



# **What future for the past?**

Adaptive Reuse of the Sliedrecht Water Tower

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## 1 Introduction and problem statement

The Sliedrecht Water Tower is located on an area known locally as 't Zaagje, it is a defining landmark within the Waterdriehoek, a region that connects Dordrecht, Papendrecht, and Sliedrecht through a shared history of hydraulic engineering and water management. Constructed in 1886, the tower exemplifies the technical ingenuity that placed Sliedrecht at the forefront of industrial and public health advancements in the 19th century. Its innovative water filtration system not only revolutionized access to clean water but also solidified the town's reputation as a hub for expertise in managing water, a resource critical to the Netherlands' survival and prosperity (Historische Vereniging Sliedrecht, 1986; Watertoren-Terrein, n.d.).

Today, the Sliedrecht Water Tower is more than an architectural relic; it is a cultural touchstone and a physical reminder of the region's industrial legacy. However, as urbanization accelerates and societal needs evolve, the tower finds itself at a crossroads. The demands of modern development—including housing, commercial activity, and green infrastructure—have intensified, necessitating a careful balance between preserving the past and meeting contemporary urban needs. This challenge is heightened by environmental stressors such as air, high humidity, and fluctuating temperatures, which threaten the tower's structural integrity (Sliedrecht24, 2023; Watertoren-Terrein, n.d.).

Redeveloping the Water Tower Terrain presents a unique opportunity to enhance the tower's role within Sliedrecht's urban fabric. Adaptive reuse, a growing trend, offers a viable solution by transforming industrial heritage sites into dynamic, multifunctional spaces. Successful projects have showcased how water towers can be repurposed for residential, cultural, or commercial use while preserving their historical significance. These examples underline the potential for the Sliedrecht Water Tower to follow a similar path, blending heritage preservation with sustainable urban development (Watertoren.nl, n.d.; Nederlandse Watertoren Stichting, n.d.).

## 2 Research question

To address these multifaceted challenges, this research focuses on the following main research

question:

How can the Sliedrecht Water Tower be preserved and adapted for contemporary use while maintaining its historical and cultural significance?

This question is supported by several sub-questions aimed at exploring the various dimensions of the transformation process. These sub-questions include:

- What are the values of the Water Tower that must be preserved during the transformation process?
- What are the main factors causing the tower's deterioration, and how can they be addressed?
- How can the tower's historical value be preserved while integrating sustainable features for adaptive reuse?

## 3 Methodology

This research aims to assess the historical, architectural, and cultural significance of the Sliedrecht Water Tower while proposing sustainable strategies for its adaptive reuse. The study uses mixed-methods approach, combining qualitative and quantitative methods.

The first archival research examines historical documents, construction records, and photographs to explore the tower's role in the community and its significance in local infrastructure development. This includes a review of the tower's initial purpose as a water supply system and its impact on public health.

Stakeholder interviews are conducted with community members to gather perspectives on the tower's cultural value and potential for adaptive reuse. This step will provide insights into the social importance of the structure and inform strategies for maintaining its historical integrity.

The research involves conservation assessment to identify visible damage to the tower, such as cracks, erosion, and foundation issues, along with a geotechnical investigation to evaluate the soil conditions and potential subsidence. Expert consultations with structural engineers will be conducted to better understand the cause of deterioration and provide recommendations for stabilization.

Finally, the research recommends sustainable conservation strategies that balance historical preservation with modern needs, focusing on moisture management, foundation stabilization, and possible adaptive reuse options. The goal is to ensure the tower's continued relevance as a symbol of the community's industrial heritage.

#### 4 Historical and urban analysis

The Sliedrecht water tower was built in 1886 as part of the region's first water supply infrastructure. The construction was initiated by the public limited company Maatschappij tot Exploitatie van Waterleiding in Nederland, based in Amsterdam, with financial support from, among others, the beer brewer Gerard Adriaan Heineken (Historische Vereniging Sliedrecht, 2016). Architect Schotel was responsible for the design of the tower, which was built on a floodplain ('t Zaagje) along the banks of the Merwede River.

The construction of the tower took two years and was completed on December 22, 1886, with a one-week delay due to unfavorable weather conditions. The total cost amounted to f 185,000. The tower was directly connected to an extensive water supply network, with cast iron pipes transporting the purified water from the tower to Sliedrecht, Giessendam, and later even Papendrecht (Historische Vereniging Sliedrecht, 2016).

The water tower site was functionally equipped and included, besides the tower itself, a machine room, filtration buildings, and several service houses. A small bridge over Het Zaai-gat provided direct access to the tower from the machinist's residence (A 238, now Rivierdijk 124) (Historische Vereniging Sliedrecht, 2011).

Throughout the 19th century, the infrastructure was continuously adapted to technological advancements. In 1894, the water pipes had to be laid 50 cm deeper due to frost issues. Later, in 1975, the tower was decommissioned following the merger of water supply companies, after which the regional headquarters was relocated to Gouda (Historische Vereniging Sliedrecht, 2011).

##### 4.1 Urban history and demographic development of Sliedrecht

The urban development of Sliedrecht is closely linked to its location along the Merwede River

and the rise of the hydraulic engineering and dredging industry. Until well into the 19th century, the town primarily consisted of a linear settlement along the dike, with homes and businesses situated directly on the waterfront. The water tower and the 't Zaagje site played a crucial role in the further expansion and modernization of the town (Historische Vereniging Sliedrecht, 2011). The historical analysis of Sliedrecht's urban growth is illustrated in figure 02.

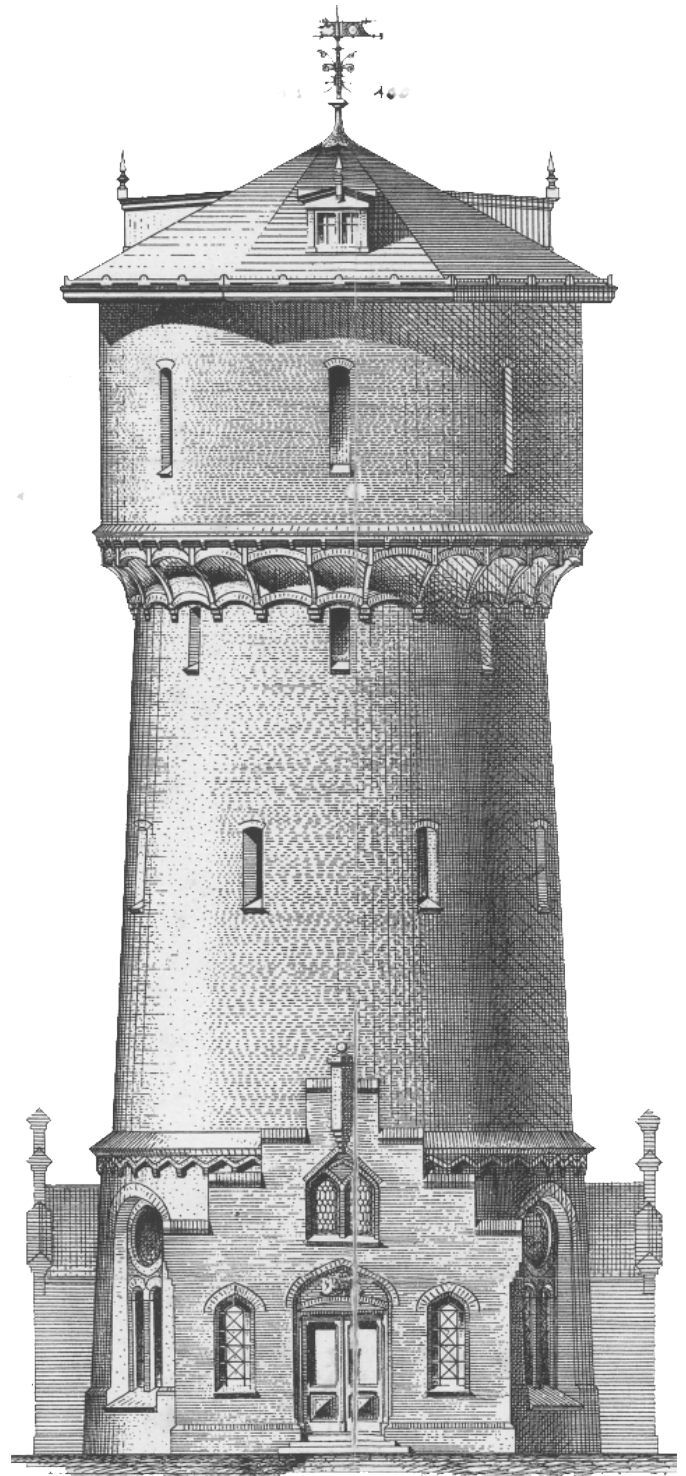


Figure 01: elevation Water tower

Sliedrecht's demographic and housing development mirrored its industrial shifts. In 1899, the town had approximately 2,500 residents and around 600 homes. By 1937, the population had grown to about 10,000, with the number of homes increasing to roughly 2,500 as industrialization spurred urbanization. In 1970, the population reached around 20,000, and the number of homes had risen to approximately 5,000, reflecting the expansion of both industry and housing as the town modernized. As of 2025, Sliedrecht is home to 26,261 residents and has 11,257 homes, continuing its evolution as a thriving suburban community within the context of the greater Dutch industrial economy (AlleCijfers.nl, z.d.).

The development of water infrastructure  
 Before the construction of the water tower in 1886, Sliedrecht relied on rainwater and shallow wells, which led to issues with drinking water supply and public health. The arrival of the water tower and its associated pipeline network marked a significant step in urban development, as it not only improved public health but also supported industrial growth (Historische Vereniging Sliedrecht, 2016).

Although water towers are essential for the storage and distribution of drinking water, they typically do not have water purification functions. Water purification usually takes place in separate treatment facilities before the clean water is pumped to the water tower for storage and distribution. In Sliedrecht's case, the introduction of the water tower likely represented an advancement in water distribution infrastructure, while water purification processes is implemented with in the tower to address public health concerns.

#### 4.2 't Zaagje

From the late 19th century, 't Zaagje developed into a dynamic industrial area, with shipyards. At the same time, it became a popular spot for local youth, who played, swam, and spent time around the warehouse, the slipway area, and the basalt blocks along the riverbank (Historische Vereniging Sliedrecht, 2016).

During the 19th century, Sliedrecht expanded further inland. The traditional linear development along the dike saw the addition of more side streets, creating compact residential neighborhoods. As a result,



Figure 02: urban analysis

the town's center of gravity gradually shifted from the river toward higher-lying areas. (Historische Vereniging Sliedrecht, 2016).

With the growth of industry in the 20th century, the area surrounding the water tower and 't Zaagje became increasingly urbanized. The tower itself was decommissioned in 1975 following the integration of Sliedrecht's water company into a larger regional network. Nevertheless, the tower remained an important landmark in the local landscape (Historische Vereniging Sliedrecht, 2011).

## **5 Values and attributes of the Sliedrecht water tower**

The Sliedrecht Water Tower is a historically significant structure and a symbol of the community's resilience and evolution. To assess the values the Values & Attributes Coding Toolkit framework developed by Bruno de Andrade, is used, ensuring a structured approach to heritage evaluation. By categorizing values and their corresponding attributes, the values can systematically be understood and justify the tower's historical, architectural, cultural, social, and functional importance. This method supports informed decision-making for conservation and adaptive reuse, ensuring the tower remains relevant in contemporary urban life while respecting its industrial heritage.

This structured approach aligns with internationally recognized heritage assessment frameworks (Pereira Roders, 2007; Tarrafa and Pereira Roders, 2011). It provides:

1. Clarity and Justification: Categorizing values and attributes ensures an evidence-based evaluation of the tower's heritage significance.
2. Guidance for Conservation and Adaptive Reuse: Helps prioritize preservation efforts and informs sustainable transformation projects.
3. Integration of Sustainable Development: Recognizes the balance between conservation and contemporary needs, supporting environmentally responsible solutions.
4. Community Engagement: Ensures that public sentiment and cultural connections remain central to any interventions. Application of the Methodology

## **Application of the methodology**

The application of the Values & Attributes Coding Toolkit enabled a comprehensive and systematic categorization of the Sliedrecht Water Tower's heritage significance. Through this framework, the tower's historical, architectural, social, and functional attributes were analyzed to determine their contribution to the overall heritage value. The results of this structured evaluation are presented in Table 1, which provides a clear framework for conservation and potential adaptive reuse strategies.

## **Results and discussion**

As shown in Table 1, the Sliedrecht Water Tower's heritage significance is categorized into cultural, architectural, social, and functional values. The historical and age values highlight the tower's critical role in Sliedrecht's development and its enduring legacy as one of the region's oldest industrial structures. The architectural value underscores its unique design elements that blend functionality with aesthetic considerations. Social values emphasize the tower's cultural significance within the local community and its role in the region's industrial transformation. Lastly, the functional value indicates the potential for adaptive reuse, ensuring continued relevance through sustainable interventions.

## **Implications for conservation and adaptive reuse**

This study demonstrates the applicability of the Values & Attributes Coding Toolkit in systematically assessing the heritage significance of the Sliedrecht Water Tower. By employing this framework, the analysis provides a structured rationale for conservation and adaptive reuse strategies. As indicated in Table 1, the categorization of values and attributes highlights key aspects of the tower's historical, architectural, social, and functional importance. The findings underscore the necessity of balancing heritage preservation with contemporary urban development objectives, ensuring that the Sliedrecht Water Tower remains an integral component of the community's cultural and historical identity. Future research may focus on the practical implementation of proposed adaptive reuse strategies and the long-term socio-economic impacts of heritage conservation in Sliedrecht.

Category	Value	Description
<b>Cultural</b>	Historical value	The Sliedrecht Water Tower was constructed in 1886 and was pivotal in addressing public health challenges. Before its establishment, residents relied on contaminated water sources, which led to waterborne diseases. The tower provided a safe, pressurized water supply that drastically reduced health risks, marking a critical advancement in local infrastructure and public health. Its role in Sliedrecht's growth remained central until it was decommissioned in 1975 (Gemeente Sliedrecht, 2023).
	Age value	At over 130 years old, the Water Tower is one of the oldest industrial structures in the region. Its age gives it a unique place in Sliedrecht's identity, embodying the long-standing relationship between the town and its industrial past. Its longevity is also a testament to the community's dedication to preserving this landmark as part of their collective history (Gemeente Sliedrecht, 2023).
<b>Architectural</b>	Architectural value	The Water Tower's design, created by architect Schotel, is an eclectic blend of industrial and aesthetic principles. While not as ornate as some of Schotel's other works, it features distinctive elements, such as decorative ironwork and large windows, which serve both functional and decorative purposes. These features make it an exemplary piece of late 19th-century industrial architecture (Gemeente Sliedrecht, 2023).
<b>Social</b>	Cultural value	Beyond its architectural and historical roles, the Water Tower has become a powerful cultural symbol for the local community. It stands as a visible representation of Sliedrecht's industrial heritage and progress. The tower's influence extends beyond its physical structure, inspiring local stories and creative works, including a youth novel that incorporates it as a key cultural element (Sliedrecht24, 2023).
	Social value	The Water Tower's social significance is deeply tied to its function in supporting local industry. It was a crucial infrastructure element that enabled industrial activities in the region, marking the shift from manual labor to modern mechanical processes. The tower's closure in 1975 symbolizes the end of an industrial era in Sliedrecht, reflecting broader socio-economic changes in the town (Gemeente Sliedrecht, 2023).
<b>Functional</b>	Functional value	Although it no longer serves as a water tower, its functional potential for adaptive reuse remains high. Proposals for converting the tower into a museum, cultural center, or community venue ensure its continued relevance. Additionally, integrating sustainable features like solar panels and water recycling systems would align with modern environmental goals while preserving the tower's historical value (Gemeente Sliedrecht, 2023).

Table 1: Categorization of values and attributes of the Sliedrecht water tower



Figure 04: water tower aerial view (Sliedrecht24. (2023))

The preservation of historic structures requires a thorough understanding of their current condition, including structural stability, material integrity, and environmental influences. This conservation assessment examines the existing state of the Sliedrecht Water Tower, identifying forms of deterioration and their underlying causes. By documenting visible damages—such as cracking patterns, plaster degradation, and moisture-related issues—this aims to establish links between observed defects and potential structural or environmental factors.

A fundamental aspect of this assessment is the formulation of hypotheses regarding damage causation. For example, the presence of vertical cracks in the plastered sections raises questions about foundation settlement and differential load distribution. Similarly, grass growth in

the roof gutter on only one side of the structure suggests possible structural tilt or hydrological imbalances. By integrating empirical observations with existing literature on historic masonry conservation (Lubelli, 2021; Monumentenken- nis, n.d.-a; Quist, 2021), this study seeks to provide a scientific basis for conservation strategies.

### 6.1. Structural analysis

Documenting visible damages such as cracks, plaster deterioration, and vegetation growth. Figure 05 highlights that grass growth in the roof gutter occurs only on one side, likely due to water retention. This may be related to structural tilt, or it could be influenced by the building's orientation. Further analysis, such as digital leveling measurements and hydrological assessments, is needed to confirm these hypotheses.

#### Vertical cracks (Settlement and load redistribution)

The presence of long vertical cracks in the plastered sections (Figure 06) suggests settlement issues. These could be linked to differential foundation subsidence, potentially due to groundwater fluctuations or inadequate foundation depth. According to Monumentenkennis (n.d.-a), such cracks typically occur due to variations in soil-bearing capacity, exacerbated by inadequate drainage or structural loads. Additionally, Lubelli (2021) explains that rising damp and capillary moisture transport can weaken masonry, accelerating crack propagation. The cracks' concentration on the cemented façade raises questions: does cement plaster contribute to differential moisture retention, influencing crack formation? Further structural monitoring, including leveling measurements and soil composition analysis, would help confirm this hypothesis.

#### Horizontal and diagonal cracks (material stress and wind load)

The tower's upper sections experience significant wind pressures, leading to shear stress cracks. These are most pronounced at transitions in geometry, particularly at the junction between the cylindrical shaft and the wider top section (Figure 06). Monumentenkennis (n.d.-b) describes how shear stress accumulates in historical masonry due to material fatigue and fluctuating environmental loads. According to Quist (2021), wind pressure-induced shear stress is particularly problematic in tall, slender structures, necessitating careful reinforcement. Advanced digital strain analysis and wind load simulations should be conducted to assess the long-term impact of these stresses.

Dense vegetation and standing water around the base (Figure 04) indicate drainage deficiencies. Lubelli (2021) notes that excessive moisture retention near foundations accelerates settle-



Figure 05: water tower



Figure 06: water tower upper part

ment and structural instability. A geotechnical survey is required to determine if the observed settlement correlates with soil composition and moisture infiltration patterns.

#### Ground floor condition

The ground floor, including the former boiler house, exhibits notable instability. These single-story structures, featuring simple segment-arched windows, were built with a slightly different execution than the original plans. During the 1930s, an extension was added to the ground floor (see figure 04), adding extra weight to the foundation and further affecting its stability.

These buildings once featured decorative brickwork along the roofline and a prominent chimney on the west facade (highlighted with blue in figure 05). However, years of neglect have left them severely damaged. The boiler house, once a key component of the water supply system, had its roof removed due to safety concerns. Its walls are heavily deteriorated, suffering from extensive moisture damage, with wooden doors missing, and window frames either decayed or completely absent.

Wooden structural elements show signs of biological degradation due to moisture retention. Lubelli (2021) emphasizes that fungal growth and cellulose breakdown occur in persistently damp conditions. Improved ventilation and passive conservation techniques should be prioritized to prevent further deterioration.

### 6.2. Material degradation

#### Plaster layer condition and deterioration factors

The plaster has detached in some areas, with the most significant loss concentrated on one section of the masonry (visible in figure 05 and 06). This could indicate underlying moisture retention or material incompatibility. Lubelli (2021) describes how cement-based plasters, when applied to historic masonry, can restrict moisture evaporation, leading to internal stress and detachment.

Further assessment is required to determine whether the cement-based plaster contributed to differential stress buildup. Testing the plaster's breathability and adhesion properties will provide insights into appropriate conservation methods.



Figure 07: extension window

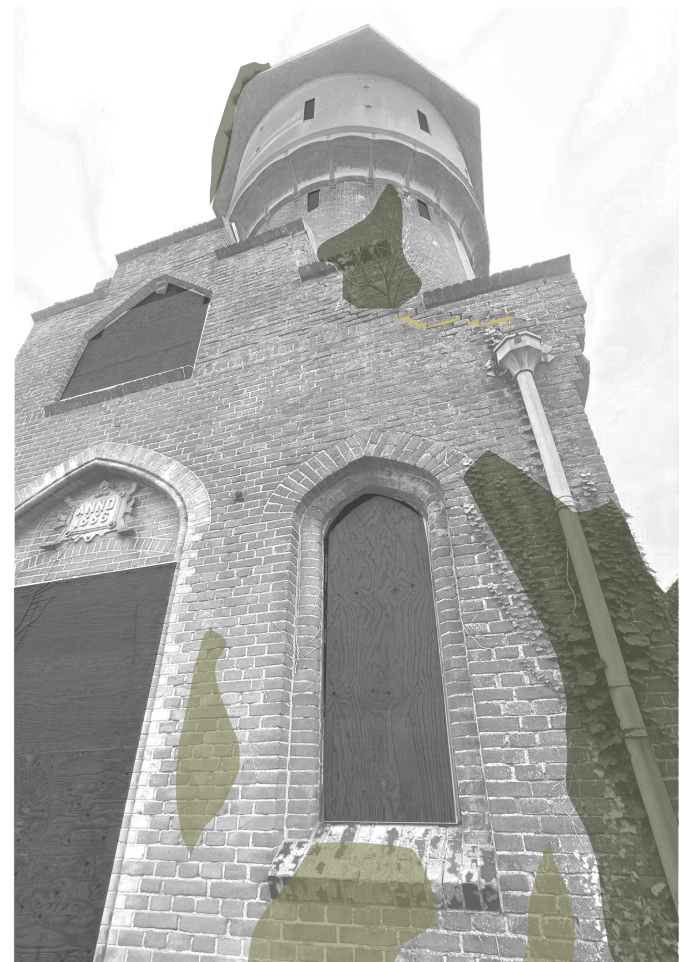


Figure 08: entrance

damage in mortar  
crack  
used to be an opening  
detached plaster  
Weathering  
missing element  
vegetation

- Brick and mortar degradation

Weathered brick faces and erosion:

The exposed brick surfaces, particularly on the lower portion of the tower (figure 08), show signs of erosion. This could be due to prolonged exposure to freeze-thaw cycles, where absorbed moisture expands and contracts within the bricks, leading to spalling and surface loss (Rijksdienst voor het Cultureel Erfgoed, 2012).

### 6.3. Environmental factors affecting deterioration

The tower's surroundings significantly influence its current state of degradation, as illustrated in Figure 09. Key environmental factors, including moisture retention, drainage conditions, wind exposure, and solar impact, contribute to the ongoing deterioration (Lubelli, 2021).

Moisture and drainage issues

Vegetation and soil retention:

The presence of dense vegetation around the tower base (see Figure 09) suggests high humidity retention. This creates a favorable environment for biological growth, such as moss and algae, which can degrade the masonry over time. Additionally, if climbing plants or tree roots penetrate the brickwork, they may cause mechanical damage by widening cracks and increasing moisture infiltration (Stichting ERM, n.d.; Monumentenkennis, n.d.-a). Managing vegetation near the base of the tower is essential to mitigate these risks.

Poor drainage and water accumulation:

As indicated in Figure 09, potential water pooling near the base—likely due to insufficient drainage—poses a risk to the foundation's stability. Prolonged exposure to moisture can lead to subsidence and structural weakening, particularly if the water is not effectively redirected away from the foundation. Studies highlight that implementing French drains, gravel layers, or capillary-breaking layers can significantly reduce moisture-related damage (NEBEST, n.d.; Monumentenkennis, n.d.-b).

Climatic and weathering effects

Wind and rain exposure :

The prevailing wind direction, coming from the river side (see Figure 09), plays a major role in accelerating the deterioration of the tower. Wind-driven rain consistently impacts the southwest-facing side, increasing moisture penetration and erosion. The airflow pat-

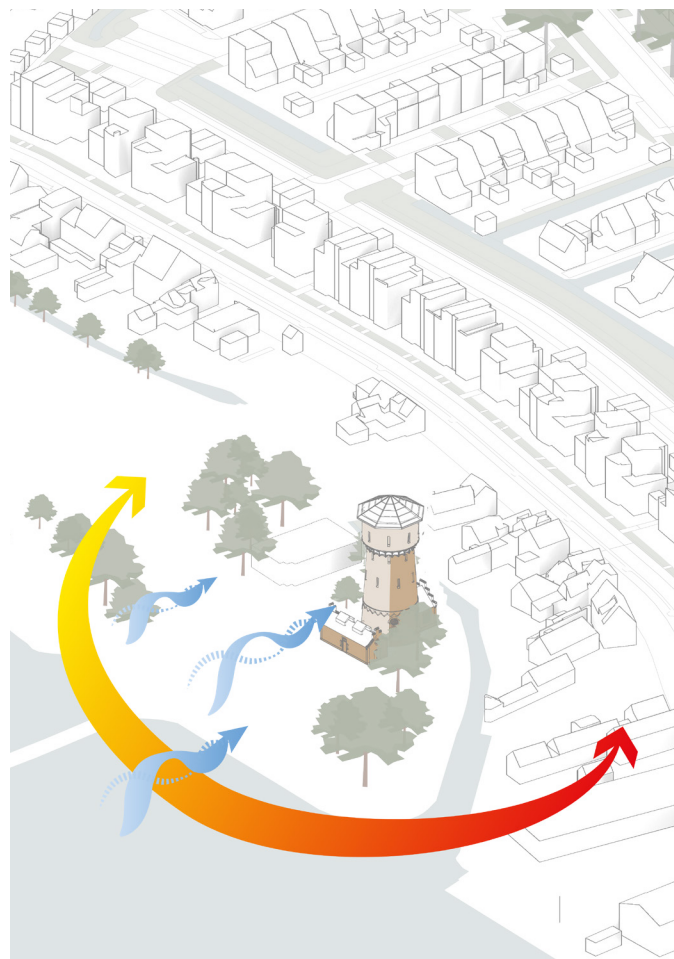


Figure 09: water tower with solar path and wind direction

terns in Figure 09 highlight how strong coastal winds intensify these effects, particularly during storms. Wind-driven moisture transport is a key factor in the degradation of historic masonry, as repeated wetting and drying cycles weaken both the plaster and the underlying brickwork (Rijksdienst voor het Cultureel Erfgoed, 2012; Monumentenkennis, n.d.-a).

Solar exposure and temperature fluctuations:

The solar path in Figure 09 indicates that the southern and western facades receive the most sunlight, which has both beneficial and detrimental effects. Sunlight aids in drying out masonry after rainfall, reducing prolonged moisture retention. However, intense daytime heating followed by rapid nighttime cooling can cause thermal stress, leading to material fatigue and cracking. In winter, infiltrated moisture may freeze, expanding inside the brick pores and causing freeze-thaw damage—a well-documented issue in historic structures (Kalk Mortel, n.d.; Lubelli, 2021). Breathable, hydrophobic treatments may help mitigate this issue while preserving the tower's historical integrity (Quist, 2021).

## 7 conservation strategies

- Foundation and structural reinforcement:  
Stabilizing the Foundation:

The foundation of the tower shows signs of differential settlement and subsidence. To prevent further structural damage, it is recommended to conduct a thorough geotechnical investigation of the soil conditions around the tower and the extent of subsidence. Based on the findings, foundation reinforcement methods such as underpinning or installing micropiles may be required to stabilize the base and redistribute loads evenly across the structure (Stichting ERM, n.d.).

Addressing vegetation growth:

The vegetation around the tower base should be carefully removed to avoid further moisture retention and mechanical damage to the foundation and walls. Regular maintenance to prevent root growth near the structure is essential (Feilden, 2003). This can prevent root penetration, which could exacerbate cracking and further destabilize the structure (Doehne & Price, 2010).

Crack repair and material restoration

The different types of cracks in the tower require a tailored approach to prevent further deterioration and structural weakening. Based on the Damage Atlas and Heritage Conservation Wiki from Monumentenkennis (n.d.-a, n.d.-b), the following repair strategies are recommended:

### 1. Vertical cracks

Vertical cracks are often caused by differential foundation settlement or excessive load concentration on certain masonry sections (Monumentenkennis, n.d.-a). According to Lubelli (2021), capillary moisture transport can weaken masonry, accelerating the progression of cracks.

Repair strategy:

Use crack width gauges and digital leveling measurements to monitor crack progression over time. Inject a flexible, compatible mortar (e.g., lime-based mortar) into the cracks to prevent further moisture infiltration (Monumentenkennis, n.d.-b). If cracks are structurally significant, stainless steel anchors or tension rods may be installed to reinforce affected areas (Stichting ERM, n.d.). Improve foundation stability by addressing drainage issues to prevent further settlement (Monumentenkennis, n.d.-a).

### 2. Horizontal and diagonal cracks

These cracks often result from wind loads, thermal expansion, and material fatigue. The Damage Atlas of Monumentenkennis (n.d.-a) highlights that horizontal cracks near transition zones in building geometry indicate structural stresses and insufficient flexibility in the materials.

Repair strategy:

Conduct digital strain measurements and wind simulations to assess wind pressure impact (Monumentenkennis, n.d.-b). Inject an elastic joint mortar to better absorb future stress distribution. If necessary, apply carbon fiber reinforcements or steel strengthening profiles to improve stability (Quist, 2021).

### 3. Stair-Step cracks in brickwork

Stair-step cracks in masonry often result from moisture infiltration and freeze-thaw damage, where absorbed water expands within the bricks during freezing, causing spalling and material loss (Rijksdienst voor het Cultureel Erfgoed, 2012).

Repair strategy:

Restore damaged bricks using historically compatible masonry to minimize material stress. Apply a breathable hydrophobic coating to reduce water absorption without compromising masonry permeability (Monumentenkennis, n.d.-b). Improve drainage around the tower to prevent prolonged moisture accumulation.

Structural monitoring:

Regular monitoring:

Continuous monitoring of the structure is essential to track any ongoing settlement, cracking, and material degradation. This can be achieved through the use of sensors to detect any shifts in the foundation or movement in the cracks, as well as periodic visual inspections. Based on the findings, interventions can be adjusted accordingly to address emerging issues before they lead to irreversible damage (Tompkins & Wood, 2018).  
Load Assessment: Given the additional weight from the ground-floor extension, it is recommended to assess the load distribution of the tower. Structural engineers should evaluate whether the load exceeds the foundation's capacity and, if necessary, propose further strengthening measures to alleviate stress on vulnerable sections (Chudley & Greeno, 2016).

Vegetation management and environmental control:

Vegetation removal:

Continuous removal of vegetation (e.g., ivy, moss, and tall grasses) is critical for preventing further biological decay and moisture retention. This should be done carefully to avoid damaging the masonry. It is also recommended to trim or remove any tree roots that may interfere with the foundation (Feilden, 2003).

Control of biological growth:

The growth of moss, algae, and other organisms on the tower's exterior should be addressed by applying biocides or anti-fungal treatments to inhibit further biological decay (Doehne & Price, 2010). Regular cleaning and inspection of the exterior will be necessary to prevent vegetation and biological growth from exacerbating the deterioration.

## 8 Discussion

The assessment of the Sliedrecht Water Tower has revealed a complex interplay of structural, environmental, and material degradation factors influencing its state. The structural analysis identified key vulnerabilities, including differential settlement leading to vertical cracks, wind-induced stress causing shear cracks, and moisture-related damage accelerating material deterioration. These findings align with established research on historic masonry structures, emphasizing the importance of moisture management, foundation stability, and material compatibility in conservation efforts (Lubelli, 2021; Monumentenkennis, n.d.-a).

From a structural perspective, monitoring tools such as digital strain analysis and geotechnical surveys will be essential for developing precise intervention strategies. While minor cracks can be treated with compatible repair mortars, more significant damage may require reinforcement measures such as steel anchoring or carbon fiber strengthening. The consideration of adaptive reuse presents an opportunity to maintain the tower's functional relevance while integrating sustainable technologies, ensuring its long-term preservation. Beyond technical challenges, the Water Tower holds substantial cultural and historical value for Sliedrecht. As a landmark representing industrial progress, its conservation must balance structural integrity with heritage authenticity. The restoration approach should prioritize

historically accurate materials and techniques to maintain its original character. Additionally, ongoing public engagement and awareness initiatives can strengthen local commitment to preserving this historical structure.

## 9 Conclusion

The Sliedrecht Water Tower stands as a historical and architectural testament to the town's industrial heritage and technological advancements in public health. However, its long-term preservation requires addressing key structural, environmental, and material deterioration challenges. This research assessed the current state of the tower, identify the primary causes of degradation, and propose conservation strategies that ensure its structural stability and cultural relevance. Based on the findings, it is evident that a combination of structural reinforcement, material restoration, and environmental control measures is essential to safeguarding the tower for future generations.

A critical finding of this research is the role of moisture in accelerating degradation processes. The presence of cracks, biological growth, and material erosion can all be linked to water infiltration, poor drainage, and freeze-thaw cycles. Addressing these issues requires implementing improved drainage solutions, applying breathable protective coatings, and carefully managing vegetation around the foundation. Additionally, foundation stability is a major concern, as differential settlement has contributed to vertical cracking and potential structural displacement. Conducting geotechnical investigations and implementing foundation reinforcement techniques, such as underpinning or micropile installation, will be key to preventing further movement.

Material compatibility and conservation techniques must also be carefully considered. The analysis of plaster deterioration highlights the risks of using cement-based coatings on historic masonry, as they can trap moisture and lead to further cracking. Instead, historically appropriate lime-based mortars and breathable coatings should be prioritized to ensure long-term stability without compromising the tower's original materials. Moreover, structural reinforcement through the use of carbon fiber or steel anchors should be explored in areas experiencing significant wind-induced stress.

Beyond structural concerns, the research underscores the Water Tower's cultural and social significance. Its role in Sliedrecht's industrial development and public health history makes its preservation more than just a technical challenge—it is a matter of maintaining the town's identity. Adaptive reuse strategies, such as converting the tower into a museum or community space, provide an opportunity to ensure its continued relevance while integrating sustainable technologies. This approach not only safeguards the physical structure but also enhances public engagement and appreciation of its historical value.

Ultimately, the research confirms that a comprehensive and multidisciplinary conservation strategy is necessary to address the deterioration of the Sliedrecht Water Tower. By combining scientific assessments, engineering solutions, and heritage preservation principles, it is possible to mitigate current risks and secure the tower's future. Long-term success will depend on continued monitoring, preventive maintenance, and community involvement, ensuring that this iconic structure remains a symbol of Sliedrecht's industrial past while adapting to modern conservation standards.

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