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Adapting from the Ground Up: Climate-Resilient Construction in Herne, Germany

How Herne Integrates Climate Adaptation into Urban Planning and Private Construction

Filling out a climate-proofing form enables the integration of additional adaptation measures from the planning phase of private and municipal planning and building activities.

Key Learnings

- **Embedding adaptation in planning ensures long-term resilience:** By integrating the climate adaptation measures into city planning and development procedures, Herne made climate adaptation a legally binding element of urban policy. This mainstreaming approach ensures early incorporation of climate considerations in every building and planning decision.
- **Evidence-based planning improves coordination and accountability:** The use of climate maps, checklists, and an adaptation catalogue enables evidence-based decision-making across departments. These instruments help identify local vulnerabilities, guide suitable measures, and ensure transparent, consistent implementation throughout the planning process.
- **Practical approaches raise awareness among homeowners:** The city's climate-proofing form encourages homeowners to include adaptation measures, such as green roofs, façade greening, and flood prevention, when constructing or renovating. This approach raises awareness and translates citywide adaptation goals into individual action.

About the region

Herne is a city located in the Ruhr area of North Rhine-Westphalia, Germany. It covers an area of approximately 51 km² and has a population of around 162,000 residents ([2025](#)). During the 19th century, Herne developed from a small village into an industrial hub, primarily due to coal mining and steel production. Today, a dense urban landscape with limited green spaces and a high population density of about 2,880 inhabitants per km² characterises the city. The city's industrial past has shaped its landscape, with remnants of mining infrastructure and a relatively flat terrain. Herne is part of an urban centre and transportation system network of the Ruhr metropolitan region. In response, the [State Office for Nature, Environment and Climate NRW](#) (LANUV) highlights the importance of local adaptation strategies, including urban planning and infrastructure resilience.

Climate Hazards

Extreme Heat, Flooding

Sector

Buildings, Urban, Water Management

Key system

Water Management, Ecosystem and Nature Based Solutions



Figure 1: City of Herne's location.
Image Credit: [Wikipedia images](#).

Climate Threats

Over the past few decades, Herne, as part of North Rhine-Westphalia, has experienced a notable rise in average temperatures, with a growing number of hot days (above 30°C) and tropical nights (above 20°C). Projections suggest that average temperatures could rise by up to 2.3 °C by 2050 under high-emission scenarios ([LANUV report 157](#); [Klimaatlas NRW](#)). Herne is particularly vulnerable to heatwaves due to its dense urban structure, which intensifies the urban heat island effect, resulting in higher temperatures within the city compared to its surroundings. The city also faces increasing risks of flooding and heavy rainfall, as seen in the devastating floods across North Rhine-Westphalia in [2021](#), causing 49 fatalities in the federal state. Droughts and declining groundwater levels have also become more frequent, contributing to ecological stress and water scarcity.

Climate-proofing private building works increases resilience

Previous adaptation processes have shown that climate adaptation works best when activities and measures are integrated into existing processes and structures of urban development and disaster-risk prevention. Climate adaptation, therefore, must be integrated into the development of the city of Herne and its individual districts. In this context, the city developed its [Climate Adaptation Plan](#) in 2019. Funded through the German National Climate Protection Initiative, the plan provides a strategic framework and the legal basis for addressing the unavoidable impacts of climate change at the local level. It integrates climate adaptation into urban planning and development processes from the planning and development stage to

the building stage. It incorporates three building blocks for implementing climate change adaptation measures in Herne:

1. **Baseline models** on the spatial distribution of heat stress (i.e. identification of particularly heat-prone areas in the city), the heat impacts on Herne's population, and a flow path and flooding analysis.
2. The results of the analysis feed into developing the Climate Adaptation Map for Herne, which shows areas particularly exposed to climate impacts by 2050 and that could be prone to conflicts due to social, economic or natural conditions at the given site. To ensure targeted and effective adaptation measures, the **Climate Adaptation Map** is integrated into planning processes. The map also includes an overview of the required adaptation measures, which should inform planning processes.
3. A **Climate Adaptation Catalogue** with appropriate measures at different spatial scales, such as the city, district, and building level. Those measures also involve behavioural changes among Herne's residents to reduce their sensitivity towards the impacts of climate change. Each measure within the catalogue consists of a factsheet describing the measure, its application area, synergies, conflicting objectives, stakeholders involved, cooperation partners, target groups, possible implementation tools, and illustrative examples.

Herne's Climate Adaptation Plan essentially serves as a procedural model for evaluating planning projects, with the overall aim of incorporating climate adaptation into community planning practices early on, rather than viewing it as a nice-to-have or sideline approach. The city of Herne requires the integration of adaptation into planning processes within the city area, making the Climate Adaptation Plan a legally binding instrument.

Before approving a specific building location, the city council must first verify internally whether the targeted area has any identified tensions between people using the Climate Adaptation Map. If this is the case, the process requires clarifying the type of conflict potential involved. For example, these include heat stress, reducing the ventilation or cooling function of an area, or increasing the flood risk. Then, the council determines the appropriate adaptation measures, as outlined in the [Climate Adaptation Catalogue](#) (in German, p. 52).

Mainstreaming climate change into spatial planning

The implementation of climate adaptation measures is particularly necessary in urban planning, as this offers the opportunity to make urban areas resilient to climate impacts as early as possible. Key areas of action include adapting settlements, open spaces, and infrastructure.

The major challenge for the coming years is not only to have climate adaptation plans readily available alongside everyday municipal planning, but also to integrate them into municipal planning processes. In this way, they will not remain mere well-intentioned recommendations for action and helpful guides, but will become established and, above all, binding components of municipal planning for the stakeholders involved. Figure 2 illustrates the process that guides the integration of climate adaptation into city planning in Herne. This internally developed framework is mandatory and has proven to be a valuable tool for supporting decision-making and ensuring consistency.

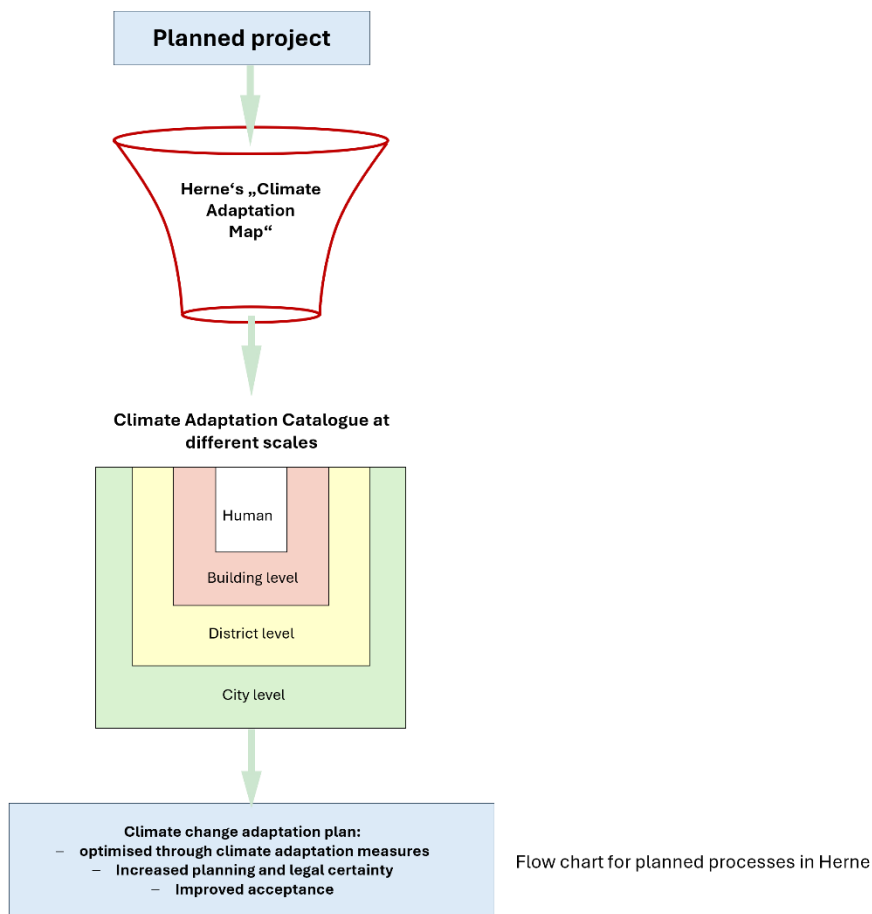


Figure 2: Integrated Planning Process Herne. Image Credit: The city of Herne.

There are four steps for applying the assessment [grid](#) with the Herne checklists for the Climate Adaptation Plan, which applies to all planning processes and relevant urban development projects:

Step 1: Area Assessment to Prioritise Need for Action

- First, the location of the affected area within Herne must be reviewed. Potential exposure to heat and/or flooding during extreme rainfall events must be considered in subsequent steps of the planning process.
- This step examines the potential for climate conflict.
- Resources for completing Checklist 1 include the "Climate Adaptation Action Map" and the "Heavy Rainfall Hazard Map" for Herne. Additional thematic maps from the climate analysis conducted by the Ruhr Regional Association can also be utilised.

Step 2: Project Assessment to Prioritise Need for Action

- This checklist examines the type of planned project and its impacts on the climate in terms of adaptation and, indirectly, mitigation.
- Resources for completing Checklist 2 include the development plan, building project descriptions, or similar.

Step 3: Implementation of Measures

- For the planning project, relevant climate adaptation measures should be identified and compiled based on the specific climatic stresses. If updating an existing development plan, it must be reviewed across departments to ensure the integration of appropriate adaptation strategies.
- Depending on the type of planning, the checklists for urban structure/buildings, for development planning (Checklist 3b), or for green and open space planning must be completed.

Step 4: Assessment of the project's "climate adaptation" scope

- The degree of planned project's climate adaptation scope is assessed based on the final climate-proofing score.
- The planning process is presented to policymakers and the public, and undergoes different levels of public participation

Planned projects that achieve a total score of less than -6 are not sufficiently adapted to climate change. These could be corrected by implementing additional adaptation measures. If the area affected by the planned project has a significant potential for climate conflict, compensation through adaptation measures is often insufficient to achieve at least a neutral to good climate adaptation score. The result of the check is politically binding. The planning authority incorporates the measures identified through the climate check into the development plan specifications during the planning procedure and formally adopts them. Once adopted, these measures become legally binding under a statutory resolution. For example, the climate check identifies extensive green roofs and green façades as key climate adaptation measures, which are incorporated into the development plan as mandatory requirements, thereby making them legally binding.

Promoting climate adaptation among homeowners

Based on the Climate Adaptation Plan, the city council developed the "Climate-Check" for homeowners. It is an awareness-raising approach about the climate risks the city is facing and the active role every homeowner can take in adapting to those risks. To increase the city's resilience to the effects of climate change at the local scale, particularly flooding and heatwaves, Herne decided to introduce the Climate Check, a climate-proofing form. This is intended to motivate homeowners to incorporate adaptation measures when (re-)building on their property.

Every construction activity requires a building permit issued by the city administration. Regardless of the type of work homeowners intend to carry out, each project must include climate-adaptation measures to enhance resilience and reduce long-term costs. To assess how well a project integrates these measures, the permit form includes a checklist indicating which adaptation actions the homeowner plans to implement (Table 1).

Table 1: Overview of Climate-proofing assessment.

Implemented measure	Points	Evaluation
No measure	-1 point	Not sufficiently climate-adapted
1 measure	0 points	Neutral
2 measures	1 to 2 points	Well climate-adapted
>2 measures	>2 points	Very well climate-adapted

Depending on the construction work, the Climate Adaptation Catalogue provides a set of measures that homeowners can also implement at the building level (page 103 ff.):

- **Greening measures:** Tree plantings, roof greening, façade greening (Figure 3)
- **Materials and colours:** Choosing bright materials and light colours to lower surface temperatures
- **Dealing with flooding and heavy rain:** rainwater reuse, structural flood prevention measures during heavy rain, where Nature-based Solutions are not possible



Figure 3: Intensive façade greening with wild vine. Image Credit: K.PLAN.

Adaptation measures should accompany any building activity that increases surface sealing – for example, the creation or enlargement of parking spaces, houses, or garages. Sealed

surfaces absorb and store heat more quickly than green areas, a difference that becomes especially pronounced during hot summer days. This leads to higher local temperatures around private homes, reducing comfort and well-being and increasing health risks. Prolonged exposure to high temperatures can contribute to cardiovascular strain and poses a serious threat to human health.

(Re-)Building activities, therefore, offer an important opportunity to integrate adaptation measures at an early stage. Homeowners or architects can complete the climate-proofing form during the planning phase, ensuring that suitable measures are incorporated from the outset. The completed form is submitted together with the building permit application and reviewed by the city council.

Surface sealing or land use generally reduces a project's score by one point. Any construction project that occupies land must therefore include climate adaptation measures. Each measure adds one point, meaning that a single well-chosen measure can fully compensate for the negative impact of sealing. The final assessment of the project is based on its total score, as shown in Table 1.

“The municipal administration and city council have increased awareness of climate adaptation and intensified their engagement in a constructive dialogue concerning climate adaptation measures.

The awareness of the need for climate adaptation has been implemented through the climate checks.”,

City of Herne

Summary

The city of Herne has taken a proactive and coordinated approach to addressing climate risks such as heatwaves and flooding by embedding climate adaptation into its urban planning and building processes. Through its Climate Adaptation Plan, Herne has made adaptation legally binding in local planning, ensuring that every new development considers long-term climate resilience. The climate-proofing form for private construction empowers homeowners to adopt practical adaptation measures – from green roofs to rainwater reuse – linking individual action with citywide goals. Supported by evidence-based information, like climate maps, checklists, and an adaptation catalogue, Herne promotes transparency, cooperation, and accountability across departments. This approach increases the city's resilience and raises public awareness, setting a strong example for other European cities and municipalities that seek to incorporate adaptation into their everyday planning and decision-making.

Further information

The work presented in this adaptation story is part of Herne's Climate Change Adaptation Strategy.

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- Klimafolgenanpassungskonzept der Stadt Herne:
https://www.herne.de/PDF/Umwelt/klima/kurzfassung_klimafolgenanpassungskonzept_herne_ne_u.pdf (in German)
- Klimacheck für private Bauvorhaben: [Klima-Check für private Bauvorhaben - Serviceportal Stadt Herne](#) (in German)
- Handbuch „Herner Checklisten“ zur Anwendung des Klimafolgenanpassungskonzeptes in der Stadt Herne:
https://www.herne.de/PDF/Umwelt/klima/handbuch_herner_checklisten_zur_klimaanpassung_gs_zusammengefasst.pdf (in German)

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