower planned decarbonisation, therefore the energy targets are relatively more stringent and a higher exposure risk is associated. Market exposure is determined by the rate of energy reduction required by an asset for its associated pathway by 2050. The asset is classified within the CRREM tool as ‘Retail Shopping Centre’, which is defined as: “Enclosed centres for retail purposes. Examples may include, but are not limited to, regional malls and shopping malls.” (CRREM Reference Guide, 2020).

*Table 2. CRREM Data – Arneken Galerie Hildesheim.*

| Asset Details | |
|---|---|
| **Asset Type** | Shopping Centre |
| **Total Gross Internal Area – Whole Building** | 62,995 m² |
| **Annual Vacant Area** | 0 m² |
| **Consumption Year** | 2025 |
| **Grid Electricity Consumption** | 816,810 kWh |
| **On-Site Renewable Electricity Generation** | null |
| **District Heating Consumption** | 855,021 kWh |
| **District Cooling Consumption** | N/A |
| **Reporting Method** | Location-Based Approach |

This tool is used to project the asset’s “CRREM misalignment year”, which refers to the year in which the asset’s carbon emissions performance is no longer expected to follow a 1.5°C decarbonisation trajectory, as outlined within the Paris Agreement. It compares the asset’s projected emissions trajectory against national and asset-type decarbonisation pathways, accounting for evolving regulations, carbon pricing, grid decarbonisation, and climate impacts on heating and cooling demand. The tool categorises exposure risk based on the misalignment year, ranging from very high exposure (misalgnment prior to 2030) to low exposure (aligned through to 2050). It also models the financial implications of misalignment, including the “Carbon Cost of Excess Emissions after Misalignment” and “Cost of Energy and Carbon Emissions,” using country-specific carbon prices and energy rates. Where applicable, the tool provides decarbonisation targets aligned with CRREM pathways to quantifiably guide each asset’s transition plan.

### 3.3.3. Technology

Technology exposure is assessed for six key technologies based on their competitiveness within each region, and any pertinent regulations concerning their implementation. A high exposure risk rating may be due to mandatory regulations to implement the technology, or from incentives and schemes which make the technology competitive, therefore the asset would be less competitive (higher exposure risk) if the technology is not implemented.

For global consistency, this assessment considers five technologies as the low-carbon emerging technologies that will increase competitiveness among organisations and will assist assets in their decarbonisation transition. These are: on-site renewable energy generation systems, green energy tariffs, electric vehicle (EV) chargers, automatic meter readings, and smart building technologies (such as building management systems and occupancy sensors). An additional technology is also considered: gas boilers, which are considered the key technology to hinder the decarbonisation efforts of an organisation.

### 3.3.4. Reputation

In this section, the reputation exposure risk posed by changing consumer preferences and stakeholder concern and feedback is assessed. Exposure of the asset to these risks is driven by the type of sector the asset belongs to, its location and the associated trends analysed within these variables. Other climate-related reputation risk such as social disruption through national instability or population shifts are not considered of significant enough exposure to be included within the scope of this assessment.

## 3.4. Social Implications

A review is undertaken of the social implications of physical and transition climate risks, particularly the effect on the economic stability, safety, and well-being of individuals and communities, as well as the financial performance and sustainability of real estate assets. A key focus here is given to the engagement opportunities that the asset has within the community due to the critical importance to incorporate local area involvement and influence when designing solutions and implementing new measures to mitigate and adapt to climate change.

## 3.5. Vulnerability of Zones

The vulnerability of different zones is broken down in Section 7 and in the Executive Summary Report. The purpose of this analysis is to give a high-level indication as to the relative vulnerabilities of different elements of the asset to the discussed risks.

The considered zones are: Construction, Façade, Rooftop, Indoor Space, Outdoor Space, Adaptation Measures, Technical Equipment, Smart Building Technologies, Water and Waste Dynamics, Policies and Procedures and, Stakeholder Engagement. The representation of each of these zone's vulnerability is an analysis of answers given by property management and asset observations which are relevant for the material hazards defined in the scope of this assessment.

## 3.6. Financial Impact Assessment

### 3.6.1. Climate Expected Loss

As calculated by Munich Re Location Risk Intelligence, Climate Expected Loss is the average annual loss (annualised expected loss) due to physical damage to buildings and their contents due to physical hazard events. The Climate Expected Loss is measured relative to the total cost of rebuilding, assuming region-specific standard building characteristics which are captured in the vulnerability functions used and is expressed as a percentage of its rebuilding cost, ranging from 0.00% to 100%.

Climate Expected Loss is available for the storm hazards of tropical cyclone and extratropical storm and the flood hazards of river flood (defended) and storm surge (defended). It is calculated by combining the expected peak wind speeds of tropical cyclones and extratropical storms, or the expected flood inundation depths, for multiple return periods within the relevant grid cell, with asset vulnerability curves. These vulnerability curves relate the intensity of a hazard event to the expected damage, which is expressed as a damage ratio, i.e. the ratio of the cost of repairing the damage to the total cost of replacing the building and its contents entirely (if it is totally destroyed). The vulnerability curves depict the estimated damage to buildings in different parts of the world on the basis of differences in building type, materials and local building codes. This yields the location-specific exceedance probabilities. Climate Expected Loss is the expected value of the modelled loss distribution, including information on local flood protection measures.

### 3.6.2. 1-in-100 Year Damage

As calculated by Munich Re Location Risk Intelligence, the storm hazards of tropical cyclone and extratropical storm and the flood hazards of river flood (defended) and storm surge (defended) are within scope for return period damage analysis.

The 1-in-100-year damage measures the mean damage degree to an affected asset at a location-specific hazard intensity for the applicable hazard with a return period of 100 years. This metric indicates the extent of damage to the asset, expressed as a percentage of its rebuilding cost, ranging from 0.00% to 100% (representing none to total destruction). The degree of damage depends on the asset type. Standard buildings can vary across regions in terms of size, quality and building standards, which is reflected in region-specific damage functions describing the functional relationship between the hazard intensity and the resulting damage.

### 3.6.3. Financial Risk Analysis

The Financial Impact Assessment is summarised in the Executive Summary report. In this assessment, a review of the overall risks posed by climate change determines their overall impact on key financial areas that would affect asset continuity in the future. This is broken down into the following areas: increased operating costs, asset write offs, reduced demand for asset products and services, capital investments in technology, adaptation costs, shifts in energy costs, repricing of assets, reduced revenue from the workforce, reduction in capital availability and increased capital costs. This is evaluated based on the culmination of the aforementioned risk assessments undertaken, referencing the most pressing time period and extreme climate scenario (SSP5-8.5 for physical risks or 1.5℃ for transition risks). This is then expressed as a qualitative rating scale (low, medium, high) to provide an indication of the financial impacts that could be caused to the business by these risks.

### 3.6.4. Risk Reduction Measures and Costs

Due to the interlinked nature of climate-related risks, the key recommendations listed in the report that should be considered to build the resilience of the asset against future climate change are summarised in the Executive Summary report. The indicative cost figures are derived from market research to provide a high-level estimation of costs. It should be noted that these prices are designed to be indicative only and are likely to be very variable per region and supplier.

## 3.7. Compliance to Certification Schemes

This report is compliant for a number of credits and sections within both Building Research Establishment Environmental Assessment Method (BREEAM) in Use asset certification (part 1 and part 2), and the portfolio level reporting to Global Real Estate Sustainability Benchmark (GRESB). Please see Table 3 and Table 4, which summarise the compliance to both schemes.

### 3.7.1. Compliance to BREEAM In Use

*Table 3. Report compliance to BREEAM in Use (DE/AT/CH).*

| BIU Credit | Question | Credits achieved through the Longevity Climate Risk Report |
|---|---|---|
| **Part 1: RSL 01 Flood Risk Assessment** | If a flood risk assessment (FRA) has been carried out, what was its scope and which flood risk level was assigned to the asset? | The number of credits gained here depends on the findings in the report. Since Fluvial flooding hazard is high, **1 credit is attained**.<br><br>Please note that the **exemplary credit is achieved** from this report but scored separately. Therefore, the total score will be the number of credits above plus the one exemplary credit (**1% available**). |
| **Part 1: RSL 03 Natural Hazard Risk Assessment** | Has a risk assessment been carried out to understand an asset's exposure to current Natural Hazards? | Longevity Partners drafted a Natural Hazard Emergency Plan alongside this Climate-Related Risk Assessment. This means that 2 credits will be achieved here. |

| | | |
|---|---|---|
| **Part 2: RSL 06 Emergency plans and climate-related physical risks** | What is included within the scope of the Emergency plans? | Please note that Longevity Partners can help advise on how to integrate climate-related risks into your existing emergency plan to target the **exemplary credit (1% available)** within the report and assist in integrating appropriate phrasing within the plan itself for an additional cost. This is an *additional service* to this report. |
| | Has the asset been assessed for climate-related physical risks? | **3 credits** will be achieved from this asset level report ('Yes, and the risks posed to the asset value and the community have been identified'). |
| **Part 2: RSL 07 Climate-related transition risks and opportunities** | Has the asset been assessed for exposure to climate-related transition risks and opportunities through a risk assessment process? | **2 credits** are available for **each of RSL 07 and RSL 08** if this report is not externally disclosed.<br>**4 credits** are attainable for **both RSL 07 and 08** out of this report, but only if you are willing to incorporate this onto the website of the asset itself to make it externally disclosed. Longevity Partners can again advise on the wording for this disclosure. Full TCFD reporting, however, is not included within this scope of work but can certainly be provided at an additional cost. |
| **Part 2: RSL 08 Social risks and opportunities** | Has the asset been assessed for exposure to social risks and opportunities through a risk assessment process? | |

### 3.7.2. Compliance to GRESB

*Table 4. Report compliance to GRESB.*

| GRESB Risk Category | | Risk Criteria | Potential Asset Risk |
|---|---|---|---|
| **Physical Risk** | Does the entity have a systematic process for identifying physical risks that could have a material financial impact on the entity? | Acute Hazards | The asset is not significantly exposed to the following acute GRESB hazards: Cold-Frost, Hail, Heavy Precipitation, Storm, Water Stress, and Tornado. |
| | | Chronic Hazards | The asset has material exposure to the GRESB hazard of subsidence and cold. |
| | The entity's process for prioritising physical risks | This is the entity's preference. It is recommended that risks are prioritised by severity in the short term under the least stringent climate scenario. | |
| | How materiality determinations are made for such risks | In this assessment, materiality is determined by any hazard that shows a risk of moderate to extreme under each respective climate scenario and time horizon. | |
| | Does the entity have a systematic process for the assessment of material financial impact from physical climate risks on the business and/or financial planning of the entity? | Section 7 of the Appendix Report assesses the financial exposure to all direct and indirect physical risk impacts. | |
| **Transition Risk** | The entity's process for prioritising transition risks | This is the entity's preference. It is recommended that risks are prioritised by severity in the short term under the least stringent climate scenario. | |
| | How materiality determinations are made for such risks | In this assessment, materiality is determined by any hazard that shows an exposure risk of medium or higher under any respective climate scenario and time horizon. | |
| | Does the entity have a systematic process for identifying transition risks that could have a material financial impact on the entity? | Increasing price of GHG emissions | Current carbon price is ~€60/tCO2e under the German national emissions trading system, which is an increase of 689% since 2015, when the price was €7.60/tCO2e under the EU ETS. |

| | | | |
|---|---|---|---|
| | | Enhancing emissions-reporting obligations | No current emissions-reporting obligation identified, but this may change in future. |
| | | Mandates on regulation of existing products and services | Key regulations relevant for the asset are listed in Section 5.1.1. |
| | | Exposure to litigation | At least 71 recent climate litigation cases have been recorded in Germany. |
| | | Substitution of existing products and services with lower emissions options | Analysis not available from this assessment. |
| | | Unsuccessful investment in new technology | Analysis not available from this assessment. |
| | | Costs to transition to lower emissions technology | Capex to adopt risk reduction measures are provided in the Executive Summary Report recommendations. |
| | | Changing customer behaviour | See analysis in Section 5.1.4. |
| | | Uncertainty in market signals – highlight uncertainty of climate models, renewable shares, energy prices, etc | Market analysis and costs of energy and emissions are outlined in Section 5.2.1 of this report. |
| | | Increased cost of raw materials | Analysis not available from this assessment. |
| | | Shifts in consumer preferences | See analysis in Section 5.1.4. |
| | | Stigmatisation of sector | See analysis in Section 5.1.4. |
| | | Increase stakeholder concern or negative stakeholder feedback | See analysis in Section 5.1.4. |
| | The entity's process for prioritising transition risks | This is the entity's preference. It is recommended that risks are prioritised by severity in the short term under the least stringent climate scenario. | |
| | How materiality determinations are made for such risks | In this assessment, materiality is determined by any hazard that shows a risk of moderate to extreme under each respective climate scenario and time horizon. | |
| | Does the entity have a systematic process to assess the material financial impact of transition risks on the business and/or financial planning of the entity? | Section 5.2.1 of the Appendix Report assesses the financial exposure to all direct and indirect transition risk impacts. | |

## 3.7.3. Compliance to EU taxonomy

### 3.7.3.1. Background of the EU Taxonomy

The EU Taxonomy Regulation is a classification system, establishing a list of environmentally sustainable economic activities. In other words, it provides a common and clear definition of what 'sustainable' means. In doing so, it seeks to protect private investors from greenwashing, help companies to become more climate-friendly, and shift investments where they are most needed.

The six environmental objectives covered by the EU Taxonomy are:

- Climate change mitigation;
- Climate change adaptation *(focus of this report)*;
- Sustainable use and protection of water and marine resources;
- Transition to a circular economy;
- Pollution prevention and control; and
- Protection and restoration of biodiversity and ecosystems.

*This report will address the climate change adaptation objective.*

Assessing an activity's alignment with the EU Taxonomy is based on a list of criteria provided by the European Commission (Technical Screening Criteria). Criteria for the real estate and construction sector cover the following activities:

- Construction of new buildings;
- Renovation of existing buildings;
- Acquisition and ownership of buildings.

Technical Screening Criteria covering the climate change objectives (1 and 2) entered into force in January 2022. Draft criteria for the remaining objectives were published in 2023.

#### 3.7.3.2. EU Taxonomy regulation applicability

The EU Taxonomy Regulation is a mandatory classification and disclosure regime for certain large non-financial undertakings (those previously in scope of NFRD) and financial undertakings. It requires them to disclose how much of their turnover, CapEx, or Opex is taxonomy-eligible and aligned. The mandatory disclosure obligations began in 2022 (initial phase) and are currently on a roadmap of being phased in further (including from January 2024 and beyond). Full EU Taxonomy alignment reporting is not yet mandatory for all listed companies with more than 500 employees. The obligations apply specifically to undertakings in scope of the NFRD or CSRD, and are being implemented in stages: first, disclosure of taxonomy-eligible activities; subsequently, taxonomy-aligned performance against the six environmental objectives. Most companies are still transitioning towards full alignment disclosures as additional objectives and delegated acts take effect.

#### 3.7.3.3. Consideration of natural hazards to be aligned with the EU Taxonomy climate change adaptation criteria in real estate sector

The table below shows the coverage of natural risks based on Annex A of the climate change adaptation objective of the EU Taxonomy delegated act. It is important to note that the objective of adapting to climate change is also associated with the other objectives within a framework known as the "Do No Significant Harm (DNSH)". In this way, each activity wishing to know its alignment with a Taxonomy objective must carry out an analysis of current and future natural risks using the list of risks identified in Table 5.

Natural hazards are considered material based on the current or future exposure risk potential. Vulnerability and adaptation plan for below medium level risks – present or projected – are not considered necessary in this assessment as the hazard is considered to be low or non-existent.

#### 3.7.3.4. How the EU Taxonomy links with the SFDR (The Sustainable Finance Disclosure Regulation)

Under the definition given by the SFDR, funds can demonstrate that they make 'sustainable investments' by proving that their assets are EU Taxonomy-aligned investments. In SFDR product-level disclosures the Fund must demonstrate that its assets pass the following tests:

1. Substantial contribution to one of the six EU Taxonomy objectives (listed in the above EU Taxonomy section).
2. Do No Significant Harm to other EU Taxonomy objectives (DNSH).
3. Minimum Safeguards
    a. Alignment of the company carrying out the economic activity with the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises and the UN Guiding Principles for Business and Human Rights.
4. Take into account Principle Adverse Impacts

   a. Collect data on mandatory Principal Adverse Impact (PAI) indicators from Table 1 of Annex I SFDR RTS and any relevant indicators in Table 2.
   b. Apply self-defined thresholds per PAI indicator (quantitative or qualitative) to exclude principle adverse impacts.
5. Good governance
   a. This includes: sound management structures; employee relations; remuneration of staff; tax compliance.

To be classified as Article 9, a fund must demonstrate that 100% of its investments comply with the definition of ‘sustainable investments’ given above, at the point of acquisition. A fund may classify as Article 8 and commit some percentage of its assets to making sustainable investments. This is known as an Article 8+ fund. Article 8 funds have no obligation to make sustainable investments, just to promote environmental and/or social characteristics. These are self-defined thematics which guide the investment strategy of the fund.

*Table 5. EU Taxonomy Materiality Table (present).*

| Category | Severity | Climate-related hazards | Materiality |
|---|---|---|---|
| **Temperature-related** | Chronic | Changing Temperature (Air, Freshwater, Marine Water) | **Low materiality** |
| | | Heat Stress | **Low materiality** |
| | | Temperature Variability | **Medium materiality** |
| | | Permafrost Thawing | **Very Low materiality** |
| | Acute | Heat Wave | **Very Low materiality** |
| | | Cold Wave / Frost | **High materiality** |
| | | Wildfire | **Very Low materiality** |
| **Wind-related** | Chronic | Changing Wind Patterns | **Very Low materiality** |
| | Acute | Cyclone / Hurricane / Typhoon | **Very Low materiality** |
| | | Storm (Including Blizzards, Dust and Sandstorms) | **Medium materiality** |
| | | Tornado | **Medium materiality** |
| **Water-related** | Chronic | Changing Precipitation Patterns and Type (Snow/Ice, Hail, Rain) | **Very Low materiality** |
| | | Precipitation Or Hydrological Variability | **Low materiality** |
| | | Ocean Acidification | **Very Low materiality** |
| | | Saline Intrusion | **Very Low materiality** |
| | | Sea Level Rise | **Very Low materiality** |
| | | Water Stress | **Medium materiality** |
| | Acute | Drought | **Low materiality** |
| | | Heavy Precipitation (Rain, Hail, Snow/Ice) | **Medium materiality** |
| | | Flood (Coastal, Fluvial, Pluvial, Ground Water) | **High materiality** |
| | | Glacial Lake Outburst | **Very Low materiality** |
| **Solid mass-related** | Chronic | Coastal Erosion | **Very Low materiality** |
| | | Soil Degradation | **Very Low materiality** |
| | | Soil Erosion | **Very Low materiality** |
| | | Solifluction | **Very Low materiality** |
| | Acute | Avalanche | **Very Low materiality** |
| | | Earthquake / Landslide | **Very Low materiality** |
| | | Subsidence | **Medium materiality** |

# 4. PHYSICAL RISK ASSESSMENT

## 4.1. Summary of Physical Exposure Risk Assessment

The results of the Munich Re exposure data are outlined in Table 6. The asset has material exposure (at present) to Cold wave/ Frost, Flood, Temperature variability, Storm, Tornado, Water Stress, Heavy Precipitation, Subsidence and Hail. These are the only hazards relevant for vulnerability analysis. Please refer to Section 3.1 for an overview of methodology.

1) **Cold wave / Frost**: Arneken Galerie has **high** exposure at present and under all scenarios, but it decreases to **medium** under SSP3 by 2100 and **low** under SSP5 by 2100.
2) **Flood**: Arneken Galerie has **high** exposure at present, which remains high under SSP2 and SSP5 scenarios across all future time horizons, while no exposure is projected under SSP3.
3) **Temperature variability**: Arneken Galerie has **medium** exposure at present and under all scenarios to the end of the century.
4) **Storm**: Arneken Galerie has **medium** exposure at present, with no projections.
5) **Tornado**: Arneken Galerie has **medium** exposure at present, with no projections.
6) **Water Stress**: Arneken Galerie has **medium** exposure at present, then **high** exposure projected by 2050 under SSP5.
7) **Heavy Precipitation**: Arneken Galerie has **medium** exposure at present and consistent **medium** exposure projected under all scenarios to the end of the century.
8) **Subsidence**: Arneken Galerie has **medium** exposure at present and increases to **high** in 2050 under SSP2, in 2100 under SSP3 and in 2040 under SSP5.
9) **Hail**: Arneken Galerie has **medium** exposure at present, with no projections.
10) All other Munich Re physical hazards: Arneken Galerie has very low or low exposure at present. These are considered immaterial risks.

*Table 6. Physical Risk Exposure.*

| Hazard | Present | SSP2/RCP4.5 | | | | SSP3/RCP7 | | | | SSP5/RCP8.5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2030 | 2040 | 2050 | 2100 | 2030 | 2040 | 2050 | 2100 | 2030 | 2040 | 2050 | 2100 |
| Changing temperature | | Low | Medium | Medium | High | Low | Medium | Medium | Very High | Medium | Medium | High | Very High |
| Heat stress | Low | Low | Low | Low | Medium | Low | Low | Low | Medium | Low | Low | Medium | Medium |
| Temperature variability | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium |
| Permafrost thawing | Very Low | | | Very Low | Very Low | | | | | | | Very Low | Very Low |
| Heat wave | Very Low | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low | Medium |
| Cold wave / frost | High | High | High | High | High | High | High | High | Medium | High | High | High | Low |
| Wildfire | Very Low | | | | | | | | | | | | |
| Changing wind patterns | | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low |
| Cyclone / hurrricane / typhoon | Very Low | Very Low | | Very Low | Very Low | | | | | Very Low | | Very Low | Very Low |
| Storm | Medium | | | | | | | | | | | | |
| Tornado | Medium | | | | | | | | | | | | |
| Changing precipitation patterns | | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low |
| Precipitation or hydrological variability | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low | Low |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ocean acidification | | Very Low | | Very Low | Very Low | Very Low | | Very Low | Very Low | Very Low | | Very Low | Very Low |
| Saline intrusion | Very Low | Very Low | Very Low | Very Low | Very Low | | | | | Very Low | Very Low | Very Low | Very Low |
| Sea level rise | | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low | Very Low |
| Water stress | Medium | | | | | Medium | Medium | Medium | Medium | Medium | Medium | High | High |
| Drought | Low | Low | Medium | Medium | Medium | | | | | Medium | Medium | Medium | High |
| Heavy precipitation | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium |
| Flood (coastal, fluvial, pluvial, ground water) | High | High | | High | High | | | | | High | | High | High |
| Glacial lake outburst | Very Low | | | | | | | | | | | | |
| Coastal erosion | | | | Very Low | Very Low | | | | | | | Very Low | Very Low |
| Soil degradation | Very Low | | | | | | | | | | | | |
| Soil erosion | Very Low | | | Low | Low | | | | | | | Low | Low |
| Solifluction | Very Low | | | | | | | | | | | | |
| Avalanche | Very Low | | | | | | | | | | | | |
| Landslide | Very Low | | | | | | | | | | | | |
| Subsidence | Medium | Medium | Medium | High | High | Medium | Medium | Medium | High | Medium | High | High | High |
| Earthquake | Very Low | | | | | | | | | | | | |
| Volcanoes | Very Low | | | | | | | | | | | | |
| Tsunami | Very Low | | | | | | | | | | | | |
| Hail | Medium | | | | | | | | | | | | |
| Lightning | Low | | | | | | | | | | | | |

## 4.2. Cold Wave / Frost and Temperature Variability

### 4.2.1. Exposure Analysis

For cold, Table 7 outlines in more detail the evolution of variables under different scenarios and time horizons. As seen, all variables show a decrease in intensity or frequency.

*Table 7. Cold Variables (Munich Re Location Risk Intelligence).*

| Variable | Year | SSP2/RCP4.5 | SSP3/RCP7.0 | SSP5/RCP8.5 |
|---|---|---|---|---|
| Annual Minimum Temperature (°C) | Present | | -12.1 | |
| | 2030 | -10.0 | -9.5 | -10.3 |
| | 2040 | -10.0 | -8.8 | -9.3 |
| | 2050 | -9.6 | -8.3 | -8.4 |
| | 2100 | -7.9 | -5.4 | -4.4 |
| Mean Daily Minimum Temperature (°C) | Present | | 6.1 | |
| | 2030 | 6.8 | 6.7 | 6.9 |

| | | | | |
|---|---|---|---|---|
| | 2040 | 7.0 | 7.2 | 7.3 |
| | 2050 | 7.2 | 7.5 | 7.8 |
| | 2100 | 8.1 | 8.9 | 10.0 |
| Annual Frost Days | Present | | 66.8 | |
| | 2030 | 57.4 | 59.1 | 57.2 |
| | 2040 | 56.3 | 53.1 | 52.7 |
| | 2050 | 52.1 | 46.3 | 47.7 |
| | 2100 | 44.8 | 30.8 | 21.3 |
| Annual Ice Days | Present | | 16.2 | |
| | 2030 | 12.6 | 12.1 | 13.0 |
| | 2040 | 11.3 | 9.8 | 10.2 |
| | 2050 | 11.5 | 7.9 | 8.9 |
| | 2100 | 6.8 | 2.8 | 1.6 |
| Cold Spell Duration Index (days) | Present | | 5.2 | |
| | 2030 | 4.8 | 4.5 | 4.1 |
| | 2040 | 4.2 | 3.8 | 2.4 |
| | 2050 | 3.6 | 2.2 | 1.9 |
| | 2100 | 1.6 | 0.8 | 0.6 |

### 4.2.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to cold wave / frost is **medium**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various cold sensitive features of the asset:

1) The most heavily glazed façade faces east, meaning that solar gain is limited to morning hours during cold but sunny periods, and the risk of cold-associated hazards may be increased compared to south-facing façades.
2) The predominant colour of the façade (light) results in more heat being reflected than absorbed, during cold but sunny periods.
3) The main building material that the asset is constructed with (concrete) may experience long-term issues due to cold weather, like cracking if moisture penetrates the material.
4) The glazing g-values are unknown. A high solar heat gain coefficient for windows indicates that the windows allow a significant amount of solar energy to pass through, helping to warm the interior.
5) The building materials' U-values are unknown. Higher U-values may result in higher heat losses from windows, roofs and walls.

Features which enhance the asset's resilience and reduce its sensitivity to cold include:

1) The predominantly urban topography surrounding the asset. This decreases the plot's albedo effect and therefore renders the asset more likely to absorb heat.
2) The external windows are double glazing type with laminated/toughened glass which are more efficient in extreme cold weather because the double insulating layer between the panes prevents significant heat transfer.
3) The building is sufficiently insulated and can provide adequate protection from the cold.
4) The building is divided into thermal zones to control cooling/heating independently.
5) The ventilation system is designed to prevent significant build-up of moisture within the building.
6) The low proportion of the building (20%) that is glazed reduces the amount of heat that is able to escape.
7) The building materials and foundations are frost resistant and well-insulated.

### 4.2.3. Adaptive Capacity Risk Analysis

The adaptive capacity risk analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of cold to the asset from an adaptive capacity perspective is **medium**. A lower rating was not awarded due to the following cold vulnerable features:

1) The low percentage (0%) of vegetation surrounding the asset prevents evapotranspiration to occur and reduces reflectivity of the asset plot, allowing for more heat to be absorbed.
2) The absence of a relevant health and safety policy in case of cold-related events increases the vulnerability of building users.
3) The absence of heated driveways/walkways/roofs is not provided, increasing the risk of ice formation and associated hazards.
4) The absence of thermal curtains/blinds (closed at night to keep heat in) reduces the ability to retain internal heat during colder periods.
5) Some part of the rooftop parking is light yellow (20-30%) whereas remaining rooftop is mid toned colour. A mid-toned/mixed roof colour does not optimise heat retention during cold periods compared to darker surfaces.

Features that enhance the adaptive capacity of the asset include:

1) Heating is present onsite.
2) The presence of a green roof improves insulation and reduces heat loss during colder periods.
3) The asset is equipped with an alternative power source or backup storage system in the form of batteries to provide electricity in case of disruption to service lines.
4) Water pipe systems are monitored and maintained frequently, reducing the risk of freezing and associated damage.
5) The presence of programmable or smart thermostats allows precise control of internal temperature and improves thermal comfort during cold conditions.
6) An emergency procedure for cold was carried out alongside this report.

### 4.2.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of cold, frost and temperature variability to the asset and its users at present is **medium**, with a projection of **low** under the SSP5 scenario by 2100. The risk of cold can be further reduced through implementing the recommendations in Section 4.10.2.

## 4.3. Storm

### 4.3.1. Exposure Analysis

For storms, Table 8 outlines in more detail the evolution of variables under different scenarios and time horizons. As seen, all variables show no significant increasing or decreasing trend.

*Table 8. Storm Variables (Munich Re Location Risk Intelligence).*

| Variable | Year | SSP2/RCP4.5 | SSP3/RCP7.0 | SSP5/RCP8.5 |
|---|---|---|---|---|
| Annual Windless Days | Present | | 2.2 | |
| | 2030 | 2.3 | 2.3 | 2.3 |
| | 2040 | 2.3 | 2.3 | 2.3 |
| | 2050 | 2.2 | 2.5 | 2.3 |
| | 2100 | 2.3 | 2.7 | 2.2 |
| Mean Wind Speed (metres/second) | Present | | 3.0 | |
| | 2030 | 3.0 | 3.0 | 3.0 |
| | 2040 | 3.0 | 3.0 | 3.0 |
| | 2050 | 3.0 | 2.9 | 3.0 |
| | 2100 | 3.0 | 2.8 | 2.9 |
| Ratio of Maximum to Minimum Monthly Wind Speed | Present | | 1.7 | |
| | 2030 | 1.8 | 1.8 | 1.8 |
| | 2040 | 1.8 | 1.8 | 1.8 |
| | 2050 | 1.8 | 1.8 | 1.8 |
| | 2100 | 1.8 | 1.8 | 1.9 |

### 4.3.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to storms is **low**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various storm sensitive features of the asset:

1) The flat roof is more vulnerable to being damaged during high winds as it can cause greater wind resistance and uplift forces.
2) The power supply and other utilities are located above ground, making them more susceptible to storm damage.
3) There is possibility of wind tunnel effects in areas between the lanes formed by the four buildings surrounding the asset.
4) The type of foundations on which the asset is built is unknown, meaning its resilience against potential storm-related hazards cannot be determined.

Features which enhance the asset's resilience and reduce its sensitivity to storms include:

1) The asset is located in an urban topography. Surrounding buildings and infrastructure provide shelter, reducing wind exposure and storm impact.
2) The asset is not isolated vertically since there are buildings of similar height immediately adjacent.
3) The asset is considered a low-rise building since it has only three storeys. This renders the asset less susceptible to high-wind damage and increased wind speed at ground level.
4) The primary glazing type of the external windows is double glazing with laminated/toughened glass, which enhances their structural resistance and ability to withstand external forces.
5) The building's primary construction material (concrete) offers a high level of resilience against high winds during storms.
6) The building is built to withstand future thresholds of wind.
7) The building does not have undercut corners at pedestrian level.
8) There are no large undercrofts or holes through the asset that could channel the wind.
9) It is reported that there is a local vegetation management, this reduces the likelihood of falling branches from trees damaging the building.
10) The asset has canopies present at the entrance level on the ground floor to protect building users from high winds.

### 4.3.3. Adaptive Capacity Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of storm to the asset from an adaptive capacity perspective is **medium**. A lower rating was not awarded due to the following storm vulnerable feature:

1) The absence of storm shutters to close over windows during events which could protect glazing and internal aspects.
2) It is unknown whether there exists a health and safety policy for the asset. The absence of such a policy with specific reference to storms or extreme weather events makes it more vulnerable to such events.
3) The presence of windbreak installations is unknown, such installations like wind screens or baffles on site, prevents unpleasant gusts of wind at ground level.

Features that enhance the adaptive capacity of the asset include:

1) The frequent maintenance of the roof (more than once a year) ensures that rooftop equipment is properly anchored, thereby reducing injuries and damage to the asset from loose rooftop equipment, cladding or roof tiles potentially working free.
2) The asset is equipped with an alternative power source or backup storage system in the form of batteries to provide electricity in case of disruption to service lines.
3) The presence of a weather monitoring/ early warning system helps with preparedness for extreme weather events.
4) Exterior fittings (awning, signage, etc.) are securely attached.
5) The equipment stored on the roof is securely fastened with straps, clips or equivalent.
6) Large doors are reinforced effectively to be able to cope with extreme winds and storms.
7) Ventilation systems are designed to be able to operate in extreme wind conditions.

8) An applicable emergency procedure for storm was drafted alongside this report.

### 4.3.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of storm to the asset and its users at present, and projected through to 2100, is **medium**. The risk of storm can be reduced through implementing the recommendations in Section 4.10.2.

## 4.4. Tornado

### 4.4.1. Exposure Analysis

Despite their relatively short-term and small-scale characteristics, tornadoes exert a destructive power through rotating wind speeds that can exceed those of tropical cyclones. Severe damage occurs through uprooting trees, destroying buildings and vehicles, and hurling debris. As seen in Table 6, the exposure of Arneken Galerie's location to tornadoes at present is medium with no future projections.

### 4.4.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to tornadoes is **low**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various tornado sensitive features of the asset:

1) The asset has a flat roof, making it more vulnerable to potential damage from tornadoes.
2) The power supply and other utilities are located above ground, making them more susceptible to tornadoes.
3) The type of foundations on which the asset is built is unknown, meaning its resilience against potential storm-related hazards cannot be determined.

Features which enhance the asset's resilience and reduce its sensitivity to tornadoes include:

1) The asset is not isolated vertically, as there are other assets in the surrounding area of a similar height.
2) There are two basement floors which could be used as safe spaces for building users during tornadoes.
3) The external windows are double glazing type with laminated/toughened glass which enhances their structural resistance and ability to withstand external forces.
4) The building was built to withstand future thresholds of wind.
5) The roof and main building material are both concrete, so the building is likely to be able to withstand a tornado.
6) There are anchor systems present to secure the building to its foundation.

### 4.4.3. Adaptive Capacity Risk Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of tornado to the asset from an adaptive capacity perspective is **medium**. A lower score was not awarded due to the following tornado vulnerable features:

1) There are no controllable storm shutters present to close over the windows, leaving them vulnerable to flying debris.
2) It is unknown whether there exists a health and safety policy for the asset. The absence of such a policy with specific reference to tornadoes or extreme weather events makes it more vulnerable to such events.

Features that enhance the adaptive capacity of the asset to precipitation include:

1) Frequent maintenance of the roof ensures that rooftop equipment is properly anchored, thereby reducing injuries and damage to the asset from loose rooftop equipment, cladding or roof tiles.
2) Exterior fittings (awning, signage, etc.) are securely fastened.
3) Equipment stored on the roof is securely fastened using straps, clips or similar.
4) Large doors, such as those leading to car parks or delivery entrances/exits, are reinforced.

5) The asset is equipped with an alternative power source or backup storage system in the form of batteries to provide electricity in case of disruption to service lines.
6) The presence of a weather monitoring/ early warning system helps with preparedness for extreme weather events.
7) An applicable emergency procedure for tornadoes was drafted alongside this report.

### 4.4.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of tornadoes to the asset and its users at present, is **medium**, with no future projections. The risk of tornadoes can be reduced through implementing the recommendations in Section 4.10.2.

## 4.5. Water Stress

### 4.5.1. Exposure Analysis

For drought and water stress, Table 9 outlines in more detail the evolution of variables under different scenarios and time horizons. As seen, all variables show an increase.

*Table 9. Drought and Water Stress Variables (Munich Re Location Risk Intelligence).*

| Variable | Year | SSP2/RCP4.5 | SSP3/RCP7.0 | SSP5/RCP8.5 |
|---|---|---|---|---|
| Drought Duration (months with drought conditions) | Present | | 2.5 | |
| | 2030 | 3.0 | | 3.8 |
| | 2040 | 3.6 | | 3.9 |
| | 2050 | 4.1 | | 4.4 |
| | 2100 | 4.6 | | 7.4 |
| Annual Number of Meteorological Drought Days | Present | | 110.9 | |
| | 2030 | 110.5 | | 113.1 |
| | 2040 | 112.5 | | 115.3 |
| | 2050 | 113.7 | | 117.9 |
| | 2100 | 117.8 | | 128.7 |
| Maximum Drought Severity Index (maximum length of dry spells [days]) | Present | | 17.2 | |
| | 2030 | 17.0 | | 17.1 |
| | 2040 | 17.1 | | 17.5 |
| | 2050 | 17.3 | | 17.9 |
| | 2100 | 18.6 | | 19.8 |
| Water Stress (ratio of water demand and groundwater supplies) | Present | | 2.8 | |
| | 2030 | | 2.9 | 2.9 |
| | 2040 | | 2.8 | 3.0 |
| | 2050 | | 2.7 | 3.1 |
| | 2100 | | 2.5 | 3.2 |
| Water Depletion (ratio of water withdrawals and groundwater supplies) | Present | | 1.2 | |
| | 2030 | | 1.2 | 1.2 |
| | 2040 | | 1.2 | 1.2 |
| | 2050 | | 1.1 | 1.3 |
| | 2100 | | 1.1 | 1.4 |

### 4.5.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to drought and water stress is **medium**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various drought/ water stress sensitive features of the asset:

1) The asset is located in an urban topography. Urban areas have higher sensitivity to water stress due to their high water demand and reliance on external water sources, which can strain resources during shortages.

2) The main building material the asset is constructed with (concrete) can be affected during drought/ water stress as reduced soil moisture may lead to ground shrinkage, causing cracks in foundations and structural instability in the long term.
3) The absence of either blackwater or greywater recycling systems to reuse water and avoid additional consumption.

At this stage, no resilient 'sensitivity' features or policies were identified.

### 4.5.3. Adaptive Capacity Risk Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of drought/ water stress to the asset from an adaptive capacity perspective is **medium**. A lower rating was not awarded due to the following drought/ water stress vulnerable features:

1) The asset has 0% vegetated outdoor area, limiting natural water retention and cooling benefits.
2) The absence of drought-tolerant species that can reduce the effects of drought by stabilising soil and enhancing water retention.
3) There is no health and safety policy in place for water-related events like hail, flood, precipitation, drought etc.
4) The water consumption intensity of the asset is unknown. A high-water consumption intensity may cause stresses to the asset and local water supply.
5) The absence of rainwater recycling systems on-site increases dependency on local water supply which could be under high pressure during periods of droughts or high water stress.
6) The presence of a green roof increases water demand for the asset due to irrigation requirements.
7) The asset is not equipped with smart irrigation systems to adjust water use based on weather conditions and soil moisture levels.
8) The absence of leak detection or monitoring systems may result in undetected water losses and inefficiencies.

Features that enhance the adaptive capacity of the asset against drought include:

1) The relatively low percentage of vegetation decreases the amount of water required for irrigation.
2) An applicable emergency procedure for water stress was drafted alongside this report.

### 4.5.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of water stress to the asset and its users at present is **medium** and is projected to be **high** in 2050 to 2100 under SSP5. The risk of water stress can be reduced through implementing the recommendations in Section 4.10.2.

## 4.6. Heavy Precipitation

### 4.6.1. Exposure Analysis

For heavy precipitation, Table 10 outlines in more detail the evolution of variables under different scenarios and time horizons. As seen, all variables show an increase.

*Table 10. Precipitation Variables (Munich Re Location Risk Intelligence).*

| Variable | Year | SSP2/RCP4.5 | SSP3/RCP7.0 | SSP5/RCP8.5 |
|---|---|---|---|---|
| Maximum Daily Precipitation (mm) | Present | | 26.8 | |
| | 2030 | 28.8 | 29.2 | 28.8 |
| | 2040 | 28.9 | 29.6 | 28.7 |
| | 2050 | 28.8 | 30.3 | 29.4 |
| | 2100 | 29.7 | 32.5 | 31.6 |
| 5-day High Precipitation (mm) | Present | | 55.3 | |
| | 2030 | 58.2 | 58.4 | 58.1 |
| | 2040 | 58.2 | 59.3 | 58.2 |
| | 2050 | 57.9 | 60.0 | 58.7 |
| | 2100 | 60.2 | 63.4 | 62.9 |

| | | | | |
|---|---|---|---|---|
| Days Above 10mm Precipitation | Present | | 15.6 | |
| | 2030 | 16.5 | 16.1 | 16.3 |
| | 2040 | 16.6 | 16.7 | 16.5 |
| | 2050 | 16.5 | 17.0 | 16.7 |
| | 2100 | 17.4 | 18.5 | 18.7 |
| Extreme Wet Day Precipitation (annual sum of precipitation on days with more precipitation than in the 1% wettest days 1995-2014 [mm]) | Present | | 48.1 | |
| | 2030 | 62.8 | 64.3 | 60.8 |
| | 2040 | 62.6 | 64.7 | 66.6 |
| | 2050 | 60.5 | 72.4 | 70.3 |
| | 2100 | 73.4 | 100.4 | 98.7 |
| Annual Precipitation | Present | | 802.7 | |
| | 2030 | 811.1 | 817.6 | 808.3 |
| | 2040 | 810.4 | 820.3 | 803.9 |
| | 2050 | 804.6 | 818.7 | 796 |
| | 2100 | 804.5 | 813.2 | 800.8 |
| Total Precipitation Range (between months [mm]) | Present | | 100.4 | |
| | 2030 | 105.0 | 105.6 | 100.9 |
| | 2040 | 102.7 | 104.6 | 102.1 |
| | 2050 | 101.6 | 104.8 | 101.8 |
| | 2100 | 106.0 | 113.5 | 113.5 |

### 4.6.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to heavy precipitation is **medium**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various precipitation sensitive features of the asset:

1) The asset is located in an urban area with one floor below ground level, increasing the risk of water ingress during periods of heavy precipitation.
2) Having floor below ground level could make them susceptible to acute rainwater damage or chronic damage due to accumulation of moisture leading to mould and other issues.
3) The asset is built on flatlands, meaning there is limited natural drainage and a higher likelihood of surface water accumulation.
4) The power supply and other utilities are located above ground, increasing their vulnerability to power cut impacts in case of frequent precipitation.
5) The absence of floodproofing methods (such as flood vents) increases the likelihood of water entering the building during heavy rainfall events.
6) A flat roof configuration may increase the risk of water pooling and associated waterproofing issues.
7) The foundation type on which the asset is built is unknown, so its resilience against potential hazards associated with extreme precipitation, such as subsidence, cannot be determined.

Features which enhance the asset's resilience and reduce its sensitivity to cold include:

1) Technical plant rooms and HVAC systems are located above ground level, reducing the probability of damage during flooding events.
2) The main soil type (gravel/coarse sand) supports drainage and reduces water retention.
3) The asset is equipped with a ventilation system designed to prevent the build-up of moisture within the building.

### 4.6.3. Adaptive Capacity Risk Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of heavy precipitation to the asset from an adaptive capacity perspective is **medium**. A lower rating was not awarded due to the following precipitation vulnerable features:

1) The percentage of vegetated outdoor area is very low, limiting natural water percolation.
2) No flood barriers are installed onsite, increasing the risk of water ingress during heavy precipitation events.
3) No rainwater harvesting system or excess water storage system is in place, limiting the ability to manage excess runoff.
4) No heavy rainfall mitigation measures such as sandbags, flood boards, air bricks or similar systems are in place.
5) Areas on or below ground level are not permanently protected against flood water penetration.
6) The absence of a health and safety policy for water-related events increases the vulnerability of building users.

Features which enhance the adaptive capacity of the asset to cold include:

1) The presence of a green roof increases the ability to absorb and manage rainfall effectively.
2) Sustainable Drainage Systems (SuDS), such as permeable pavements and infiltration systems, are present onsite and support water management.
3) The asset is equipped with an alternative power source or backup storage system in the form of batteries to provide electricity in case of disruption to service lines.
4) The asset is connected to a local flood warning system, enabling early response to heavy precipitation events.
5) The presence of gutters and downpipes helps direct rainwater away from building foundations.
6) Regular inspection and maintenance activities are carried out, supporting early identification of vulnerabilities.
7) The presence of a weather monitoring/ early warning system helps with preparedness for extreme weather events.
8) An applicable emergency procedure for heavy precipitation was drafted alongside this report.

### 4.6.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of heavy precipitation to the asset and its users at present, and projected through to 2100, is **medium**. The risk of heavy precipitation can be reduced through implementing the recommendations in Section 4.10.2.

## 4.7. Subsidence

### 4.7.1. Exposure Analysis

Subsidence exposure 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.

As seen in Table 7, the exposure of Arneken Galerie's location to subsidence at present is **medium**, with a projected increased exposure to **high** in 2050 under SSP2, in 2100 under SSP3 and in 2040 under SSP5.

### 4.7.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to subsidence, soil erosion and solifluction is **medium**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various subsidence sensitive features of the asset:

1) The asset is built on flatlands with gravel/coarse sand soil type, which is more susceptible to erosion and ground instability.
2) The building was not designed to tolerate some degree of settlement without significant damage (e.g. flexible joints), increasing vulnerability to ground movement.
3) The type of foundations on which the asset is built is unknown, meaning its resilience against subsidence-related hazards cannot be fully determined.
4) It is unknown whether a geotechnical engineer was consulted or a comprehensive soil survey was completed, increasing uncertainty regarding ground conditions and associated risks.

Features which enhance the asset's resilience and reduce its sensitivity to subsidence, soil erosion and solifluction include:

1) The power supply and other utilities are located above ground, reducing their exposure to erosion and ground movement.
2) There are anchor systems present to secure the building to its foundation.

### 4.7.3. Adaptive Capacity Risk Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of subsidence, soil erosion and solifluction to the asset from an adaptive capacity perspective is **low**. A lower rating was not awarded due to the following subsidence vulnerable features:

1) No rainwater harvesting system or excess water storage system is in place, limiting the ability to manage excess water during heavy rainfall events.
2) The lack of ground movement monitoring systems (e.g. settlement gauges, tiltmeters, geodetic markers) enabling early detection of ground movement.
3) The asset has 0% Vegetated area outdoor, reducing natural soil stabilisation and increasing susceptibility to erosion.

Features which enhance the adaptive capacity of the asset to subsidence include:

1) The annual frequency of structural and building fabric inspection and maintenance prevents potential damages from going unnoticed and subsequently impacting on a larger scale.
2) Sustainable Drainage Systems (SuDS), such as permeable pavements and infiltration systems, are present on site, helping to manage surface water runoff.
3) Structural and building fabric inspections are carried out regularly (annually), supporting ongoing monitoring and maintenance of the asset.
4) An applicable emergency procedure for subsidence was drafted alongside this report.

### 4.7.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of subsidence to the asset and its users at present is **medium** and is projected to increase to **high** by 2050 under SSP2 and by 2040 in SSP5. The risk of subsidence can be reduced through implementing the recommendations in Section 4.10.2.

## 4.8. Hail

### 4.8.1. Exposure Analysis

Hailstorms cause extensive damage to agriculture as well as to buildings and vehicles. At Arneken Galerie, the main areas affected are the windows, skylights, and technical installations on the roof. Heavy hailstorms are usually triggered by wide cold fronts. Occasionally, local hot weather thunderstorms, a result of intense insolation over land or mountain slopes, also lead to severe localised hailstorms.

As seen in Table 6, the exposure of Arneken Galerie's location to hail at present is **medium**, with no future projections of exposure under any scenario available.

### 4.8.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to hail is **medium**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various hail-sensitive features of the asset:

1) The roof is flat, increasing the likelihood of direct impact and accumulation of hail.
2) The power supply and other utilities are located above ground, making them more susceptible to hail damage.
3) The asset has not been designed with adequate protection/insulation from potential hailstone impact.

4) There are no roof overhangs present to protect walls and windows in the case of a hail storm.
5) The type of foundations on which the asset is built is unknown, meaning its resilience against hail-related indirect impacts cannot be fully determined

Features which enhance the asset's resilience and reduce its sensitivity to hail include:

1) The external windows are double-glazed with laminated/toughened glass, which enhances their structural resistance and ability to withstand external forces.
2) The roof is constructed of concrete, which provides a durable surface against hail impact.

### 4.8.3. Adaptive Capacity Risk Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of hail to the asset from an adaptive capacity perspective is **medium**. A lower rating was not awarded due to the following hail vulnerable features:

1) There is no asset/corporate health and safety policy in place for hail-related events, increasing the vulnerability of building users.
2) No protective hail screens are present or ready to be installed on externally facing glazing.
3) It is unknown whether gutters and downspouts are impact resistant, increasing uncertainty regarding water management during hail events.

Features which enhance the adaptive capacity of the asset to hail include:

1) Roof inspections and maintenance are carried out more than once a year, supporting early identification of damage.
2) The asset is equipped with an alternative power source or backup storage system in the form of batteries to provide electricity in case of disruption to service lines.
3) The presence of a weather monitoring/ early warning system helps with preparedness for extreme weather events.
4) An applicable emergency procedure for hail was drafted alongside this report.

### 4.8.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of hail to the asset and its users at present, is **medium**, with no future projections. The risk of hail can be reduced through implementing the recommendations in Section 4.10.2.

## 4.9. Flood

### 4.9.1. Exposure Analysis

In Munich Re, the hazard of flooding is assessed as storm surges (coastal flooding), river floods (fluvial flooding) and flash floods (pluvial flooding) using a weighting scheme to aggregate the hazard scores of the underlying flood models.

Figure 1 is a flood risk map from Munich Re Location Risk Intelligence which shows that the asset is exposed to flooding from fluvial sources (**material**). Note that the exposure to this flood source is **high** at present which remains high under SSP2 and SSP5 scenarios across all future time horizons, while no exposure is projected under SSP3.

Note that in addition to the flood exposure analysis conducted using Munich Re Location Risk Intelligence's modelling, local sources were consulted, which confirmed the finding of material exposure to sources of flooding (geoportal.bafg.de).


*Figure 1. Flooding exposure risk for the asset at present under SSP2/RCP4.5 (Munich Re Location Risk Intelligence).*

### 4.9.2. Sensitivity Analysis

This stage of the analysis determined that the asset's sensitivity to flood is **medium**. This score was determined through a series of asset specific enquiries to the asset management team to ascertain any preventative measures already in place to mitigate the exposure risk, particularly regarding the building plot or fabric and its users. A lower rating was not awarded due to various flood sensitive features of the asset:

1) The asset is located in an urban topography, which can limit natural drainage and increase surface water runoff.
2) The asset is built on flatlands, meaning there is limited natural gradient to facilitate water runoff.
3) The presence of a floor below ground level increases the asset's susceptibility to floodwater ingress and associated structural damage.
4) The absence of wet floodproofing methods (such as flood vents) to divert water away from the asset.
5) The asset does not incorporate waterproof materials within its structure.
6) The type of foundations on which the asset is built is unknown, creating uncertainty regarding its resilience to floodwater ingress and ground saturation.

Features which enhance the asset's resilience and reduce its sensitivity to flood include:

1) Technical plant rooms and HVAC systems are located above ground level, reducing their susceptibility to flood damage.
2) Power supply and other utilities are also located above ground, limiting vulnerability to inundation.
3) The main soil type of the area (gravel/coarse sand) allows for efficient water infiltration and drainage, reducing the likelihood of surface water accumulation during flood events.
4) There is a local municipal river defences in place to protect against flooding.

### 4.9.3. Adaptive Capacity Risk Analysis

The adaptive capacity analysis defines and highlights the features present or absent at the asset which consequently affect the overall risk of the building and its users. This stage of the analysis determines that the risk of flood to the asset from an adaptive capacity perspective is **medium**. A lower rating was not awarded due to the following flooding sensitive features:

1) The asset has 0% vegetated outdoor area, limiting the capacity for natural water absorption and increasing surface runoff.
2) The absence of structural flood defences and soft mitigation measures (such as flood barriers, flood gates, levees, and sandbags) increases the asset's vulnerability to damage during flood events.

3) The absence of subsidence or structural monitoring systems may prevent early identification of vulnerabilities.
4) The absence of areas protected against flood water penetration increases the likelihood of internal damage.
5) The absence of an asset or corporate health and safety policy that addresses flood risk reduces preparedness and response capability.
6) The absence of evacuation plans for extreme weather events increases vulnerability during flood scenarios

Features which enhance the asset's adaptive capacity to flood include:

1) The asset subscribes to a flood warning system, supporting early awareness of flood events.
2) Permeable paving and infiltration systems on-site allow for improved surface water drainage.
3) The asset is equipped with an alternative power source or backup storage system to provide electricity in the event of disruption to service lines.
4) Emergency exits are accessible during floods, supporting safe evacuation.
5) Regular inspection and maintenance are carried out more than once a year, enabling early identification of potential issues.
6) An applicable emergency procedure for hail was drafted alongside this report.

#### 4.9.4. Overall Risk Analysis

Based on the exposure, sensitivity, and adaptive capacity analyses, the overall risk of flooding to the asset and its users at present, and projected through to 2100, is **high**. The risk of flooding can be reduced through implementing the recommendations in Section 4.10.2.

## 4.10. Overall Physical Risk

### 4.10.1. Physical Risk Scores

The overall risk for each material hazard is summarised in Table 11.

*Table 11. Overall Risk of the Material (at present) Hazards.*

| Hazard | Present | SSP2/RCP4.5 | | | | SSP3/RCP7 | | | | SSP5/RCP8.5 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2030 | 2040 | 2050 | 2100 | 2030 | 2040 | 2050 | 2100 | 2030 | 2040 | 2050 | 2100 |
| Flood | High | High | | High | High | | | | | High | | High | High |
| Cold Wave / Frost | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Low |
| Hail | Medium | | | | | | | | | | | | |
| Storm | Medium | | | | | | | | | | | | |
| Tornado | Medium | | | | | | | | | | | | |
| Water Stress | Medium | | | | | Medium | Medium | Medium | Medium | Medium | Medium | High | High |
| Subsidence | Medium | Medium | Medium | High | High | Medium | Medium | Medium | High | Medium | High | High | High |
| Heavy Precipitation | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium |
| Temperature Variability | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium | Medium |

### 4.10.2. Physical Risk Recommendations

Due to the location having material exposure at present to cold wave/ frost, flood, temperature variability, storm, tornado, water stress, heavy precipitation, subsidence and hail, the following implementations (Table 12), in order of relative priority are recommended to reduce the vulnerability of the asset.

*Table 12. Adaptation Action Recommendations.*

| Recommendation | Additional Information | Associated Risks | Estimated Duration | Complexity | Potential Costs |
|---|---|---|---|---|---|
| Maintenance and monitoring of water pipes | Ensure that water pipes are monitored and maintained at | Cold Wave / Frost | <6 months | Easy | Internal resourcing and general |

| | | | | | |
|---|---|---|---|---|---|
| | least once a year to check for any potential damage due to freeze-thaw. This will reduce the risk of catastrophic damages. | | | | operating expenditure (OPEX) |
| **Integrate blue-green infrastructure solutions** | Introduce blue-green infrastructure such as rain gardens, bioswales, or green roofs to enhance water retention and reduce surface runoff. These nature-based solutions can complement existing drainage systems and improve long-term flood resilience. | Flood (pluvial) | 6–12 months | Medium | Local provider consultation necessary |
| **Install deployable flood barriers at key entry points** | Implement demountable or automatic flood barriers at entrances, loading bays, and other vulnerable access points. These systems can be rapidly deployed during flood events to prevent water ingress into the building. | Flood and Heavy precipitation | 3–6 months | Easy to Medium | Moderate capital expenditure |
| **Increase vegetation** | Increase vegetation on roof and outdoor area where feasible to improve drainage, reduce surface water runoff and enhance protection from cold winds. | Cold / Frost, Flood and Heavy precipitation | 6-12 months | Medium | Local provider consultation necessary |
| **Track water consumption and implement water efficiency and conservation measures** | Track water consumption and set reduction targets along with initiatives to reduce water consumption. Install low-flow fixtures, water-efficient appliances and leak detection systems in order to reduce water consumption and improve resilience during water scarcity. | Water Stress | 3–6 months | Easy | Internal resourcing |
| **Develop an asset or corporate-level health and safety policy** | A health and safety policy provides multiple benefits, including raising awareness and promoting preventive action in the event of natural hazards. | Cold / Frost, Flood, Tornado, Heavy precipitation, Storm and Hail | <6 months | Medium | Internal resourcing |
| **Installation of storm shutters** | Install storm shutters to close over windows | Storm, Tornado | 1-2 months | Medium | €350-1200 (electric shutters) |

| | | | | | |
|---|---|---|---|---|---|
| | during times of strong winds. | | | | |
| **Flood defences** | Implement temporary / moveable flood barriers in and around the asset. | Flood and Heavy precipitation | 1-2 months | Easy | €200-250 per fast-deployable defence |
| **Soft flood mitigation measures** | Implement soft flood mitigation measures such as sandbags, flood boards or air brick covers. | Flood and Heavy precipitation | 1-2 months | Easy | €25-25 (sandless/ water activated barriers) €20-35 (air brick covers) |
| **Install flood protection for areas on and below ground level** | Protect areas on and below ground level from potential water inundation by waterproofing joints, doors, fittings and windows. | Flood and Heavy precipitation | 6-12 months | Hard | €100-250 per m2 |
| **Heated driveways/walkways /roofs** | Install heating systems for external surfaces to prevent ice build-up and maintain safe access during freezing conditions. | Cold / Frost | 6-12 months | Hard | €150–300/m² installed for electric systems; hydronic systems can be higher |
| **Regularly inspect roof** | Implement more frequent roof inspections (at least annually) ensuring safe rooftop equipment. | Tornado and Hail | <6 months | Easy | Internal resourcing |
| **Maintenance and monitoring of the building** | Monitor and maintain the building (structure) when extreme weather events occur. | Cold / Frost | Instant | Easy | Internal resourcing |
| **Installation of protective hail screens** | Install protective hail screens over vulnerable glazed areas or other exposed asset features. | Hail | 1-2 months | Medium | €80–200/m² |
| **Install rainwater harvesting system** | Install rainwater harvesting systems and excess water storage systems to collect and store excess rainfall and reducing the risk of water accumulation. | Heavy precipitation, Flood and Water Stress | 3 months | Hard | €5,000–20,000+ depending on tank size, filtration, pumps and connection to building services |
| **Permeable paving and natural drainage systems** | Install permeable paving or natural drainage systems to reduce runoff and improve on-site drainage during heavy rainfall. | Heavy precipitation and Flood | <6 months | Medium | €80–180/m² |
| **Re-paint roof colour** | Repaint the roof in a dark colour to enhance absorption of solar radiation. | Cold Wave / Frost | <1 month | Medium | €60-80 /5L<br><br>best option is any water-based acrylic |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | paints that are elastomeric |
| **Develop and implement ground stability monitoring systems** | Install subsidence monitoring systems such as settlement gauges, tiltmeters or geodetic markers to detect early signs of ground movement and enable timely intervention. | Subsidence | 3–6 months | Medium | External specialist consultation required |

# 5. TRANSITION RISK ASSESSMENT

## 5.1. Exposure Analysis

### 5.1.1. Policy and Regulation Exposure Risk

The exposure of Arneken Galerie Hildesheim to policy-related transition risk was determined through a national and local level legislation review of relevant climate change and environmental policies. A country with stringent legislation regarding climate change adaptation and resilience, energy consumption, and transparency and reporting is considered a high exposure risk scenario for an asset.

Table 13 outlines legislation relevant to the asset. As previously stated, high exposure does not equate high risk, as the vulnerability of the asset to said legislation is given equal consideration. Based on the legislation review, the exposure of Arneken Galerie Hildesheim to policy and legislation risk is **high**.

*Table 13. Overview of Legislative Exposure.*

| Regulations | Measures | Implications | Exposure Level |
|---|---|---|---|
| **Building Energy Act (GEG) (2023/2024 update)** | Sets requirements for building energy quality, energy certificates, and renewable heat; mandates at least 65% renewable energy for new heating systems; introduces phase-out of fossil fuel boilers and energy performance standards for buildings. | Major refurbishments and plant replacement must follow a low-carbon heat pathway. Existing gas/oil boilers will face mandatory replacement timelines, particularly upon failure. Large retail assets may require transition to systems such as heat pumps or district heating. Compliance may necessitate staged upgrades and retrofits. | **Very High** |
| **EU Energy Performance of Buildings Directive (EPBD Recast, expected transposition by 2026–2030)** | Introduction of Minimum Energy Performance Standards (MEPS); worst-performing non-residential buildings must be upgraded. | Shopping centres will need deep retrofits if energy ratings fall below thresholds. Large assets are highly visible targets for enforcement. Likely triggers façade upgrades, HVAC overhaul, and electrification. | **Very High** |
| **Carbon Pricing under Fuel Emissions Trading Act (BEHG) (2021–2027)** | Carbon price on heating fuels (e.g., gas, oil), rising annually. | Direct operational cost increases for fossil fuel boilers. For a large asset, this creates material OPEX pressure, incentivising early switch to low-carbon systems. Costs may be partially recoverable from tenants depending on lease structure. | **High** |
| **EU Taxonomy for Sustainable Activities (2020)** | Defines criteria for sustainable real estate (e.g., energy efficiency thresholds, emissions intensity). | Impacts asset valuation and access to green finance. Non-compliant shopping centres risk “brown discount”. Large assets are typically scrutinised by institutional investors. Retrofit alignment may be required to maintain liquidity. | **High** |
| **Renewable Energy Heat Act / Municipal Heat Planning (Wärmeplanungsgesetz, 2024)** | Cities must develop local heat plans (e.g., district heating zones, hydrogen readiness). | Hildesheim’s heat planning may restrict future heating choices. The asset may be required or incentivised to connect to district heating or adopt specific technologies. Timing of investment decisions becomes critical. | **High** |
| **Energy Efficiency Act (EnEfG) (2023)** | Sets energy consumption reduction targets; obligations for large energy users; potential audits and reporting. | Large commercial buildings may face mandatory energy monitoring, audits, and reduction plans. Shopping centres of large size are likely within scope of corporate-level obligations (especially if part of a significant portfolio). | **Medium** |

| | | | |
|---|---|---|---|
| **Local Building Codes & Subsidy Schemes (e.g., BEG funding programmes)** | Financial incentives for retrofits, heat pumps, insulation, and renewable integration. | Opportunity to offset retrofit costs through grants/subsidies. However, funding often tied to strict performance criteria. Large assets can benefit significantly but require careful planning and compliance documentation. | **Medium** |
| **Overall Exposure** | | | **High** |

### 5.1.2. Market Exposure Risk

The evolution of market preferences and developments can drive a risk in itself, in addition to decarbonisation targets. Each market, as determined by geography and asset-type, transitions towards a lower carbon economy at different rates depending on the climate, grid and usage demands, as well as Nationally Determined Contributions in line with the COP21 Paris Agreement. The scale of this transition, or decarbonisation and energy reduction pathway, creates an exposure rating for the asset itself.

The energy intensity reduction required for Arneken Galerie Hildesheim from the Retail, Shopping Centre, Germany pathway between 2024 to 2050 is 50%. This is therefore considered a **medium** exposure risk.

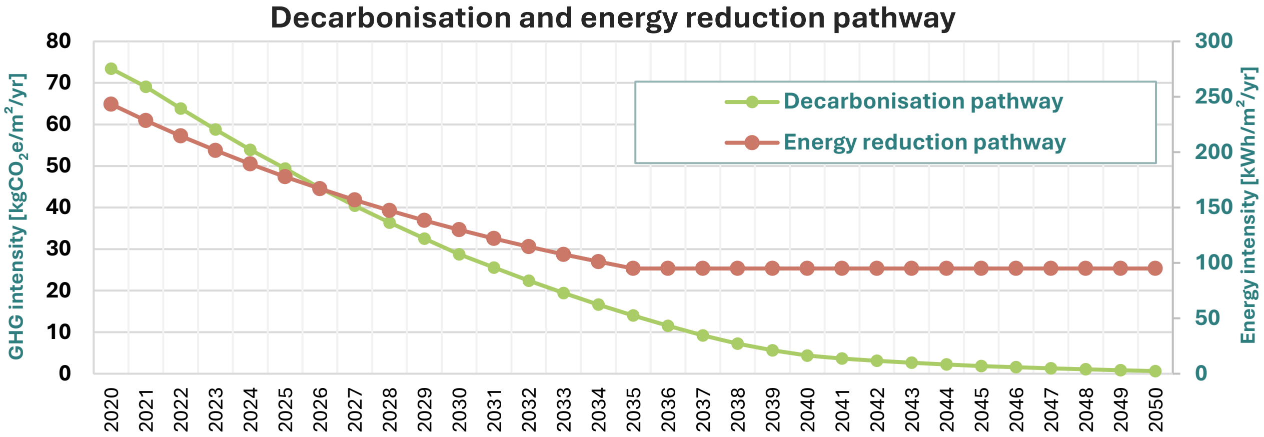


*Figure 2. Decarbonisation and Energy Reduction Pathway for Arneken Galerie Hildesheim.*

### 5.1.3. Technology Exposure Risk

There is the possibility that assets which are particularly vulnerable to climate change will become less desirable over time, and technologies within assets may become obsolete if they do not remain competitive and compliant to the market conditions. Associated impacts that could result include:

1) Increased cost of business due to compliance measures.
2) Increased taxes from climate policies such as carbon taxes.
3) Increased costs of resources such as energy and water.
4) Reduced economic activity in vulnerable markets.
5) Reduced occupier demand for properties.
6) Reduced asset value.

The technologies considered to have the most significant exposure for Arneken Galerie Hildesheim based on their competitiveness and regulations in Germany are automatic meter readings, rated as a **very high** exposure risk, and EV charging points at a **very high** exposure risk, as described below. Across all technologies, the risk exposure is considered to be **very high**.

**Automatic Meter Readings**
Since January 2020, it has been compulsory for buildings consuming 6,000 to 100,000 kWh/year to install smart meters. If the building has any conventional meters still installed, these need to be replaced with smart meters.
The installation of smart meters is primarily the responsibility of the metering point operator, who have 8 years from 21 January 2020 to convert all subject metering points to smart meters. By 2032, the Metering Point Operation Act requires all households to have a smart meter.

**Electric Vehicle (EV) Charging Points**
The Building Electric Mobility Infrastructure Act outlines key provisions relating to the installation of electric vehicle charging infrastructure in new and existing buildings. Key provisions include the following:

- Non-Residential
  - Existing non-residential buildings with more than 20 parking spaces have to be equipped with at least one charging point for electric vehicles.

- New non-residential buildings with more than 6 parking spaces must equip 1 in 3 spaces with infrastructure for future charging stations and at least one additional charging station

- Residential
  - New residential buildings with more than 5 parking spaces must install infrastructure for future EV charging stations for each space.
  - Residential buildings undergoing major renovations with more than 10 spaces must install infrastructure for future EV charging stations for each space.

**Smart Building Technology**
Under the Gebäudeenergiegesetz (GEG), non-residential buildings with heating, combined heating/ventilation, air-conditioning, or combined air-conditioning/ventilation systems above 290 kW nominal output must be equipped with building automation and control systems. The law requires digital monitoring of energy use, analysis of energy performance, and the ability to communicate with connected technical building systems.

**Natural Gas Boilers**
Germany's Energy Saving Ordinance (EnEV) mandated inspections for heating and air-conditioning systems in buildings, with specific requirements for system size and fuel types, in accordance with EPBD guidelines.
The Building Energy Act prohibits the installation of new oil and gas heating systems and aims to ban all heating systems using fossil fuels by 2045. However, this law is currently being revised.
All new heating systems installed in buildings must be at least 65% powered by renewable energy sources. The timeline of this requirement is based on building location and existing buildings. Newly installed heating systems in a new development area must meet the threshold from 2024.
Existing buildings and new buildings outside of new development areas, the obligation only applies from the following dates:
30 June 2026: in municipal areas with > 100,000 inhabitants
30 June 2028: in municipal areas with < 100,000 inhabitants

**Onsite Renewable Energy**
Under the German Act on Renewable Energy (Erneuerbare-Energien-Gesetz or EEG), operators of renewable energy plants can receive certain subsidies in the form of the market bonus (Marktprämie), the tenant electricity surcharge (Mieterstromzuschlag) or the feed-in tariff (Einspeisevergütung). This includes photovoltaic systems on rooftops.

The most notable incentive is that the German government has approved a new zero VAT rate for the supply and installation of solar modules. This means that operators of private PV systems will no longer have to pay VAT on the purchase or installation of their systems.

The tax relief was implemented on January 1, 2023, for single-family residential and commercial photovoltaic (PV) and battery systems up to 30 kWp. For multifamily and mixed-use buildings, the exemption applies to solar systems up to 15 kWp per residential or commercial unit but is limited to up to 100 kW per taxpayer.

**Green Energy Contracts**
Many utility providers in Germany offer renewable energy contracts, including:

- Major providers: E.ON, Vattenfall, and EnBW all offer renewable energy plans
- Green energy companies: Companies like E Wie Einfach, EMB, GASAG, Ostrom, Qcells, and Yello offer green electricity

### 5.1.4. Reputation Exposure Risk

The exposure of Arneken Galerie Hildesheim to reputation-related transition risk was determined by assessing the trends identified in the Arneken Galerie Hildesheim sector in Germany. These trends look at how consumers and stakeholders respond to various climate-related transitions in a way that also impacts the asset. Understanding this and meeting stakeholder values will impact customer satisfaction, thereby improving the reputation of the asset in the market, which is essential for long-term success.

Table 14 outlines the reputational risks associated with changing markets and user preferences due to the transition to a low carbon economy and highlights current trends and the impacts these could have on

Arneken Galerie Hildesheim. These user-driven shifts in behaviours pose **high** reputational exposure risk to the asset.

*Table 14. Reputation Exposure of Retail / Shopping Centre in Germany.*

| Trends | Reputation Analysis |
|---|---|
| **Rising Consumer Expectations** | *Consumers increasingly demand transparency on climate impact, making retailers reputationally exposed if they lag on sustainability.* |
| **Tenant and Brand Risk Translates into Landlord Risk** | *As retail brands face climate backlash, landlords that host them are also criticised for enabling unsustainable operations.* |
| **Green Building Certifications** | *Assets with certifications like LEED or BREEAM are seen as reputationally safer, while uncertified ones risk being perceived as outdated or irresponsible.* |
| **Urban and Flagship Stores Under Greater Scrutiny** | *High-visibility locations amplify reputational risks, with climate-related criticism more likely to attract public and media attention.* |
| **NGO and Activist Pressure** | *Retailers are prime NGO targets given their consumer reach, creating reputational spillovers for property owners and investors.* |
| **Integration of ESG into Investor Due Diligence** | *Investors now factor retail climate reputational risks into capital allocation; penalising assets linked to unsustainable practices.* |

## 5.2. Vulnerability Analysis

The vulnerability analysis examines aspects of Arneken Galerie Hildesheim which are vulnerable to the transition to a low carbon economy. This is analysed over the key themes below:

- Policy and Legal: this concerns the procedures in place to measure and disclose environmental impact in line with climate legislation, as well as installed features that aid legislative compliance.
- Market: this includes the energy performance at the asset, as a result of the building services such as heating, cooling and lighting and the alignment to natural and asset-type decarbonisation pathways as determined through the CRREM analysis.
- Technology: this includes the installations and technologies used at the asset and their relative vulnerability to policy and market trends.
- Reputation: this considers the building features and services in place and their vulnerability to stakeholder demands and user preferences.

This stage of the analysis determined the asset's vulnerability to transition risk from the transition-related risks. These scores were determined through analysis of asset-specific features and policies in place. Relevant recommendations have been presented below for medium or higher risk criteria to improve the resilience of the asset.

### 5.2.1. Market Vulnerability

#### 5.2.1.1. CRREM Misalignment Year Analysis

Market risk analysis provides an evaluation of an asset's relative position compared to the local market from a transition risk perspective, specifically addressing alignment to COP21-recognised decarbonisation pathways (1.5°C trajectory) as determined from CRREM. This manifests itself as the year in which an asset becomes misaligned from CRREM pathways; comparing the asset's future carbon performance with the target decarbonisation pathways for a Retail Shopping Centre asset in Germany.

Figure 3 illustrates that the asset performance will become misaligned from the CRREM pathways in 2046 and so it is projected that from 2046 the asset will not reach the decarbonisation target for greenhouse gas emissions intensity. Carbon emissions will need to be reduced in order to achieve compliance with national targets. In order to improve this outlook, Arneken Galerie Hildesheim should undergo an energy audit to determine how best to update the type of cooling equipment, lighting fittings, and insulation, alongside any other energy efficiency improvement measures that can be made within the asset.

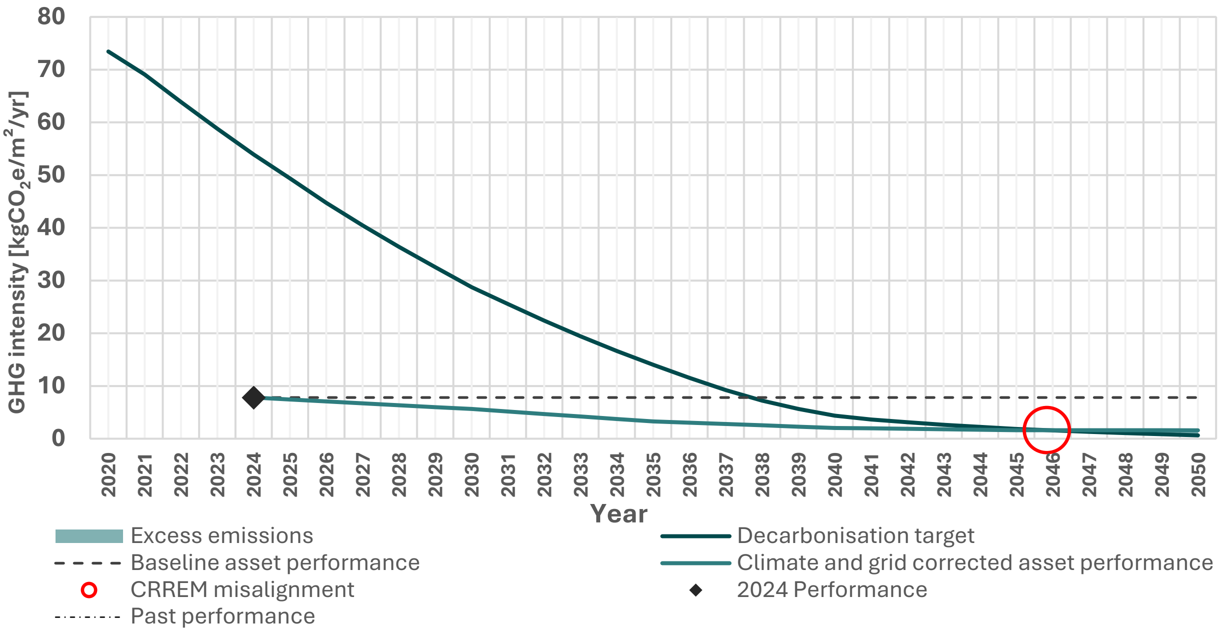


*Figure 3. Arneken Galerie Hildesheim 1.5°C Trajectory Misalignment Diagram: The graph above illustrates both the decarbonisation pathway (black line) and the misalignment year of Arneken Galerie Hildesheim, following a 1.5°C trajectory. The asset will become misaligned from the CRREM pathways in 2046, based on 2024 data.*

#### 5.2.1.2. Carbon Costs of Excess Emissions

Figure 4 illustrates the "Carbon Costs of Excess Emissions after Misalignment" diagram for Arneken Galerie Hildesheim following a 1.5°C trajectory. The red zone indicates the costs of excess emissions above the decarbonisation target, whereas the green zone is the savings from reduced emissions below the target.

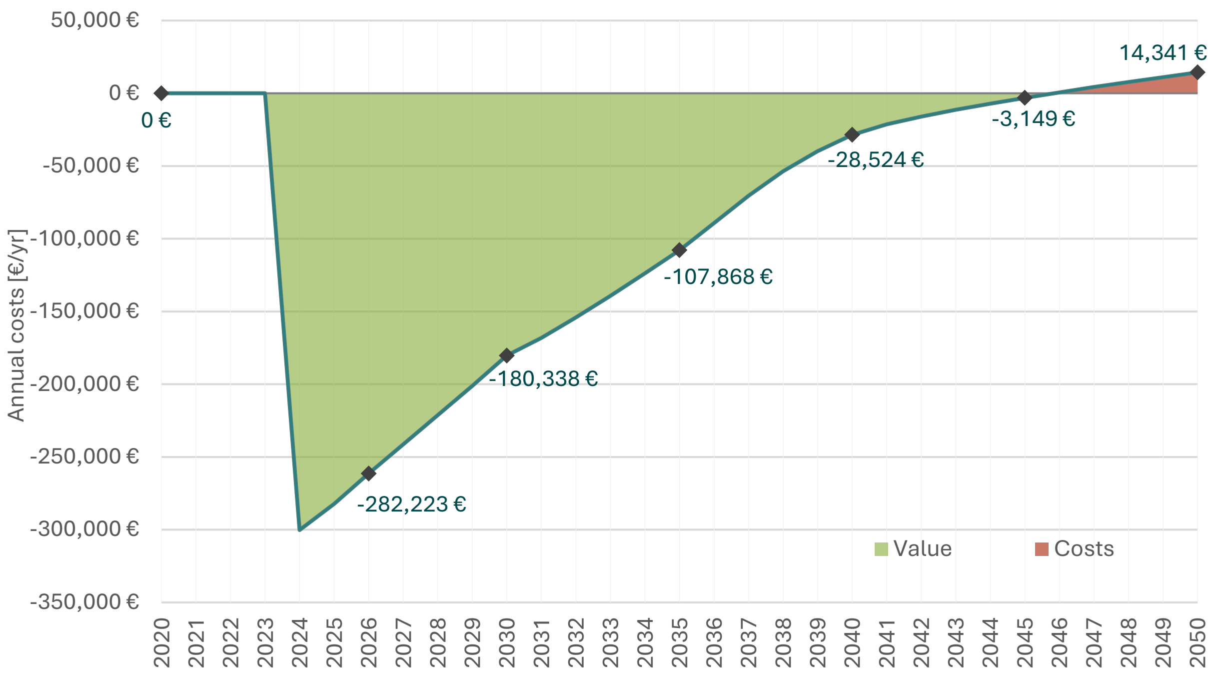


*Figure 4. Carbon Costs of Excess Emissions after Misalignment Graph: The graph above illustrates the carbon price of excess emissions of Arneken Galerie Hildesheim.*

### 5.2.1.3. Cost of Energy and Carbon Emissions

Figure 5 illustrates the cost of energy and carbon emissions of Arneken Galerie Hildesheim under a 1.5°C trajectory. Electricity dominates the majority of the annual costs. Between the year 2024 and 2050, the annual cost of energy is projected to increase from €481,562 to €833,096 (an overall increase of 73%), based on 2025 data. Purchasing all electricity consumption through a renewable contract and implementing onsite generation could result in greater savings from energy costs by becoming less dependent on the grid whilst contributing towards its national decarbonisation.

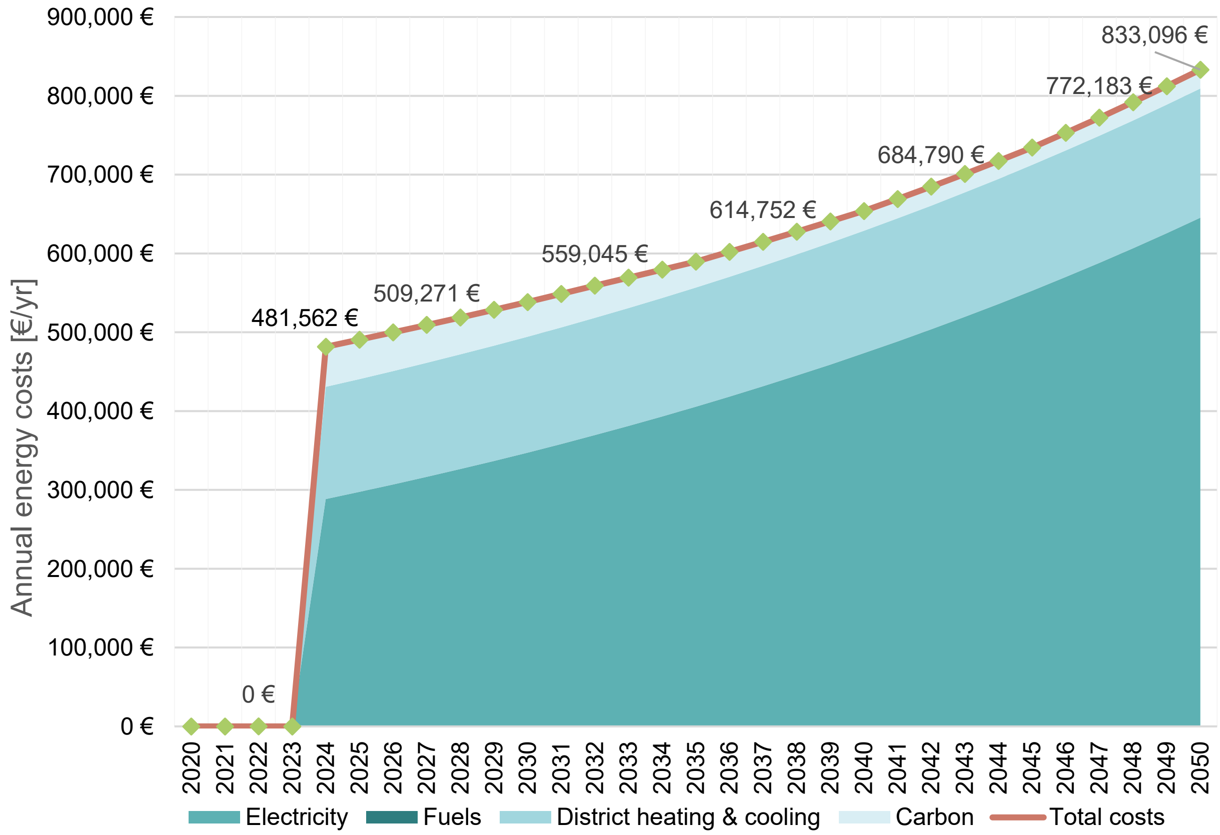


*Figure 5. Arneken Galerie Hildesheim - Cost of Energy and Carbon Emissions.*

### 5.2.1.4. Decarbonisation Targets

The targets used in this assessment are calculated from the CRREM v2 GHG and energy use intensity pathways.

Table 15 proposes the absolute greenhouse gas targets for two decarbonisation scenarios for Arneken Galerie Hildesheim from a baseline 2024 value of 7.8 $kgCO_2e/m^2/yr$, using a location-based emission analysis.

*Table 15. Greenhouse Gas intensity reduction targets.*

| Year | CRREM 2050 1.5°C Trajectory | | | CRREM 2040 1.5°C Trajectory | | |
|---|---|---|---|---|---|---|
| | Absolute emissions ($kgCO_2e/yr$) | Intensity Emissions ($kgCO_2e/m^2/yr$) | Percentage target reduction (from 2024 baseline) | Absolute emissions ($kgCO_2e/yr$) | Intensity Emissions ($kgCO_2e/m^2/yr$) | Percentage target reduction (from 2024 baseline) |
| **2024** | 491,361 | 7.8 | 0.0% | 491,361 | 7.8 | 0.0% |
| **2025** | 453,136 | 6.6 | 7.8% | 450,259 | 7.1 | 8.4% |
| **2030** | 278,263 | 4.0 | 43.4% | 262,222 | 4.2 | 46.6% |
| **2035** | 153,335 | 2.1 | 68.8% | 127,890 | 2.0 | 74.0% |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2040** | 71,567 | 1.0 | 85.4% | 39,967 | 0.6 | 91.9% |
| **2045** | 50,260 | 0.8 | 89.8% | - | - | - |
| **2050** | 39,967 | 0.6 | 91.9% | - | - | - |

The asset's energy intensity has been assessed against the scenarios required to align with the CRREM 1.5°C trajectory by 2030, 2040 and 2050. The asset's energy intensity is already below the CRREM 2050 target pathway. As a result, no further reduction is required for CRREM compliance. The asset is therefore already compliant with the CRREM targets and only needs to maintain its current performance level through to 2050.

### 5.2.2. Policy and Technology Vulnerability

*Table 16. Vulnerability Analysis for Policy, Technology and Market.*

| Vulnerability Analysis | | | | |
|---|---|---|---|---|
| **Procedure** | **Asset Vulnerability** | **Sensitivity Rating** | **Recommendation** | **Associated Risk** |
| **Cooling Equipment** | Arneken Galerie Hildesheim uses chillers for its climate control, with the refrigerants R410A and R407C. | **HIGH** | Assess whether it is possible to replace current cooling systems with newer technologies that use environmentally friendly refrigerants (global warming potentials of less than 10). | Policy and Legal, Market, Technology |
| **Heating Equipment** | The heating equipment of the asset is fossil fuel powered. | **HIGH** | Use heating equipment based on renewable energy or shift to district heating network. | Policy and Legal, Market, Technology |
| **Glazing type** | The asset features double-glazed windows as the main type. | **MEDIUM** | Consider installing triple-glazed windows to the asset. | Market, Technology |
| **EPC** | The asset has a valid EPC (Energieausweis) with Primary energy demand of 125.8 kWh/(m²·a) which indicates moderate energy efficiency, but not high performing. | **LOW** | N/A | Policy and Legal |
| **Refurbishment Date** | The asset was most recently refurbished in 2018. | **LOW** | N/A | Market, Technology |
| **Energy Data Coverage and Availability** | Energy data is available for the whole asset for the whole year. | **LOW** | N/A | Market |
| **Asset Adaptability** | The building was designed with some degree of flexibility regarding its use or layout. | **LOW** | N/A | Policy and Legal, Market |
| **Glazing g-values** | The glazing g-values are unknown. | N/A | N/A | Market |
| **Procedure** | **Asset Vulnerability** | **Adaptive Capacity** | **Recommendation** | **Associated Risk** |

| | | Risk Rating | | |
|---|---|---|---|---|
| **PV and Renewable Energy** | The asset has no PV or other renewable energy installed on-site. | **HIGH** | Assess the feasibility of installing renewable energy sources and implement the most appropriate one. | Policy and Legal, Market, Technology |
| **Refrigerant** | The Global Warming Potential of the refrigerant currently used for the cooling system is 2008. | **HIGH** | Replace the refrigerant of the cooling system with a more environmentally friendly one, with a lower GWP. | Policy and Legal, Market, Technology |
| **EV (Electric Vehicle) Charging Stations** | Arneken Galerie Hildesheim has only two EV charging stations. | **HIGH** | Consider installing more EV charging stations on the asset in the future as demand for these grows. | Policy and Legal, Market, Technology |
| **Cooling System Sizing** | The cooling system has not been sized using future climate scenarios. | **MEDIUM** | Review cooling system sizing against future climate scenarios and upgrade if needed. | Market, Technology |
| **Water Consumption Intensity** | Arneken Galerie Hildesheim's water consumption intensity is unknown; however, some water appliances are low water consumption. | **MEDIUM** | The asset should track water consumption and target a consumption intensity of less than 0.5 $m^3/m^2/yr$. | Market |
| **Climate Risk Management Strategy** | Arneken Galerie Hildesheim has no corporate risk management process that takes climate risk into consideration. | **MEDIUM** | Consider implementing an asset-level Climate Risk Management Strategy or Governance structure. | Policy and Legal |
| **Education of Tenants** | Environmental impact is discussed with tenants. | **MEDIUM** | Encourage consideration of and require compliance to reduce environmental impact from tenants. | Policy and Legal |
| **Lighting Type** | About 50% of the lighting is fitted with LED light bulbs. | **MEDIUM** | N/A | Market, Technology |
| **Lighting Control** | Any internal, office or display nights are not left on at night. | **LOW** | N/A | Market, Technology |
| **Alternative Power Source** | There is an alternative power source present on-site. | **LOW** | N/A | Market, Technology |
| **HVAC occupancy sensors** | There are occupancy sensors for the HVAC system. | **LOW** | N/A | Market, Technology |
| **Green Energy Contract** | Arneken Galerie Hildesheim has a green energy contract. | **LOW** | N/A | Market, Technology |
| **EPC** | The asset has a valid EPC (Energieausweis) with Primary energy demand of 125.8 | **LOW** | N/A | Policy and Legal |

| | | | | |
|---|---|---|---|---|
| | kWh/(m²·a) which indicates moderate energy efficiency, but not high performing. | | | |
| **Sustainability Strategy** | There is a corporate-level Sustainability Strategy in place. | **LOW** | N/A | Policy and Legal |
| **Scope 1, 2 and 3 Footprinting** | Arneken Galerie Hildesheim reports on its Scope 1, 2 and 3 emissions with Deepki. Scope 1 and 2 emissions reporting ensure improved transparency, investor confidence and demonstrate climate engagement. | **LOW** | N/A | Policy and Legal |
| **Energy Audit** | An Energy Audit has been conducted for Arneken Galerie Hildesheim in 2023. | **LOW** | N/A | Policy and Legal, Market, Technology |
| **Smart technologies** | Arneken Galerie Hildesheim uses BMS connected with sub-meters to track energy usage. | **LOW** | N/A | Market, Technology |
| **Sustainable Procurement Policy** | There is an asset-level or corporate-level sustainable procurement policy. | **LOW** | N/A | Policy and Legal |
| **Sustainability/Climate Risk Governance Structure** | There is a Sustainability Risk Governance Structure in place for Arneken Galerie Hildesheim. | **LOW** | N/A | Policy and Legal |
| **BMS** | BMS energy management system is present on-site. | **LOW** | N/A | Market, Technology |
| **Green Building Certification** | The asset has a valid BREEAM-In-Use Certification. | **LOW** | N/A | Market |
| **Occupancy/Daylight Sensors** | Occupancy and daylight sensors are present on site. | **LOW** | N/A | Market, Technology |
| **Free Cooling Strategies** | Free cooling strategies are available on some systems. | **LOW** | Extend free cooling strategies to all applicable systems. | Technology |

### 5.2.3. Reputation Vulnerability

*Table 17. Reputational Vulnerability Analysis.*

| Vulnerability Analysis | | | |
|---|---|---|---|
| **Procedure** | **Asset Vulnerability** | **Vulnerability Rating** | **Recommendation** |

| | | | |
|---|---|---|---|
| **Drinking Water Fountains or Dispensers** | There are no drinking water fountains or dispensers accessible for all asset users. | **HIGH** | Install accessible drinking water fountains or dispensers. |
| **Vegetation and Greenspace** | Limited outdoor vegetation (0% of site area). | **HIGH** | Improve the green image of the asset by increasing the proportion of outdoor green space. For example, planters and green walls. |
| **EV Charging Points** | There are only 2 onsite EV charging stations. | **HIGH** | Consider installing more EV charging stations on the asset in the future as demand for these grows. |
| **Community Hub/ Refuge Point** | The asset is not used as a community hub for community meetings or as a refuge point. | **HIGH** | Improve the community engagement of the asset by establishing partnerships with local organisations for community meetings and emergency refuge use. |
| **Tenant Communication about Environmental Impact** | The environmental impacts are not discussed with the tenants; however, compliance is not required. | **HIGH** | Encourage consideration of discussing environmental impacts and encouragement to reduce environmental impact from tenants. |
| **Onsite Renewable Generation** | The asset has no on-site renewable energy generation installations. | **MEDIUM** | A PV feasibility study should be conducted and installing onsite renewable generation should be considered. |
| **Records of Past Events** | Records of resilient features against extreme climate/weather events as well as past event's impacts are not kept. | **MEDIUM** | Establish a formal process to document and periodically review building resilience features and past climate-related incidents to inform risk management and future adaptation planning. |
| **Heating Equipment Fuel** | The heating equipment is fossil fuel powered. | **MEDIUM** | Use heating equipment based on renewable energy or shift to district heating network. |
| **Multiple Waste Streams** | Arneken Galerie Hildesheim has 5 different waste streams. | **LOW** | N/A |
| **Green Building Certification** | The asset has a valid BREEAM-In-Use Certification. | **LOW** | N/A |
| **Parking** | At Arneken Galerie Hildesheim parking spaces are available. | **LOW** | N/A |
| **Transparency on Environmental Impact** | A corporate Sustainability Report or sustainability section is publicly available. | **LOW** | N/A |
| **Bicycle Storage** | There are bike racks provided for asset users onsite. | **LOW** | N/A |
| **Drinking Water Fountains or Dispensers** | Drinking water fountains or dispensers accessible for all asset users. | **LOW** | N/A |
| **Asset/ Corporate Sustainability Targets** | There is an asset/ corporate sustainability policy. | **LOW** | N/A |
| **Wider Public Transport Connections** | Wider public transport infrastructure is available within less than 5km. | **LOW** | N/A |

| | | | |
|---|---|---|---|
| **Access to Public Transportation** | Public transportation includes Prager Straße tram and bus station and Dresden Central station. | **VERY LOW** | N/A |

## 5.3. Overall Transition Risk

Table 18 displays the overall transition risk based on the exposure and vulnerability analyses.

*Table 18. Overall Risk – Transition Risk.*

| Hazard | Exposure | Sensitivity | Adaptive Capacity | Overall Risk |
|---|---|---|---|---|
| **Policy and Legal** | **HIGH** | **MEDIUM** | **MEDIUM** | **MEDIUM** |
| **Market** | **MEDIUM** | **MEDIUM** | | **HIGH** |
| **Technology** | **HIGH** | **MEDIUM** | **MEDIUM** | **MEDIUM** |
| **Reputation** | **HIGH** | **MEDIUM** | | **MEDIUM** |

# 6. SOCIAL IMPLICATIONS

The social implications of physical and transition climate risks on real estate are significant. These implications can affect the economic stability, safety, and well-being of individuals and communities, as well as the financial performance and sustainability of real estate assets. Table 19 provides an overview of such implications.

*Table 19. Social Implications of Physical and Transition Climate-related Risks.*

| Category | Social Implication | Explanation |
|---|---|---|
| **Health** | Increased Morbidity and Mortality | Extreme weather events such as cold waves, tornadoes, floods, and hailstorms can lead to higher mortality rates and health problems, including respiratory and cardiovascular diseases. |
| | Vector-Borne Diseases | Changes in temperature and precipitation can expand the range of vector-borne diseases (e.g., malaria, dengue fever), affecting populations that were previously not at risk. |
| **Tenant Disruption** | Displacement and Migration | Areas impacted by severe climate events might lead to displacement of communities to less at-risk areas, reducing the tenant retention of at-risk areas. |
| | Industry Disruptions | Climate events can disrupt industries that are highly reliant on natural resources or are carbon intensive. If tenants represent such industries, it could lead to difficulties in meeting rental payments. |
| **Economic Inequality** | Access to Affordable Buildings | As the asset and its surrounding area are upgraded, there is a risk that higher rental values and service costs could place additional pressure on smaller or lower-margin retail, leisure and service occupiers, potentially reducing tenant diversity and affordability. |
| | Increased Costs | Damage to local infrastructure and rising insurance and operating costs may increase occupancy costs and, indirectly, consumer prices, disproportionately affecting smaller tenants and more price-sensitive visitors. |
| **Social Inequality** | Vulnerability of Marginalised Groups | Poorer communities and marginalised groups often have less capacity to adapt to climate impacts, exacerbating existing inequalities. These groups may have less access to resources, information, and support to recover from climate-related events. |
| **Social Disruption** | Divestment Campaigns | Activist groups may pressure or boycott investments in non-sustainable real estate assets, leading to financial losses and reputational damage for owners. |
| | Social Movements | Boycotts organised by activist groups can target specific occupier firms. |
| | Community Resistance | Local communities may resist developments that do not adhere to sustainability principles, affecting planning approvals and community support for projects. |
| **Service Disruption** | Networks and Resources | Damage to transport and communication networks, and energy and water systems, from climate events or market disruptions (i.e. energy prices) can disrupt the functioning of assets and their services. |
| **Strategic Shifts** | Training and Awareness | Asset stakeholders will need to develop new strategies to integrate sustainability into their asset management, requiring training and a shift in focus. |
| | Investment Redirection | Capital may shift from carbon-intensive sectors to climate-resilient assets. Regions reliant on high-emission industries risk economic decline, while green growth areas attract investment and opportunity, potentially widening regional inequalities. |

Addressing the social implications of physical and transition climate risks in real estate requires a collaborative approach among all stakeholders. This involves integrating climate resilience and sustainability into planning and investment decisions, prioritising the well-being of building occupiers and the community, and ensuring that adaptation and transition efforts are equitable and inclusive. Based on the analysis undertaken, Arneken Galerie Hildesheim has material exposure to Cold wave/ Frost, Temperature variability, Storm, Tornado, Water Stress, Heavy Precipitation, Subsidence and Hail, which may present the following social-related risks to and from the community and relevant infrastructure. Note that specific vulnerability ratings of very low or low imply that this feature, aspect or practice is already in place at the centre.

*Table 20. Impacts and Recommendations for Social-Related Risks due to Cold wave/ Frost, Flood, Temperature variability, Storm, Tornado, Water Stress, Heavy Precipitation, Subsidence and Hail.*

| Risks to the Community | Recommendations | Vulnerability |
|---|---|---|
| Slip and fall accidents: Flooded sections or icy walkways increase the risk of injuries for customers and employees. | Ensure outdoor walkways are sufficiently gritted during cold periods to reduce the risk of slip and fall accidents. | **HIGH** |
| Reduced customer visits: Heavy rain, hail, storm, tornado activity, extreme cold and icy roads discourage customers from venturing out, leading to a drop-in in-store sale. Furthermore, since the asset mostly fashion clothing, customers may delay non-essential purchases. | Investigate relationships with the local municipality to ensure sufficient gritting of roads during cold weather to ensure the asset remains accessible in times of cold weather extremes whilst also minimising potential disruption to business.<br>Increase the heating in the building, focusing on vulnerable areas.<br>If safe to do so, ensure that building users remain indoors. Avoid areas not heated and dissuade users from isolating. | **HIGH** |
| Employee availability: Heavy rain, storm, tornado activity and cold weather can cause transportation delays or accidents, preventing employees from reaching the centre and/or their respective stores. There could also be increased absenteeism due to cold-related illnesses, which could further strain staffing levels. Fewer employees on-site may lead to slower service, decreased productivity and employee burnout, as well as a reduction in sales. | | **HIGH** |
| Connectivity and transport: The asset is accessible via car and public transport services. During hazards relating to precipitation, storms, tornadoes or cold weather, for example flooded or icy roads increasing the risk of accidents. This may also lead to disruptions to public transport bus links, which could affect daily commutes and emergency response times. | Engage with local authorities to coordinate gritting, transport continuity, and emergency response during extreme weather events.<br>Increase the frequency of building inspections to detect damage at an early stage. Falling or flying debris could cause injuries and damages. More frequent inspections can help protect visitors. | **HIGH** |
| Work disruption: Severe precipitation, storms, tornado events or cold may shut down businesses, reducing income and productivity for both employees and employers at the asset. | | **MEDIUM** |
| Employment challenges: Individuals in hourly jobs at the | | **MEDIUM** |

| | | |
|---|---|---|
| asset are more likely to lose income during severe cold weather due to business closures or transportation issues. | | |
| Health issues: Prolonged exposure to stagnant water or cold temperatures can lead to serious health issues. Those in vulnerable groups such as the elderly, children, and those with pre-existing health conditions, are particularly at risk. | Train staff to recognise these symptoms and/or ensure a health and safety officer is present onsite during cold weather extremes. Consider engaging with food court tenants onsite to provide additional allowances for vulnerable groups, such as discounted hot drinks. | **MEDIUM** |
| Energy costs for tenants: Shop owners may face a higher energy burden with potentially increased bills during colder months. | Continue the current dialogue with tenants on energy efficiency practices. Share utility costs transparently and ensure buildings are examined regularly to prevent any cracks that may result in insulation problems. | **MEDIUM** |
| Damage to building: Damaged pipes, due to flood events, hail or freezing temperatures, can burst, impacting water supply systems and buildings. | Implement regular winterisation checks of plumbing and building systems, including pipe insulation and frost protection measures. Develop a rapid-response maintenance plan to address burst pipes and water damage, minimising disruption to tenants and operations. | **MEDIUM** |
| Power outages: Increased demand for heating in the asset's vicinity can overload electrical grids, leading to outages. Given the asset's supply of heating, power outages may not directly affect the centre itself but may cause an influx of building users seeking warmer environments instead. | Develop contingency plans for temporary outages, including safe evacuation procedures and communication protocols for tenants and visitors. | **LOW** |
| Demand for emergency supplies: Retail assets may see spikes in demand for essentials like groceries, medications, space heaters, and blankets. Failing to meet this demand can erode community trust. However, as these supplies are not typically stocked by the existing tenants at the centre, this should not pose a significant risk. | While not a core function, explore partnerships with nearby essential goods providers (e.g. supermarkets, pharmacies) to support community needs during extreme events. | **LOW** |

In addition to the above social implications, it is imperative to integrate community engagement when seeking to enhance climate resilience within and surrounding Arneken Galerie Hildesheim. Whilst not included in its analysis, this report would recommend the following risk reduction measures to enhance the level of community engagement at Arneken Galerie Hildesheim:

1) The development of a community engagement plan.
    a) Involve questionnaires or discussion with community members to understand their values and what they believe should be done to improve Arneken Galerie Hildesheim's resilience to climate change.
    b) It may also include protocols in which Arneken Galerie Hildesheim can be used to serve the local community, addressing reputational risks associated with the asset.
    c) Consider use of the asset as a community refuge space for emergencies, for example as a cooling centre during heatwaves or as a shelter during extreme weather events. This should

only be considered if the asset has sufficient adaptation measures, training and policies in place to do so.

2) Foster engagement with existing local climate initiatives.
    a) Klimaschutzagentur Hildesheim / Masterplan 100% Klimaschutz: Forum Hildesheim could engage with the Klimaschutzagentur and the city's Masterplan framework to align with local decarbonisation and adaptation efforts, enabling collaboration with businesses and the municipality while strengthening ESG positioning and visibility for a prominent city-centre retail asset.
    b) City of Hildesheim Climate Adaptation Strategy (Klimaanpassungskonzept): Forum Hildesheim could align with the city's adaptation strategy, particularly addressing inner-city heat risks, by supporting shading, cooling measures and tenant awareness, and exploring a role as a cooling refuge during extreme heat events where operationally feasible.
    c) Flood and heavy rainfall management (Hochwasser & Starkregenmanagement): Forum Hildesheim could engage with municipal flood risk and heavy rainfall initiatives to enhance preparedness, particularly focusing on drainage resilience, basement protection, and business continuity planning for extreme weather events.
    d) Stadtentwässerung Hildesheim (SEHi): Engagement with SEHi could support water-sensitive urban design measures such as rainwater retention, permeable surfaces and stormwater management, which are particularly relevant for large retail assets with extensive roof and hardstanding areas.
    e) IHK Hannover (Hildesheim region): Forum Hildesheim could participate in regional business networks to access peer exchange, regulatory updates and funding opportunities, supporting coordinated sustainability strategies across tenants and stakeholders.
    f) Urban greening and biodiversity initiatives: Forum Hildesheim could align with local greening programmes through measures such as green roofs, façades and public realm planting, improving heat mitigation, customer experience and visible ESG performance.
    g) Community engagement and local sustainability events: Forum Hildesheim could host or participate in local environmental initiatives to engage tenants and visitors, positioning the centre as a key platform for climate awareness and sustainable urban living.

# 7. VULNERABILITY OF ZONES

Each zone's vulnerability rating represents a quantification of the vulnerability analysis via the relevant features and policies in place at the asset. These inputs were evaluated against the material hazard categories defined in the scope of this assessment, including, but not limited to, climate-related, operational, and social risks, to determine vulnerability levels across key building systems and management functions.

Figure 6 visualises the relative vulnerability of building elements to the material hazards, highlighting where relative potential vulnerability is greatest and where therefore interventions would yield the most significant resilience gains. This analysis allows for a prioritised approach to risk mitigation, supporting targeted investment in areas of current highest vulnerability.

Based on the aggregated results, the zones identified as having the most significant relative vulnerability are Smart Building Technologies and Technical Equipment. These findings suggest that both digital and operational resilience present key opportunities for enhancement, particularly through improved monitoring, controls, and data visibility, as well as through the strengthening, protection, and long-term adaptation of core building services and plant.

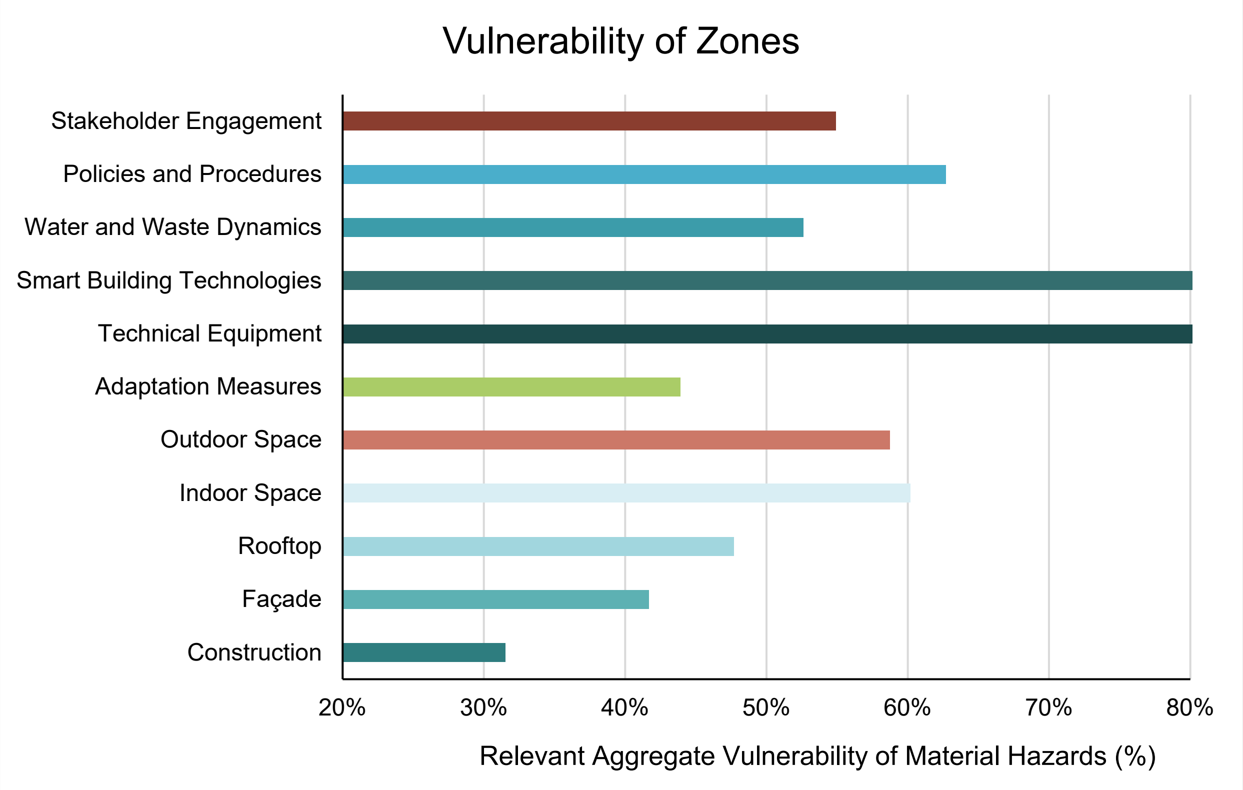


*Figure 6. Vulnerability of Zones for Arneken Galerie Hildesheim.*

# 8. FINANCIAL IMPACT ASSESSMENT

## 8.1. Financial Implications of Climate Change

Physical risks are the risks posed by climate change that directly impact building through acute extreme weather events and chronic gradual weather patterns. These could pose significant impacts to real estate, including[1]:

1) Costs to repair damaged assets or increased maintenance costs from wear and tear
2) Increased operating costs due to need for increased resources (energy and water) to adapt to changing climates
3) Investment costs into new low-carbon infrastructure and systems
4) Asset property and business downtime and business disruption from extreme events
5) Potential for increased insurance costs or reduced insurance availability

Transition risks also have the potential for significant financial implications in line with market and technology, policy and regulation and resource availability. These include:

1) Reduced economic activity in vulnerable markets
2) Reduced occupier demand for properties
3) Reduced asset value
4) Risk to company brand and reputational damages from negative stakeholder feedback if no action is taken
5) Lower liquidity and reduced attractiveness of assets of assets without climate mitigation measures
6) Increased cost of business due to compliance measures
7) Increased taxes from climate policies such as carbon taxes
8) Loss of funding opportunities
9) Increased costs of resources such as energy and water

Social implications can also impose costs through the impacts on health, social well-being, livelihoods and prosperity of local communities and individuals. These include:

1) Employee injury or illness causing increased health costs and reduced business costs due to time taken off work
2) Investment into new systems to ensure safe and comfortable working conditions under increasing climate conditions
3) Investment into community engagement and climate initiatives
4) Reduced sales from potential increased financial burden of climate change on customers

## 8.2. Financial Risk Assessment

The financial implications of physical risks are analysed below, for transition-related financial implications, refer to the CRREM analysis in Section 5.2.1.1.

Economic impact metrics are categorised into two groups in Munich Re Location Risk Intelligence:

1) **Climate Expected Loss** is the average annual loss, i.e. annualised expected loss, due to physical damage to buildings and their contents due to tropical cyclone, extratropical storm, river flood (defended) or storm surge (defended) events. The Climate Expected Loss is measured relative to the total cost of rebuilding, assuming region-specific standard building characteristics which are captured in the vulnerability functions used.
2) **The 1-in-100 Year Damage** measures the mean damage degree to an affected asset at a location-specific hazard intensity for tropical cyclone, extratropical storm, river flood (defended) or storm surge (defended) events with a return period of 100 years. This metric indicates the extent of damage to the asset, expressed as a percentage of its rebuilding cost, ranging from 0% to 100% (representing none to total destruction).

[1] ULI Heitman Climate Risk Report (2019)

*Table 21. Expected Loss and 1-in-100 Year Damage of Physical Hazards.*

| | | | Expected Loss (‰) | Damage (%) |
|---|---|---|---|---|
| Tropical Cyclone | Current | | 0.00‰ | 0.00% |
| | SSP2 / RCP4.5 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| | SSP5 / RCP8.5 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| Extratropical Storm | Current | | 0.04‰ | 0.10% |
| River Flood (defended) | Current | | 0.00‰ | 0.00% |
| | SSP2 / RCP4.5 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| | SSP5 / RCP8.5 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| Storm Surge (defended) | Current | | 0.00‰ | 0.00% |
| | SSP1 / RCP2.6 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| | SSP2 / RCP4.5 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| | SSP3 / RCP7.0 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |
| | SSP5 / RCP8.5 | 2030 | 0.00‰ | |
| | | 2050 | 0.00‰ | |
| | | 2100 | 0.00‰ | |

*Arneken Galerie Hildesheim Climate-Related Risk Assessment Appendix*

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