

Giovanni Gregorio

S.N. 2055899

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Supervisor: Dr. Carlotta Capurro



**Utrecht
University**

Fortresses of Change:

Lunetten's Cultural Journey from Military Legacy to Modern Identity

Summary of Thesis

The Lunetten fortresses in Utrecht, constructed between 1822 and 1828 as part of the New Dutch Waterline, serve as a notable example of historical transformation and adaptive reuse. Initially designed to protect the Netherlands from eastern invasions, these strategically important fortifications have evolved significantly over the years. This thesis explores their journey from military structures to integral components of Utrecht's urban and cultural landscape, focusing on physical changes, landscape modifications, land use evolution, and cultural connections.

Historically, the Lunetten forts were part of a broader defensive system utilizing the Dutch landscape's natural features to create flood barriers. Over time, advancements in military technology and urban infrastructure rendered these forts obsolete for their original purposes. However, their historical significance and potential for urban integration led to various preservation and revitalization efforts. These efforts are guided by heritage conservation policies, reflecting a shift from a "culture of loss" to a "culture of profit," where heritage sites are leveraged for socio-economic development.

The revitalization of the New Dutch Waterline, initiated in the 1980s, underscores the growing appreciation for military landscape heritage. This process involved multiple phases, from local initiatives to national and provincial policy integration, highlighting the importance of community involvement and governmental support. The transformation of the Lunetten fortresses exemplifies the intricate application of these policies, illustrating the balance between preservation and contemporary urban needs. Interviews with residents and experts reveal varying levels of accessibility and community engagement with the fortresses. While some fortresses have been successfully repurposed into community spaces, others remain underutilized. The thesis emphasizes the need for updated vision plans and enhanced community involvement to ensure the forts continue to serve as valuable cultural and ecological assets within Utrecht's urban landscape. Moreover, citizens are often not included in the regeneration process, as the municipality does not actively engage them in decision-making, further limiting the potential benefits of these projects.

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1. Introduction

The Lunetten fortresses in Utrecht represent a fascinating case of historical transformation and adaptive reuse. Constructed between 1822 and 1828 as part of the New Dutch Waterline, these crescent-shaped fortifications were designed to protect the Netherlands from eastern invasions. Positioned on the elevated Houtense Vlakte, the forts were strategically important due to their inability to be flooded, unlike other parts of the Waterline. Moreover, the New Dutch Waterline, which included floodable fields, waterworks, and military constructions like these forts, is now recognized as a UNESCO World Heritage site (Verschuure, 2015).

This thesis examines the multifaceted journey of the Lunetten fortresses from their military origins to their contemporary roles within the urban landscape of Utrecht, focusing on the physical changes, landscape modifications, and cultural connections that have shaped their evolution.

Topic Overview and Research Questions

The thesis explores the transformation of the Lunetten fortresses, focusing on four main areas: physical changes, landscape modifications, land use evolution, and cultural ties with the city of Utrecht. The overarching research question guiding this study is:

What is the role that the Lunetten fortresses occupy in the cultural landscape of Utrecht?

To address this main question, the research is structured around the following sub-questions:

- 1. What physical changes have occurred to the Lunetten fortresses since their construction?*
- 2. How has the surrounding landscape of the fortresses changed over time?*
- 3. How has land use in the area around the Lunetten fortresses evolved?*
- 4. To what extent have the goals of various policies been achieved, particularly in terms of ecological conservation, sustainable development, and community engagement?*

To answer these questions, the thesis is divided into five chapters, exploring the cultural journey of the Lunetten fortresses in Utrecht. The first chapter introduces the topic by presenting

the theoretical framework and research methodology used throughout the study. The second chapter offers a historical analysis of the New Dutch Waterline, examining its relationship with the Dutch cultural landscape and how it has evolved over time. Following this, the third chapter focuses on a chronological analysis of various national and international policies related to heritage renewal in urban environments, paying particular attention to the revitalization phases of the New Dutch Waterline and, by extension, the Lunetten fortresses. The chapter critically assesses the benefits and challenges of these policies, highlighting their implications for urban heritage preservation, sustainable development, and community engagement. The fourth chapter narrows the focus to the case study of Lunetten, using visual aids such as maps and historical photographs to analyze the physical and environmental changes that have occurred in the fortresses as well as their surrounding neighborhood over the last 150 years. Finally, the fifth chapter explores the relationship between Utrecht's citizens and this military heritage site, highlighting their involvement in decision-making processes, the accessibility of the site, and the personal attachment residents feel towards it. Together, these chapters contribute to answering the central research question by combining historical analysis, policy review, and case study insights, offering a broad understanding of the cultural significance of the Lunetten fortresses within Utrecht's landscape.

Historical Context and Significance

The Lunetten forts were an integral part of the New Dutch Waterline, a defensive system that utilized the Dutch landscape's natural features to create flood barriers against enemy forces. This system, now a UNESCO World Heritage site, exemplifies the Dutch expertise in hydraulic engineering and landscape utilization.

Constructed between 1822 and 1828, the forts were part of a broader network designed to protect vital transportation routes and safeguard the heartland of the Netherlands. This period marked a significant chapter in Dutch military history, reflecting a sophisticated understanding of the interplay between natural landscapes and military architecture. Over time, however, advancements in military technology and infrastructure developments, such as railways and highways, integrated the forts into the expanding urban landscape of Utrecht, rendering them obsolete for their original defensive purposes. Moreover, the development of the adjacent

neighborhood, named after the fortresses, brought an influx of inhabitants to the area. This transformation turned a once peripheral defensive zone into a vibrant and integral part of Utrecht.

This research investigates the dynamic process of this military heritage site in relation to its cultural ties with the city of Utrecht.

The significance of this topic extends beyond the local context of Utrecht, offering broader insights into heritage conservation, urban planning, and community engagement. As a process of renewal and revitalization of a historical military structure within an urban setting, this case study is particularly relevant to the fields of heritage and urban studies. In the next section, we explore some of the major ongoing debates related to these disciplines.

The preservation and regeneration of military brownfields in urban areas, like the Lunetten forts, are central to debates on heritage-led urban renewal (Jevremović et al., 2021). Research on military heritage and its connection to the landscape has gained considerable attention from scholars and policymakers. Wielgus (2018) highlights the significance of military heritage landscapes as valuable components of European heritage. According to ICOFORT (International Scientific Committee on Fortifications and Military Heritage), "*fortifications more than any other type of architecture have an integral relationship with the surrounding cultural landscape.*"

Over the years, two main strategies have emerged in this context: culture-led and commercially driven regeneration approaches, which have significantly influenced how Europe has repurposed military sites (Sacco et al., 2014). Initially, the focus was on preserving specific monuments and buildings, but contemporary strategies have shifted toward more sustainable models that balance conservation with the broader needs of urban development (Gonçalves et al., 2020). This evolution is reflected in UNESCO's adoption of the Historic Urban Landscape (HUL) approach in 2011, which recognizes urban areas as dynamic entities where cultural and natural values must be integrated into the development process (Martini, 2012).

In the Netherlands, a pivotal document in this renovation process is the 1999 Nota Belvedere, issued by four ministries (the Ministries of Education, Culture and Science, of Housing, Spatial Planning and the Environment, of Agriculture, Nature Management and Fisheries and of Transport, Public Works and Water Management). This policy outlines the relationship between cultural

history and spatial planning, embedded in its motto: "preservation through development" This principle highlights that heritage preservation can drive urban development, aligning with the European approach of blending heritage conservation with contemporary urban needs (Verschuure, 2015).

Despite these progressive approaches, debates persist about who controls and defines heritage. Laurajane Smith critiques what she calls the "authorized heritage discourse," where experts and authorities often dictate every aspect regarding heritage, how they should be valued and preserved, deliberately ignoring community voices in the process. The case of Naarden fortifications illustrates the importance of involving local communities in heritage decisions, where local resistance played a key role in preventing the dismantling of historic defenses. This shift in attitudes toward cultural preservation ensured that Naarden, along with other fortifications like Woudrichem and Brielle, remains intact today, underscoring the significance of community participation in safeguarding heritage (Verschuure-Stuip & Labuhn, 2014).

On the positive side, heritage preservation can lead to social and economic benefits. For example, it fosters a sense of community pride and strengthens the connection people feel to their local environments (Cresswell, 2015). Urban regeneration strategies today increasingly integrate these narratives of place into redevelopment projects, celebrating local histories and cultural identities (Edensor, 2002; Palmer, 1999). Economically, revitalized heritage sites can stimulate local economies by attracting tourism and investment, eventually leading to the creation of new jobs and stimulating the local economy (Wise & Jimura, 2020). However, these benefits do not come without challenges. Critics like Lefebvre (1991), Mitchell (2003), and Harvey (2012) warn that heritage-led regeneration can sometimes strengthen economic and social inequalities. While these projects may generate wealth, they risk marginalizing disadvantaged groups and contributing to gentrification if commercial gains are prioritized over inclusive community development.

Preserving recent fortifications not only involves heritage conservation but often extends to ecological conservation as well (Harris, 2011). Given the focus on military objects (fortresses) and their relationship with the surrounding landscape, it is essential to carefully examine the natural value. Greenery was a significant element of 19th-century fortresses, serving a masking function (Pardela et al., 2022). However, as highlighted by Bukal (2018), there exists a noticeable conflict

between preserving the monument and safeguarding nature. Therefore, it is intriguing to explore the solutions that the municipality of Utrecht aims to implement to address this dual challenge.

The Lunetten forts offer a valuable case study in the challenges of integrating military historical sites into modern urban contexts. While their transformation shows how heritage-led regeneration can contribute to urban development, it also highlights the potential risks if key factors are overlooked. Without meaningful community involvement, there's a risk of losing local identity or facing public resistance. Similarly, neglecting ecological concerns could harm the natural environment, and focusing too much on commercial gains could lead to gentrification and deepen social inequalities, thus undermining the positive outcomes of these efforts.

Research Approach

This research employs a cultural-historical approach to investigate the transformation of the Lunetten fortresses in Utrecht, focusing on both their historical development as well as the contemporary adaptations. The methodology encompasses a thorough examination of historical documents, national policies, maps, archival resources, and relevant literature to trace the construction of the forts and their evolving roles within the broader context of the New Dutch Waterline. This analysis situates the forts within key historical periods (from their construction in the first half of the 19th century till today's use), examining how their functions, significance, and physical structures have shifted over time. In tandem with this historical inquiry, an ethnographic study was conducted to gather insights from various stakeholders directly or indirectly involved in the current use and renewal of the fortresses. These include interviews with state actors responsible for heritage and urban planning, non-state actors such as preservationists and local organizations, and residents of the Lunetten neighborhood who interact with the forts in their daily lives. This ethnographic component is crucial in capturing diverse perspectives on the forts' ongoing transformation, revealing both shared understandings and potential conflicts between different groups.

The decision to incorporate both historical and ethnographic methods stems from the research's holistic aim: to provide a comprehensive view of the fortresses as living, evolving, social spaces within Utrecht's urban fabric. By integrating historical analysis with the voices of those

actively involved in the forts' renewal or regular use, the study seeks to explore the tensions and synergies between past legacies and present-day interpretations. Moreover, this is further contextualized through an exploration of government policies affecting the forts, particularly in terms of heritage management, spatial planning, and urban development. These policy perspectives allow for a deeper understanding of the institutional forces (and their relative changes in approaches related to urban heritage maintenance and renewal) shaping the forts' current status and future trajectory.

Through this multi-dimensional approach—combining historical research, policy analysis, and ethnographic interviews—the study aims to present a nuanced understanding of how the military heritage site of the Lunetten fortresses have been reimagined and repurposed within Utrecht's contemporary landscape.

Policies

In this research, I conduct a detailed review of both national and regional policies concerning urban heritage, with particular attention to those related to the New Dutch Waterline and the city of Utrecht. By tracing and discussing the evolution of these policies over time, the aim is to uncover shifts in the perception of the site and its management as urban heritage. To enrich this analysis, I also make use of maps and archival photographs to visually document the transformations in Utrecht's urban fabric. These visuals help illustrate the tangible impact of policy changes on the city's physical structure, with a focus on the Lunetten neighbourhood. This leads to the second key component of my research: the use of maps and archival materials to trace urban transformations.

Maps

From an early age, I have been deeply fascinated by topography, finding both intellectual satisfaction and practical value in the study of maps. My interest lies particularly in the comparative analysis of historical and contemporary maps, which enables a detailed understanding of the spatial and urban transformations that have shaped various landscapes over time. This passion for cartography played a significant role during my internship at the Cultural Heritage Agency of the Netherlands (RCE) in Amersfoort, where I had the opportunity to work with historical maps of the Dutch landscape.

During my internship at the RCE, I contributed to a project that involved mapping the "mobile heritage" of the Netherlands' transport network from 1850 to the present day. My specific task was to analyze and map the major waterways, both regional and national, at 50-year intervals. This analysis aimed to track changes in routes used for the transport of goods and people over time. Using QGIS, a widely-used Geographic Information System (GIS) software, I created color-coded mappings of these waterways, with different colors indicating the varying significance of each route. By repeating this process for each time period, I was able to visually represent the evolution of water routes—whether through canalization, the construction of dams, or shifts in strategic importance from primary to secondary waterways, and vice versa. The project involved working with maps from the years 1850, 1860, 1900, 1905, 1950, 1955, 2000, and 2020, all provided by the RCE. These maps were digitized and integrated into the QGIS platform, allowing for a systematic analysis of the shifts in water transport networks over time. This work not only enhanced my technical proficiency in GIS mapping but also provided valuable insights into the historical changes in infrastructure and landscape that are often linked to broader socio-economic developments.

The skills and insights gained during this period have directly influenced the methodological approach of my current research. Drawing on my previous experience, I have chosen to utilize the same QGIS software to analyze the spatial and infrastructural evolution of the Lunetten fortresses and their surrounding areas. By employing a similar method of tracing landscape changes at regular intervals, I aim to map the transformations of these fortresses within the broader urban context of Utrecht.

Interviews

As a final part of my research, I conducted a series of observations and interviews with residents of the Lunetten neighborhood to understand their engagement with the green spaces surrounding the forts, the level of accessibility to the forts, their awareness of the historical significance of the area, and examine how far the involvement of local inhabitants—highly mentioned in heritage policy documents—has been implemented in the case of Lunetten. Over the course of four days in May (a period chosen for its longer daylight hours and milder weather,

increasing the likelihood of resident activity), I carried out personal observations, spending time in the parks adjacent to the forts, as many of the fortifications are not easily accessible to the public. During these observations, I first familiarized myself with the area by simply observing the way the space was used. On the following three days, I made efforts to engage with residents and other users of the space.

The purpose of these initial observations had two reasons: first, to have a personal understanding of how the space is used before beginning with the interviews, and second, to observe to any unexpected details or events in the area. (for example, I came across a children's birthday party with small catering, kids playing football, and young adults gathering for drinks later in the evening). Observing these everyday activities offered valuable insights into how residents utilize and interact with these spaces. Additionally, these observations helped me establish contact with residents, forming the basis for identifying a research population.

To ensure that participants had enough familiarity with the area, a key criterion for inclusion in the study was that residents must have lived in Lunetten for at least three years. This requirement ensured that respondents had sufficient time to get to know the neighborhood and its surrounding green areas, making their experiences more relevant than those of occasional visitors or newer residents.

I conducted in-depth, face-to-face interviews with four residents, lasting between 20 to 35 minutes each. The interviewees included a student, two young professionals, and one elderly woman. While the sample size was too small to draw broad conclusions based on age demographics, it was still interesting to see whether different age groups might have distinct perspectives. Interviews took place either in the parks themselves or at a later time, depending on the respondents' availability. While some residents (7), were willing to engage in more casual conversations, others did not participate due to limited time or concerns about their knowledge of the subject. One elderly woman declined due to her limited English proficiency, as all interviews were conducted in English (due to my lack of Dutch proficiency), which may have posed a language barrier also for other residents.

The interviews were semi-structured, allowing flexibility while following a core set of questions. These were later semi-transcribed for analysis. The key topics of discussion included:

- **Awareness:** Understanding whether residents knew about the New Dutch Waterline (NDW) and, more specifically, if they were aware of the Lunetten forts' inclusion in the NDW.
- **Personal Experiences and Observations:** Gathering residents' impressions and use of the green spaces surrounding the forts.
- **Concerns and Suggestions:** Any critiques or ideas for improvement regarding the space or its management.
- **Engagement with Historical Sites:** Exploring how residents interact with the historical elements of the forts.
- **Overall Sentiment:** Gauging their general satisfaction with the area's current state.

In addition to these resident interviews, I decided to include the perspectives of two experts currently involved in the process of revitalizing the fortresses. I had the pleasure of interviewing Vera Driessen, a project advisor in the real estate department of the Municipality of Utrecht. Vera Driessen is currently involved in the sustainability, redevelopment, and renovation of heritage properties in the city of Utrecht, including the Lunetten Fortresses, which is one of her primary projects. Her extensive experience spans over 10 years as a heritage policy advisor, having previously worked for the Municipality of Nieuwegein, a strategic location for both the Old and New Dutch Waterline.

I also interviewed Laurens Kik as a non-state actor involved in Lunetten development (or similar) to gain a broader perspective. Laurens works as a Sustainability Advisor at Bosch & van Rijn, a private consultancy specializing in spatial planning for renewable energy projects. With a background as a social geographer and expertise in Geographic Information Systems (GIS), Laurens uses spatial data to identify potential locations for wind turbines and solar parks, contributing to the development of sustainable energy infrastructure. Laurens' involvement in projects related to the New Dutch Waterline (NDW) renewal, coupled with his focus on sustainable development, allows him to bring a distinct, future-oriented perspective to the conversation on preserving historical sites while addressing contemporary challenges.

The extensive experience in the field of these two experts enriches the content and insights of this thesis, offering information and perspective that significantly expand upon the data gathered through the analysis of various policies and interviews with the residents of Lunetten.

Differently the residents, these two practitioners deal with urban heritage renewal on a daily basis. They are well-familiar about the policies and regulations that must be considered in their projects, and their years of experience allow them to assess issues with a level of detail that only professionals in the field can provide. This allows for a deeper analysis of how policy and practice intersect, as well as the broader challenges faced in managing heritage within a changing urban landscape.

Furthermore, I also believe it is crucial to allow different viewpoints (they might offer something different) (search for citations, we need argument about the holistic approach) between the two experts, given that one works for the Municipality of Utrecht, which owns the fortresses, while the other is employed by a private company. I find it valuable to include both a state actor (Vera) and a non-state actor (Laurens) in the study, as this provides a more holistic view of the renewal processes surrounding cultural heritage sites. Despite both being involved in similar projects, I aim to uncover any synergies or divergences in their approaches, particularly regarding the challenges of "*conservation through development*," a key motto in the Belvedere approach.

By including both Vera, with her focus on municipal heritage management, and Laurens, with his private sector expertise in sustainability, I aim to explore the balance between public and private interests in the renewal of cultural heritage sites and uncover the potential for collaboration or conflicting goals between state and non-state actors.

2. Historical Analysis of the Dutch Waterlines

Understanding the historical context of the Oude and Nieuwe Waterlinie is essential for analyzing the transformation of the Lunetten fortresses from military structures to integral parts of Utrecht's urban and cultural landscape. This backdrop allows us to explore how these fortifications have been repurposed and integrated into modern urban planning, contributing to the city's cultural and ecological fabric.

Oude and Nieuwe Waterlinie

The Dutch people have historically faced the dual challenge of relying on waterways for fishing and trade while contending with the constant threat of floods. To survive in these vulnerable lowlands, they ingeniously developed a comprehensive system of dikes, sluices, and windmills along the rivers and coasts over centuries (Ven, 2004). This ingenuity extended to their military strategies, leading to the development of the Oude and Nieuwe Waterlinie, where water management was employed as a defensive mechanism to protect the nation.

The flat terrain, which lacked natural defences such as highlands and hills, presented a significant problem in the event of enemy attacks. However, the Dutch turned this challenge into an advantage by developing the innovative concept of using floods as a defensive barrier against enemy advances. The use of flooding for military purposes was feasible because the southwestern area of the country is below sea level, situated at the delta of three major rivers in Western Europe: The Rhine, the Meuse, and the Scheldt (Marulo, 2022). Their unique and ingenious ability to manipulate waterways for self-defense led to the creation of this revolutionary system. The military defensive system based on auto-inundation exemplifies historical resilience and practicality in coexisting with a dynamic environment, embodying the intersection of human influence and natural elements, akin to White's concept of a '*hybrid* (1996).' This concept refers to the interaction between human systems and natural environments, emphasizing the idea that these two elements are not separate but rather interdependent.

By leveraging rivers and waterways for efficient defensive purposes, the Dutch established a profound connection between nature and civilization, shaping the distinctive water culture of the

Netherlands and reflecting an intelligent adaptation to the environment and the risks it poses. As wonderfully put by Petra van Dam (2014): *'both in dry and wet periods, the Dutch behaved like amphibious, feeling at home on both land and water.'* The concept of 'amphibious culture' reflects the Dutch ability to adapt intelligently to their environment, behaving like amphibious creatures comfortable on both land and water.

The inundation system has long served as a defence mechanism for the Netherlands. For example, as early as 1573, during the Eighty Years' War, the city of Alkmaar (North Holland) successfully resisted a siege by Spanish troops by flooding its outskirts. One year later, in 1574, the city of Leiden followed a similar path when the Prince of Orange, Willem I, ceased the protracted siege by instructing his troops to breach the sea dikes near Rotterdam, causing a widespread flood across the Holland province (Vershuure-Stuip, 2019). These historical events underscore the effectiveness and strategic significance of leveraging water as a defensive tool.

Subsequently, the Dutch recognized the ingenious potential of creating a defence line based on the principle of auto-inundation to protect Holland, the country's economic heart, from foreign threats on the eastern borders. Thus, the Oude Waterlinie was built, stretching from Muiden (and therefore the Zuiderzee), to Gorinchem. (Fig. 1 The Oude Hollandse Waterlinie is visible in purple.).

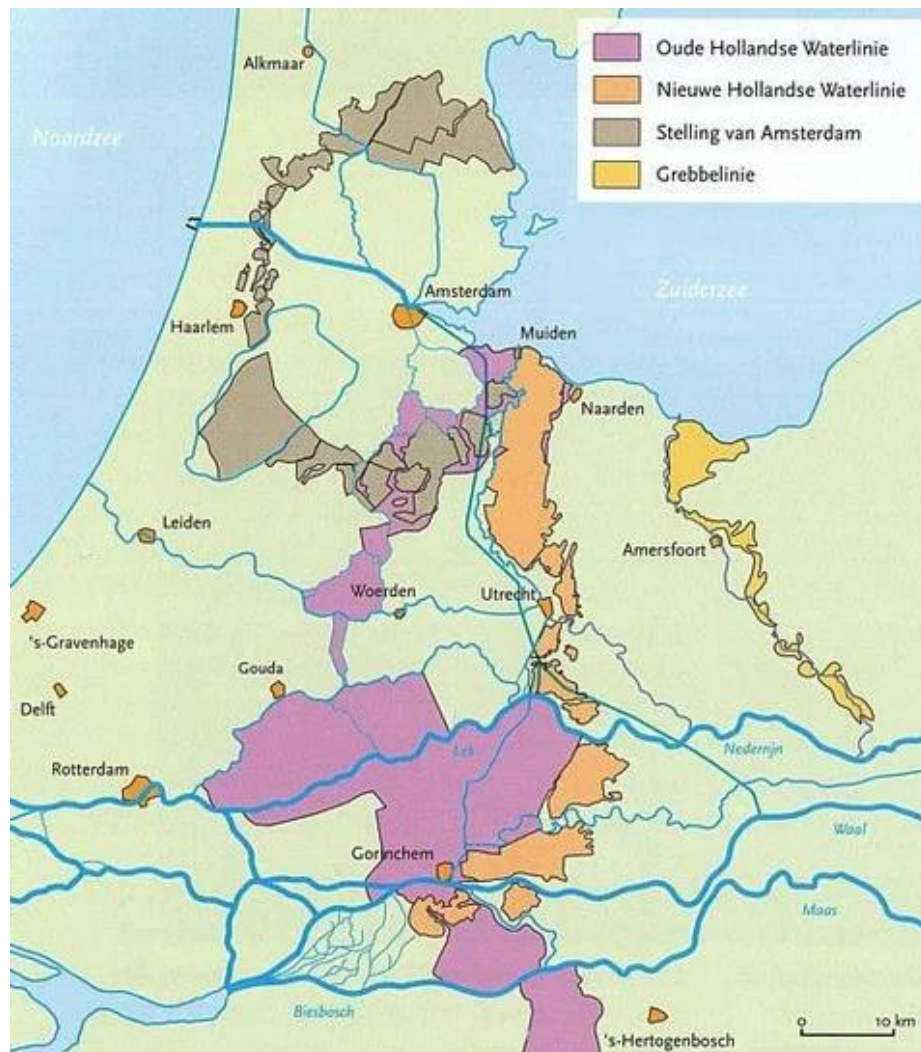


Figure 1 Waterlines. JowWeb. (n.d.). Map of the Oude Hollandse Waterlinie, Nieuwe Hollandse Waterlinie, Stelling van Amsterdam, and Grebbelinie [Map]. Retrieved from <https://waterlinies.jowweb.nl/1500-1599/1573-1940-hollandse-waterlinie/oude-hollandse-waterlinie>

This military line, established between 1672 and 1815, incorporated fortified towns and flooded polders, forming a barrier along the eastern and southern borders of the province of Holland (Vershuure-Stuip, 2019).

The importance of being part of such a strategic military system became evident in 1672 when forces led by Louis XIV failed to breach the formidable line of defence. Conversely, the rapid conquest of the city of Utrecht, which was not part of the Oude line, highlighted the criticality of inclusion in such a nearly impenetrable defensive system, especially against the ballistic technologies of the time. However, the system's impregnability was compromised during severe winters when the Dutch could not prevent enemy troops from crossing due to frozen waters. In the

winter of 1795, Napoleon's troops breached the Old Waterline due to the extreme cold, which made the water freeze too hard for the Dutch to crack the ice and therefore stop the invasion (Marulo, 2022).

Recognizing the strategic importance of fortifying the territory, Napoleon engaged in discussions with Cornelis Kraysenhoff, the chief engineer for fortifications of the former Dutch Republic, in 1811. This collaboration laid the groundwork for the Nieuwe Hollandse Waterlinie, a project spanning from 1815 to 1885. Despite only partially realizing the plan due to shifting political circumstances, King William I continued Kraysenhoff's work, incorporating the city of Utrecht into the expanded defensive line, creating a broader buffer zone around Amsterdam (Marulo, 2017). The line stretches over 85 kilometers in length and spans a width of 3 to 5 kilometers. It encompasses 46 fortresses and numerous other military and defensive installations along its path (Alewijn & Nadin, 2018). (See Fig. 1, the NDW is visible in orange).

The defensive apparatus is based on a combination of hydraulic works and military architecture, with the fundamental principle being the systematic creation of a series of floodable fields that, when necessary, could prevent enemy advancement. Ideally, water would be released onto these fields to a depth of between 40 and 60 cm, making it unnavigable yet too deep to be crossed on foot. Additionally, a network of military structures was necessary to defend nonfloodable areas, known as '*access points*'; these constructions ranged from forts to later casemates and bunkers for group shelter.

The Nieuwe Hollandse Waterlinie boasts a diverse array of military constructions, varying in size, materials, and construction techniques, reflecting the evolving nature of warfare tactics. Initially, existing forts from the Oude Hollandse Waterlinie were incorporated, alongside newly built fortifications. The introduction of fortress bricks enabled the construction of robust masonry forts capable of withstanding artillery fire (Kauffmann, 2014). By the late 19th century, concrete supplanted masonry in new constructions and reinforced existing structures, as earthen embankments became inadequate. Additionally, the emergence of mobile artillery shifted the role of forts from heavy artillery platforms to weapons storage and troop shelters (Kauffman, 2014). This transformation reflects the adaptability and evolution of military strategies over time.

In both World Wars, the advent of aviation fundamentally altered the dynamics of warfare, rendering traditional defensive structures like the New Dutch Waterline vulnerable. The

introduction of aerial bombardment capabilities meant that fortified lines could be easily bypassed and attacked from above, nullifying their effectiveness. This, for example, occurred during the bombing of Rotterdam in 1940. The once (almost) impregnable New Dutch Waterline, designed to withstand ground assaults, found itself unable to contend with the new threat posed by airpower.

Following the decline in the defensive efficacy, the waterline and its accompanying fortifications fell into a state of neglect and near obscurity. However, a recent resurgence of interest, initially spearheaded by government initiatives and later embraced by provincial and local authorities, has breathed new life into these historical landmarks. This revitalization effort has sparked projects aimed at rejuvenating and repurposing the abandoned structures, ushering in a renewed appreciation for their historical significance and architectural heritage (Verschuure, 2020). As these sites undergo restoration and adaptation for contemporary uses, they not only serve as reminders of bygone military strategies but also contribute to the cultural and recreational fabric of the surrounding areas.

Linking landscape and culture

The strategic placement of the Waterline within the Dutch landscape was a deliberate decision, taking advantage of natural transitions in terrain. Positioned amid the peat meadows in the west and the clay landscape of the river in the east, along with the elevated Utrecht sandy ridge, it maximized the landscape's inherent features. These transition zones, known as border areas or gradients, boasted rich diversity in flora and fauna (Van Leeuwen, 1965). The unique conditions in these transition zones—such as variations in soil type, moisture levels, and topography—create habitats that support high biodiversity. Human activities, such as agriculture, settlement, and defense, have been strategically placed in these areas to take advantage of their natural features. Indeed, the New Dutch Waterline was positioned along these gradients to maximize the natural defensive benefits provided by the terrain.

However, beyond its strategic significance, the Waterline held cultural importance. In this sense, Reh et al. (2005) draw a parallel between this defensive system and the Medici villas around Florence and the ancient Roman “villegiatura” The Medici villas were not just residential estates; they were designed as places of leisure, observation, and reflection, offering expansive views over the Tuscan landscape. These villas served as retreats where the Medici family and their guests

could enjoy the beauty of the natural environment while also demonstrating their power and influence. Similarly, the ancient Roman concept of “villegiatura” referred to countryside residences where urban elites would retreat to relax and engage with nature, escaping the hustle and bustle of city life. Reh et al. draw this parallel to highlight how the Waterline, despite being a military defense system, also created a landscape of observation and reflection. The Waterline’s positioning along natural gradients provided not only strategic advantages but also aesthetic and experiential qualities. The elevated ridges and the expansive views over the inundation zones transformed the Waterline into a space where one could appreciate the interplay between water and land, much like the views enjoyed from the Medici villas or Roman retreats. Yet, it also evoked feelings of anticipation and fear, whether from the threat of enemy advance or the dread of inundation during flooding, which imperilled farmers' livelihoods (Vershuure-Stuip, 2014).

The enduring impact of the Dutch Waterline on the country's landscape is still evident today, with predominantly open fields dedicated to agriculture and nature on the eastern side, contrasting with the more urbanized and densely populated western areas. This phenomenon can be attributed not only to strategic military reasons but also to legislative measures that, until a few decades ago, severely restricted any construction near the Waterline.

The Water Line was strategically crafted to blend seamlessly into the landscape, ensuring an element of surprise during enemy advances. To achieve its effectiveness, the Water Line required a unique spatial arrangement (Alewijn & Nadin, 2018). The necessity for the cannons positioned in the forts to have unobstructed firing lines was paramount. These strategic necessities required attentive management of the landscape also on a legislative level. This led to the implementation of the Kringenwet Act in 1853; specifically, the legislation delineated three concentric zones surrounding each fortress, each governed by its own building and agricultural regulations. Within the innermost zone, only wooden structures were allowed, designed for easy destruction in case of attack. The intermediate zone permitted buildings with masonry foundations up to a maximum depth of 50cm, while the outermost zone allowed for all construction materials, while still taking into account the possibility of demolishing any obstacles in case of war (Marulo, 2022). Consequently, as highlighted by Vershuure-Stuip (2014), the New Dutch Waterline can be considered as one of the first ‘protected’ landscapes in the Netherlands, albeit at that time only for military rather than historic-cultural reasons. Notably, the Kringenwet Act remained in force until its repeal in 1951, with restrictions on areas surrounding fortifications extending until 1963, having

therefore profound consequences on the urban development of the areas adjacent to the fortresses.



Figure 2 Tourism Utrecht. (n.d.). Kringwet and Fort Rijnauwen [Photograph]. Retrieved from <https://www.tourismutrecht.nl/kringenwet/>

Since the decline of its defensive effectiveness resulting from the adoption of more contemporary warfare strategies during World War II, it was in the 1990s that the New Dutch Waterline re-emerged as a focal point within Dutch landscape conservation policies (Marulo, 2022).

3. Integrating Heritage into Spatial Planning

Introduction

Since the late 1970s, heritage conservation practices in Western Europe have undergone a notable transformation. Initially focused on the legal protection of individual objects, conservation efforts have evolved into a broader movement aimed at urban and regional regeneration and socio-economic development (Ashworth, 1997). This shift was propelled by the rise of urban regeneration schemes in the 1980s and 1990s, which aimed to transition industrial cities into service-oriented economies by leveraging built and landscape heritage for regeneration purposes (Roberts, 2000). The recognition of heritage assets as drivers of socio-economic development, including tourism, recreation, and cultural activities, has become increasingly prominent (Janssen et al., 2014).

In parallel, societal changes in the 1970s, such as the democratization movement and the expansion of transnational media and tourism industries, began challenging the principles of Modernism (Urry, 1990). The emergence of a middle class with heightened prosperity and mobility, coupled with the growth of leisure and consumer culture, reshaped perceptions of attractiveness and quality (Mommaas, 2000). This cultural shift was further accentuated by the transition to a service-oriented "new economy" prioritizing knowledge and creativity (Florida, 2002). As a response, local, regional, and national authorities sought to position themselves as attractive destinations in a global market by reusing and branding historic buildings and landscapes to meet the demand for new sources of spatial identification and distinction (Mommaas, 2000).

Amidst these changes, academics and practitioners have advocated for a more integrated approach, linking heritage conservation dynamically with planning policy (Pereira Roders & Ferreira, 2023). This call for integration has led several European countries to transition from control-based conservation approaches to dynamic management of change, emphasizing the proactive use of heritage as a resource for rural and urban development (Fairclough and Rippon, 2002; Janssen et al., 2014).

During the 1990s, several European countries initiated significant projects that transformed old industrial sites into vibrant cultural and economic hubs. In England, cities like Liverpool and

Manchester undertook ambitious restoration projects, repurposing old factories into thriving cultural and economic centers. The Tate Liverpool art gallery was established in a former warehouse complex, while the Castlefield area of Manchester saw the revitalization of historic industrial buildings into residential and commercial spaces (Leary, M. E., 2009).

Since the 1990s, this push for a cohesive and participatory approach to heritage planning has also influenced discussions surrounding heritage conservation and spatial planning in the Netherlands. In this period, the Dutch heritage sector, transitioned from a 'culture of loss' to a 'culture of profit,' embracing a broader approach to spatial, economic, and ecological issues (Kolen, 2007).

New Dutch Waterline revitalization phases

The revitalization of the New Dutch Waterline began in 1980, initially concentrating on restoring historic sites for tourism and recreation, signifying a broader appreciation for the landscape heritage of these military structures (Brand and Brand, 1986). Verschuure-Stuip (2020) identifies six phases in which this effort unfolded: initiatives (1980–1993), reflection (1993–1997), starting (1997–2003), transition (2003–2008), national implementation (2008–2013), and provincial implementation (2014–future). In the early stages, emphasis was placed on protecting and repurposing historic buildings, with select fortresses designated as preserved monuments, sparking public awareness through art projects and exhibitions (Brand & Brand, 1986). Local initiatives expanded to involve provincial and national authorities, leading to plans that integrated natural and cultural aspects of the defense line. By 1993, these plans gained government support and were incorporated into national landscape policies (Raats, 2011), catalyzing a significant transformation within just 13 years (Bosma, 2009).

This rapid progression from local initiatives to national policy integration underscores a remarkable shift in the perception and value of the New Dutch Waterline. What had once been neglected and abandoned military structures quickly became focal points of cultural heritage and landscape preservation. The grassroots efforts, driven by local enthusiasm and community involvement, played a critical role in demonstrating the potential and significance of these sites. Their success in drawing public attention and generating tangible results likely influenced

governmental perspectives, showcasing the Waterline's worthiness of national investment and protection.

During the reflection phase (1993–1997), progress on the preservation of the New Dutch Waterline faltered due to unclear ministerial responsibilities at the national level (Verschuure Stuij, 2016). Nonetheless, this period witnessed intensified research efforts by organizations like the State Heritage Service (RCE) and the Menno Coehoorn Foundation, focused on gathering historical and cultural information about the Waterline. Such research, comprising oral histories, maps, and archival documents, proved pivotal for understanding the line's historical significance during the subsequent transition phase (Luiten, 2011). The State Heritage Service (Rijksdienst voor het Cultureel Erfgoed, RCE) is the national agency responsible for preserving and promoting cultural heritage in the Netherlands. It operates under the Ministry of Education, Culture and Science and plays a crucial role in identifying, researching, and protecting valuable heritage sites and monuments across the country. The Menno Coehoorn Foundation (Stichting Menno van Coehoorn) is a non-profit organization dedicated to preserving and promoting the historical fortifications and military heritage of the Netherlands, particularly the New Dutch Waterline. Named after the renowned 17th-century Dutch military engineer Menno van Coehoorn, the foundation conducts research, organizes educational activities, and advocates for the conservation of these important cultural assets.

Thanks to the dedicated efforts of the RCE and the Menno Coehoorn Foundation, the cultural-historical value of the Waterline was recognized in 1995 with its placement on the preliminary list of Dutch UNESCO World Heritage Sites (Bosma, 2009). This milestone marked a significant shift, bringing heightened awareness and increased responsibilities for preserving the Waterline. The UNESCO recognition not only underscored the Waterline's historical and cultural importance but also spurred greater collaboration and investment in its conservation. Consequently, this period saw enhanced efforts and resources devoted to the Waterline's preservation. This recognition marked more than just an acknowledgment of the site's cultural-historical value; it also served as a strategic political statement. As Meskell (2013) observes, the pursuit of UNESCO World Heritage status often signals a nation's intention to secure international and national prestige, gain access to the World Heritage Fund, and tap into the potential benefits of increased public awareness, tourism, and economic development. Recognizing these

advantages, the Dutch state rapidly shifted its stance, taking a more proactive role in preserving and promoting this once-overlooked defensive heritage system.

This shift in perception gained further momentum during the third phase of revitalization (1997–2003), which saw concrete actions being taken to preserve and repurpose the Waterline's military sites (Verschuure-Stuip, 2020). An unusual collaboration between Ministries culminated in the 1999 Belvedere memorandum, a pivotal document for cultural heritage policy development (NDW report 2018). Created by various ministries, including Education, Culture, and Science, Belvedere emphasized the cultural dimension of spatial planning and highlighted the importance of preserving regional diversity as a driver for future planning challenges (Feddes, 1999). This memorandum played a fundamental role by designating the Waterline as a pilot project for heritage preservation through reuse, which accelerated rehabilitation efforts. Belvedere changed the game by advocating "*preservation through development*", a departure from past practices that viewed conservation and development as opposing forces. This shift recognized the potential synergy between preservation and development, challenging the old belief that they were incompatible (Janssen et al., 2014). The Memorandum promoted a forward-thinking and proactive stance on heritage management, urging its alignment with spatial developments. It inspired architects, landscape architects, and planners to draw inspiration and uphold quality standards from history and heritage (Janssen et al., 2014). This approach means integrating heritage conservation into the broader context of urban and regional development, rather than treating it as a separate or secondary concern.

This holistic approach is theoretically ambitious and optimistic, aiming to harmonize the goals of preserving cultural heritage with the demands of contemporary development. However, it also raises significant challenges and complexities due to the involvement of multiple stakeholders, including government bodies, private developers, local communities, and heritage professionals. Coordinating these diverse interests and ensuring that development projects respect and enhance cultural heritage required careful planning, negotiation, and innovative design solutions (Pendlebury, 2009). Striking the right balance between preservation and progress necessitated a collaborative and interdisciplinary approach, fostering dialogue and compromise among various stakeholders. This holistic approach aimed to harmonize the goals of preserving cultural heritage with the demands of contemporary development (Veldpaus & Roders, 2013). It recognized that

heritage assets could be leveraged as catalysts for sustainable urban regeneration, economic development, and community revitalization (Bandarin & Van Oers, 2012)

The New Dutch Waterline project bureau was a dedicated organization established to lead the revitalization efforts for the historic Dutch Waterline defense system. Its primary role was to coordinate and facilitate the transformation of this large-scale military landscape into a sustainable heritage site (Kolen & Verschuure-Stuip, 2018). The project bureau acted as a central authority, lobbying and engaging with various stakeholders across multiple provinces, municipalities, water boards, landowners, and the general public. Their key objectives were to gather ideas, secure funding, and build consensus for the revitalization plans (Verschuure-Stuip, 2018). Through their lobbying efforts, the project bureau successfully integrated the cultural history and heritage value of the Dutch Waterline into the master plan "Line Perspective: Panorama Krayenhoff" (Luiten et al., 2004). This comprehensive plan, despite lacking detailed pilots or case studies, served as a guiding vision, inspiring stakeholders to commit to the revitalization (Raats, 2011). The project bureau played a crucial role in driving the initial top-down approach, working closely with the state and relevant ministries. They also facilitated the acquisition of financing through national funding and public-private cooperation, while ensuring high-quality standards were maintained throughout the process (Luiten et al., 2004).

The collaboration among multiple ministries in the Belvedere memorandum underscores the government's unified commitment to heritage preservation, demonstrating a willingness to take collective leadership. This inter-ministerial effort reflects a broader acknowledgment of heritage's role in national identity and spatial planning. In just a few years, the state's vision for military heritage conservation transformed drastically—from abandoning these sites to recognizing their potential for economic growth, urban development, and as symbols of collective identity.

However, the reliance on a visionary plan like Panorama Krayenhoff, despite lacking detailed pilot case studies, indicates both the ambition and the risks inherent in such large-scale projects. The absence of detailed case studies could imply a potential gap in practical application, necessitating strong adaptive management and continuous stakeholder engagement to address unforeseen challenges and ensure the plan's success.

Moreover, while it is true that protecting heritage can lead to both social and economic benefits, there is also a risk of prioritizing economic gains at the expense of social value. To ensure

a well-balanced approach, it is crucial to openly and transparently weigh these benefits, preventing the focus from shifting too heavily towards revenue generation while neglecting the broader social impact that heritage conservation can achieve.

During the fourth phase (2003–2008) of the New Dutch Waterline revitalization, the conceptual ideas were translated into practical plans under the leadership of state and provincial authorities, aligned with national and provincial spatial policies (Raats, 2011). The project bureau strategically divided the Waterline into seven zones, each managed by specialized teams. Simultaneously, the State Service Rural Landscape sought to engage various governmental bodies, including ministries, provinces, municipalities, and water boards (Colebrander, 2009). This decentralized approach can be interpreted as a sensible choice, given the expansive territory covered by the New Dutch Waterline, which spans multiple regions and municipalities. After managing the earlier phases with a centralized focus, transitioning to a more distributed management structure proved both logical and efficient for handling the diverse tasks required in revitalizing such a large-scale project. This shift enabled the implementation of ad hoc solutions addressing the specific needs of each region while still ensuring that the project's broader objectives remained aligned and cohesive.

The New Dutch Waterline project bureau prioritized economic viability and integration with ongoing large-scale interventions, expressed through three main goals: spatial recognizability, fostering a sense of connection and ownership ("*the line in head, heart, and hands*"), and socially and economically sustainable use (PHB NHW, 2011). The bureau aimed to enhance the visibility and legibility of the Waterline's historical features, raise awareness and active involvement with its heritage, and promote adaptive reuse and revitalization contributing to social cohesion, regional identity, and economic development through activities like tourism and recreation. Additionally, the bureau explored integrating the Waterline's revitalization with other spatial interventions, such as repurposing the inundation fields for water storage during peak load moments as part of adapting river landscapes to climate change (Verschuure-Stuip, 2020).

To ensure a swift start, an impressive design was deemed necessary to capture attention. Bunker 599's cutting-edge design, led by RAAAF and supported by the SSRL and Culemborg municipality, serves as an illustrative example. It creatively showcased the bunker's interior while emphasizing its cultural and historical significance (Verschuure-Stuip, 2020). Bunker 599 stands as a prime example of innovative design and historical preservation, showcasing a creative approach

to revitalizing military heritage. Led by RAAF and supported by the SSRL and Culemborg municipality, this project aimed to make a significant impact by attracting both national and international attention (RAAF; n.d.) The design of the bunker was both bold and symbolic. The bunker, originally a closed and inaccessible structure, was cut in half to reveal its interior. This striking visual transformation not only made the bunker more accessible but also highlighted its cultural and historical significance. A wooden path was constructed to connect the bunker to a large pond, which served as a water storage area, integrating the natural and built environments in a harmonious and educational manner (Chester, 2013). This approach demonstrated a refreshing way to tell the story of the bunker, emphasizing its historical values while also addressing preservation concerns. By exposing the interior, visitors could gain a deeper understanding of the bunker's original function and its role within the broader landscape of the New Dutch Waterline (RAAF; n.d.). The project succeeded in making the bunker an iconic landmark, enhancing public awareness and appreciation of the region's military heritage while also contributing to its cultural landscape. Verschuure-Stuip (2020) highlights how Bunker 599's cutting-edge design effectively bridged the past and present, making historical narratives accessible to contemporary audiences.



Figure 3 Forten.nl. (n.d.). Doorgezaagde Bunker [Photograph]. Retrieved from <https://forten.nl/forten/doorgezaagde-bunker/>

In the fifth phase (2008–2013), implementation commenced primarily at the national level but with increasing provincial involvement (PB NHW, 2006). Efforts concentrated on repurposing military sites within specific areas, with funding mainly sourced from other national spatial

development programs (Raats, 2011). While predominantly top-down, localized initiatives emerged, such as the transformation of Fortress "Werk aan het Spoen" into an open-air theater and restaurant (Verschuure-Stuip, 2020). After the municipality of Culemborg acquired the fort in 2002, local citizens formed the Werk aan het Spoen Foundation in 2003 to draft a vision for its revitalization. Their plan aimed to transform the fort into a community meeting place, blending culture and nature. In 2007, Ronald Rietveld Landscape Architecture and artist Erick de Lyon were tasked with designing solutions based on the concept of a 'grass sculpture,' which balanced historical reconstruction with the preservation of spontaneous vegetation. This included cutting openings in the fort's earthworks to create 'super panoramas' and referencing the historical fan sluice through a land-art installation (Marulo, 2022). A new amphitheater was built for cultural events, and historical buildings were repurposed for contemporary uses. A new structure, the Forthuis, was added to host a restaurant, integrating with the fort's existing architecture. These interventions prioritized social value, enabling local communities to reclaim heritage sites previously closed to the public. While emphasizing local engagement, the designs also respected the broader historical context of the New Dutch Waterline, incorporating both historical references and contemporary elements (Marulo, 2022).

The predominantly top-down approach during this phase reflects a continued reliance on national-level initiatives to drive the revitalization process, highlighting the importance of substantial state involvement in large-scale heritage projects. However, the success of localized initiatives like the transformation of Fortress "Werk aan het Spoen" demonstrates the potential of community-led projects to effectively revitalize heritage sites. This success likely influenced the national government to reconsider its approach, encouraging a shift towards decentralization and granting more autonomy to local governments. By recognizing the efficacy of local initiatives, the national government began to see the value in empowering local authorities and communities, fostering a more bottom-up approach. This transition signifies a strategic shift aimed at enhancing the sustainability and relevance of revitalization efforts by aligning them more closely with local needs and contexts.



Figure 4 Forten.nl. (n.d.). Werk aan het Spoel [Photograph]. Retrieved from <https://forten.nl/forten/werk-aan-het-spoel/>

The sixth phase, started in 2014 and still in progress, saw a shift to provincial responsibility due to decentralization of spatial planning (Van der Zande and During, 2010). With the Pact van Altena (Provinces, 2014), responsibility for transformation projects shifted from the national to the provincial and municipal levels. Provinces like Utrecht, Gelderland, North Holland, and North Brabant assumed leadership roles, emphasizing a bottom-up approach. Provinces assumed the task of implementing revitalization plans until 2020, focusing on restoring fortresses, bunkers, roads, and sluice complexes, often integrating contemporary architectural designs (VerschuureStuip, 2020). Provincial authorities led the initiative, with the state's involvement limited to the application for UNESCO World Heritage status.

Initially, the planning management of the New Dutch Waterline followed a top-down model similar to the so called Singapore approach, which is characterized by extensive government intervention and planning, yet flexible enough to adapt to changing conditions without strictly adhering to a rigid central plan (Huff, 1995). While this model has proven successful in achieving sustainable urban development through centralized decision-making, the evolution of the

Waterline's strategy towards a more localized approach highlights the importance of adapting to regional contexts and incorporating local stakeholder input (Duffhues & Koudstaal, 2012). This shift from a top-down to a bottom-up approach aims to create more sustainable projects that prioritize the needs of local communities over those of tourists, fostering long-term engagement and utilization by ensuring that the initiatives resonate with and benefit the people who live there (Verschuure-Stuip, 2016).

This new approach brought significant benefits by granting provinces and municipalities greater freedom of choice, allowing them to tailor revitalization efforts to their specific local contexts and needs. The Pact van Altena facilitated a form of alliance among provinces, ensuring that the New Dutch Waterline retained its national character while addressing regional priorities. This strategy is similar to the fourth phase when the project bureau divided the New Dutch Waterline into seven zones, each with its own team. Decentralizing tasks in both phases made the revitalization easier and more adaptable, combining national oversight with local flexibility to address the specific needs of each area.

However, this decentralization also presents challenges. Allowing each province or municipality to independently decide on redevelopment strategies risks undermining the continuity of the Waterline as an integrated system. Without a coordinated approach, there is a potential for fragmented efforts that could detract from the overall coherence and historical integrity of the Waterline. At the same time, it is interesting to explore the different approaches to heritage conservation adopted by various provinces and municipalities, as these diverse strategies may offer valuable insights and innovative solutions for revitalization while highlighting the unique character of each region.

The evolution of heritage conservation policies, particularly the revitalization of the New Dutch Waterline, underscores the dynamic interplay between preservation and development. This chapter highlights how, in just a few decades, heritage assets have transitioned from mere historical remnants to integral components of urban regeneration and socio-economic development. The shift from a 'culture of loss' to a 'culture of profit' reflects a broader recognition of the multifunctional benefits of heritage sites, including their roles in economic development, tourism, recreation, and cultural identity.

This evolution is relevant because it demonstrates the potential of heritage conservation to (idealistically) drive sustainable development, fostering a balance between historical preservation and contemporary urban needs. The integrated approach linking heritage conservation with planning policy, as seen in the Dutch context, can serve as a model for other regions aiming to leverage their cultural heritage for broader socio-economic benefits. The interpretation of these changes reveals that successful heritage conservation requires a proactive, interdisciplinary approach, engaging multiple stakeholders to ensure that preservation efforts enhance, rather than hinder, urban and regional development. Furthermore, collaboration between state and non-state actors has proven effective in both the top-down and bottom-up initiatives previously analyzed, reinforcing the importance of diverse partnerships in achieving successful heritage outcomes.

4. The Transformation of Lunetten Fortresses

Having examined relevant heritage policies involving the whole Nieuwe Waterlinie system, we now turn to a practical case study to see how these concepts are applied. This chapter begins with a detailed examination of the Lunetten topography, highlighting a series of historical and modern maps that chart the neighborhood's evolution from 1789 to 2020. This research allows us to track changes in land use and urban development, offering insights into how the neighborhood has transformed over time and the various factors that contributed to these shifts.

Subsequently, the chapter delves into the intricate dynamics of urban cultural and green space transformation, specifically analyzing the Lunetten fortresses and their environs. Situated within the context of Utrecht's rapid urbanization, the Lunetten neighborhood stands as a testament to the delicate balance between historical preservation and contemporary urban development. As we explore the landscape changes surrounding the Lunetten fortresses, we uncover the complexities of urban green space management and the intricate interplay between preservation and progress. Through interviews with experts in the field and local residents, I aim to unravel the nuances of this transformation, shedding light on the challenges, triumphs, and lessons learned in revitalizing historical sites for contemporary use. From the preservation of greenery to the adaptive reuse of historical structures, the Lunetten case study offers invaluable insights into the multifaceted nature of urban green space planning and management.

Lunetten Topography

In this section, we will closely examine a series of historical and modern maps depicting the Lunetten neighborhood, covering the period from 1789 to 2020. These maps allow us to track the evolution of the area over time, offering a detailed view of changes in both land use and urban development. By analyzing these maps in chronological order, we can gain insights into how the neighborhood has transformed, while also reflecting on the factors that contributed to these shifts.

Topographical research and map comparisons offer a unique way to uncover patterns that might otherwise go unnoticed. This approach not only helps us understand how historical events

and policies have shaped the landscape, but also highlights the connection between past decisions and present-day urban growth. It provides a clearer picture of how the area has evolved, offering valuable context for future development.

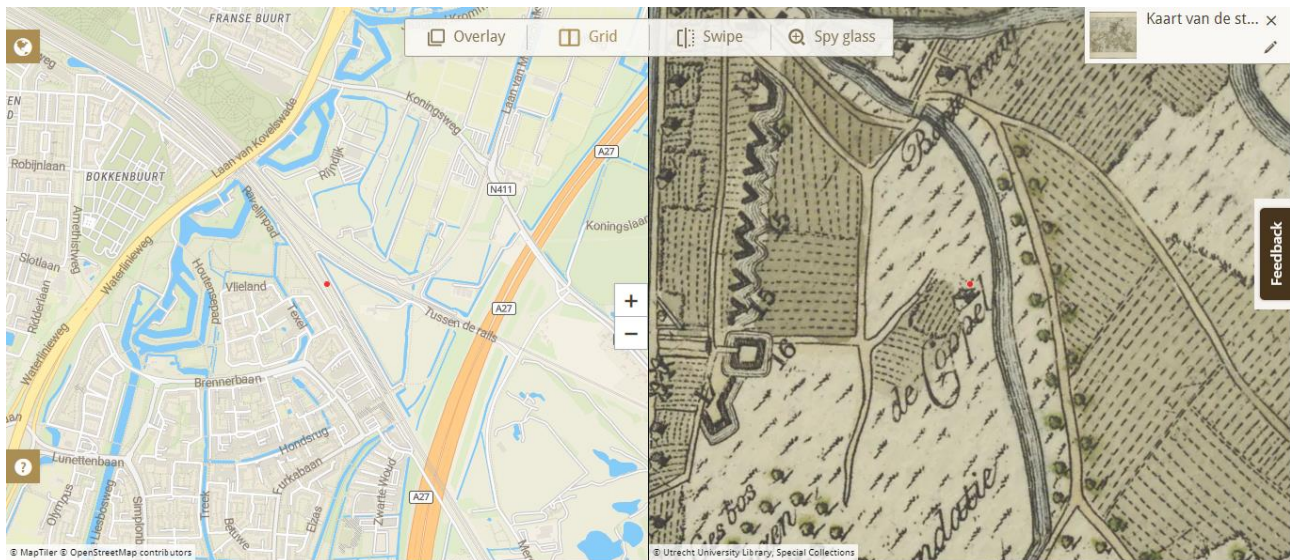


Figure 5 D.M. Langeveld. (1789). *Kaart van de stad Utrecht en een zyde van de revier de Leck: met de batterijen retranchementen die door de burgers van Utrecht op orders van den Hr. Rhyn grave Von Salm buiten de stad en omliggende plaatsen in den jaare 1787 zyn opgeworpen* [Map]. Utrecht University Library. Retrieved from <https://objects.library.uu.nl/reader/index.php?obj=1874-351096&lan=en>

The most recent map available before the construction of the Lunetten protective forts dates back to 1789. It shows how the Utrecht area appeared at the end of the 18th century. Notably, this is the only map I am using that is not taken from the RCE atlas, which covers the period from 1850 to the present. I found this map on the Utrecht University maps website, a particularly useful resource because it provides georeferenced maps that enable real-time comparisons between historical and contemporary maps. The use of color on the map enhances the analysis by clearly distinguishing between waterways, roads, buildings, and cultivated fields. Thanks to the georeferencing feature, it is easy to see how the red point on the historical map aligns precisely with the red point on the modern map, facilitating a clear visual understanding of the area's development over time.

As clearly visible, before the construction of the Lunetten fortresses, the area was not urbanized, with only a few houses marked and cultivated fields dominating the landscape. An

interesting detail is the presence of a tributary of the Kromme Rijn, which no longer appears in maps from 50 years later.

Additionally, the label "inundatie" on the white part of the map roughly corresponds to the flood zone that would be established a few decades later with the implementation of the Kringwet Act in 1853. As shown in the figure below, the white area on the map marked with the label "inundatie" aligns with the section to the south of Lunet 1, extending up to the area in front of Lunet 3. This indicates that flood plans had already been developed prior to the Napoleonic invasion in 1795, and they were ultimately realized nearly two decades later, using the same location for the flood zone.

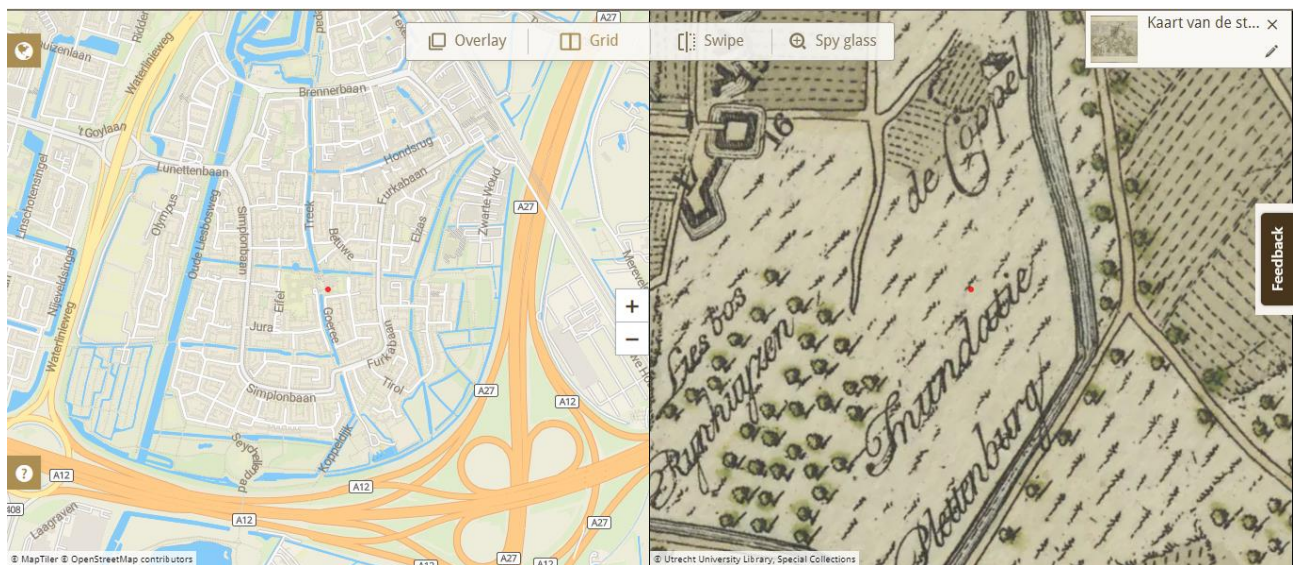


Fig. 5

Also notable are the defense structures marked with numbers (16, 15), predating the construction of the four Lunetten forts. Before the construction of these four defensive forts, the city of Utrecht had a system of triangular-shaped (similar to the lunetten case) battery defenses located just a few hundred meters west of the current forts. These batteries do not appear on the subsequent map, suggesting that they were likely demolished as part of the later plans for the four Lunetten.

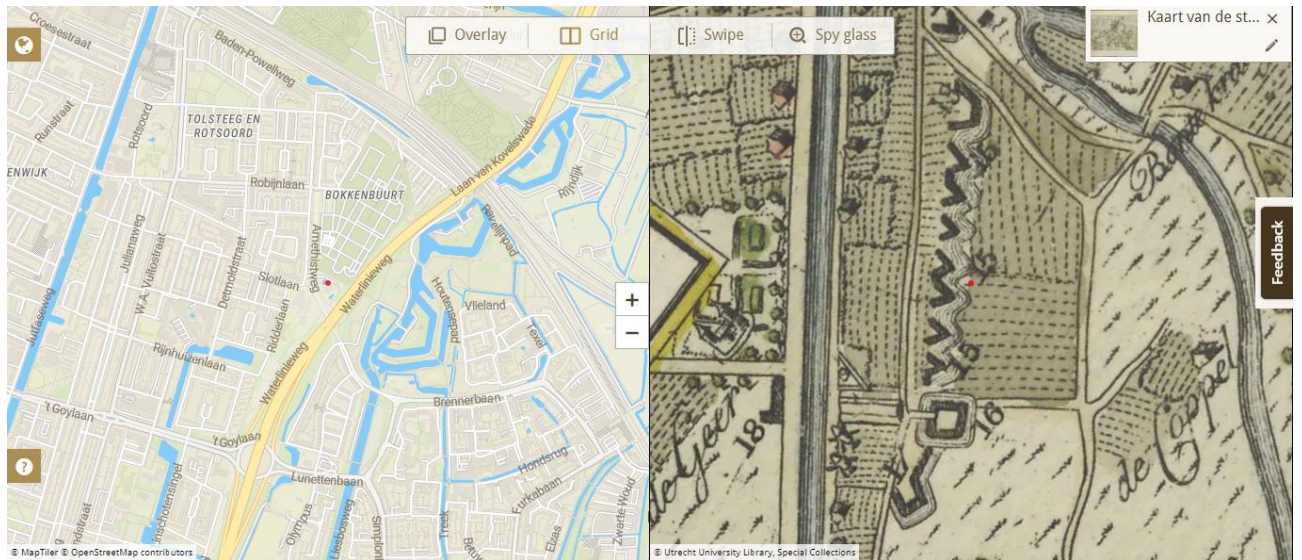


Figure 6 Rijksdienst voor het Cultureel Erfgoed. (1860). Map of the Netherlands, 1860 [Map]. Retrieved from <https://rce.webgispublisher.nl/Viewer.aspx?map=Infrastructuur%5FMCN>

The map from 1860, clearly shows the four Lunetten forts, divided into two pairs by the newly completed railway line. The map clearly illustrates the rural nature of the area, with various cultivated fields easily distinguishable (the cultivation fields are distinctly marked by various boundary lines.). However, it is noteworthy that there are no fields directly in front of the forts; this space is simply left blank on the map, with no indication of land use or any constructions. This

absence can be linked to the Kringenwet Act of 1853, which prohibited the construction of buildings in the vicinity of the forts. The map visually reflects this legislation, as no structures are present in the surrounding area.



Figure 7 Rijksdienst voor het Cultureel Erfgoed. (1900). Map of the Netherlands, 1900 [Map]. Retrieved from <https://rce.webgispublisher.nl/Viewer.aspx?map=Infrastructuur%5FMCN>

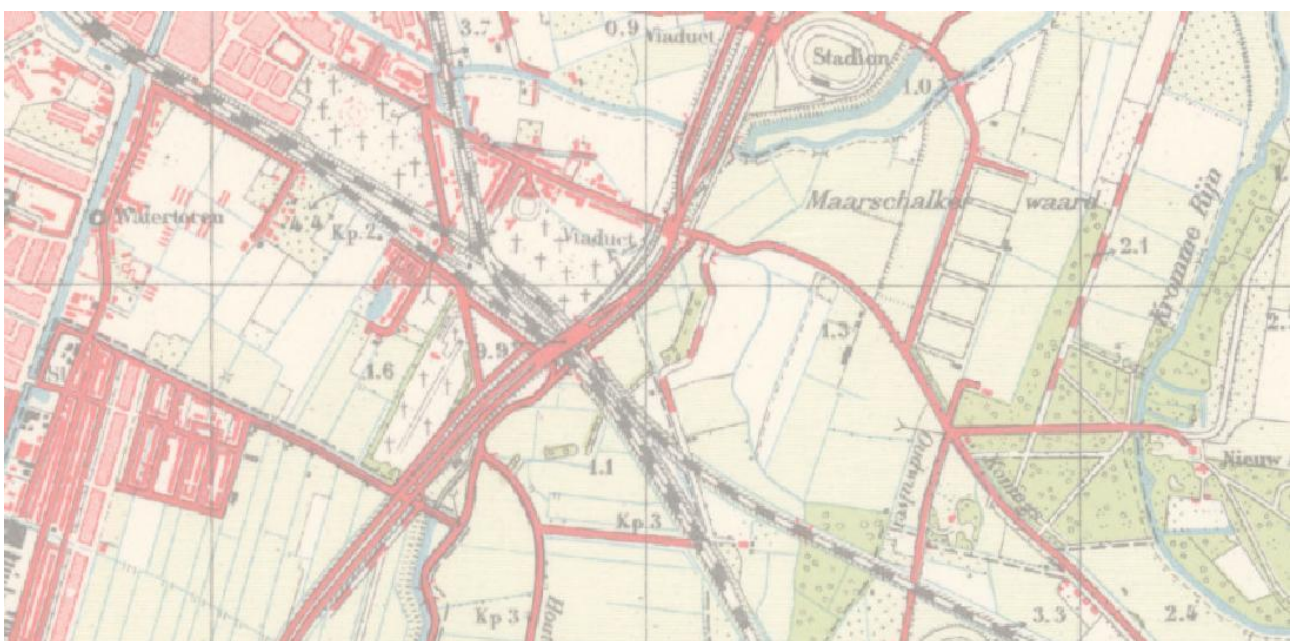


Figure 8 Rijksdienst voor het Cultureel Erfgoed. (1950). Map of the Netherlands, 1950 [Map]. Retrieved from <https://rce.webgispublisher.nl/Viewer.aspx?map=Infrastructuur%5FMCN>

It is interesting to note that the maps covering the period from 1900 to 1955 no longer depict the four Lunetten forts; the fortifications are no longer clearly outlined. However, when

comparing these maps with the one from 1860, the newer maps are notably more detailed, partly due to the fact that they are in color, making it easier to distinguish different types of land use. Similar to the earlier map, the space in front of the forts is deliberately left blank, likely reflecting the restrictions imposed by the Kringenwet Act, which remained in force until 1967. This is also evident in historical aerial photograph from the 1930s where we can clearly observe how the land on the east side of the fortresses is deliberately left free of buildings and obstacles.

From 1900 to 1950, however, there is a noticeable increase in construction, particularly to the west of the forts, in the area stretching from the city center to what will become the Lunetten neighborhood. Numerous roads were also built during this period, driven by the growing dominance of automobiles as a primary mode of transport, with the Waterlinieweg constructed in 1942 as a key example. Additionally, the construction of Galgenwaard stadium in 1936 on the outskirts of Utrecht, near the defensive line, reflects the urban expansion at the time. In contrast to the 1900 map, the presence of agricultural land had visibly decreased by 1950, replaced by rapid urbanization as the city expanded. This shift highlights the increasing pressure for development, as both infrastructure and housing needs grew significantly during this period.

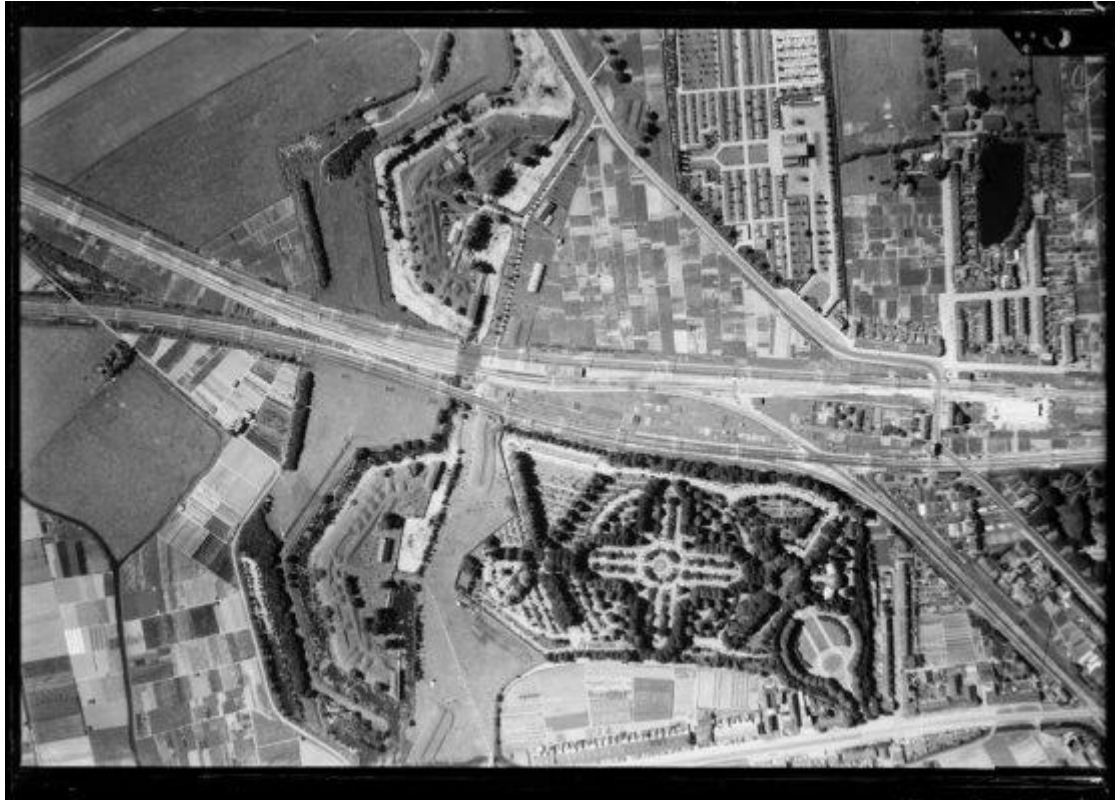


Figure 9 Alamy. (1937). Lunetten [Photograph]. Retrieved October 10, 2024, from <https://www.alamy.com/stock-photo-lunetten-33655678656-o-171935268.html?imageid=FCF66F71-424D-4530-BA13-0218E3F419F1&p=260270&pn=1&searchId=a0c5939814b18a507b0c8f366dd41eb7&searchtype=0>



Figure 10 Rijksdienst voor het Cultureel Erfgoed. (2000). Map of the Netherlands, 2000 [Map]. Retrieved from <https://rce.webgispublisher.nl/Viewer.aspx?map=Infrastructuur%5FMCN>



Figure 11 Rijksdienst voor het Cultureel Erfgoed. (2020). Map of the Netherlands, 2020 [Map]. Retrieved from <https://rce.webgispublisher.nl/Viewer.aspx?map=Infrastructuur%5FMCN>

Moving on to the more recent maps, the transformation of the neighborhood is strikingly evident. In just a few years, this once rural and peripheral area of Utrecht has been overtaken by the rapid urbanization that the city has experienced—and continues to experience. Notably, the forts reappear on these maps, clearly outlined. Blue is used to mark the waterways surrounding the forts, while green areas and buildings are also indicated. Additionally, for the first time, buildings are visible in front of Lunet 1 and 2, a direct result of the cessation of the law restricting construction in concentric zones around the fortifications.

This increased attention to detail is undoubtedly due in part to the advent of new technologies that significantly enhance topographical processes. However, it also reflects a growing recognition of military heritage structures, highlighting a shift in policy towards the preservation of cultural assets. The military system, which for many years was largely abandoned and overgrown by vegetation, almost obscuring this chapter of Dutch history, began to re-emerge with new policies introduced in the 1980s. Initially driven by the state, and later by provinces and municipalities, this renewed focus on military heritage is also visible in the maps, illustrating a kind of "renaissance" for these historical structures.

The study of maps has been particularly helpful as it allows for a visual analysis of the changes that have occurred in the area over time, as well as a comparison of different periods to see how they reflect shifts in political approaches. Much like my experience during the internship, maps from different years illustrate the transformations that have taken place across various timeframes. One notable feature is the construction of the railway line, which divides the fortifications into two pairs, as well as the rapid urbanization that began in the 1970s.

However, analyzing maps, especially historical ones, also presents certain challenges. One key difficulty is the lack of color in the maps from 1850 and 1860. Being entirely in black and white makes it harder to interpret land use or distinguish between a watercourse and a paved road, for example. While the absence of color complicates the study of these early maps, the fortifications themselves are clearly visible. In contrast, as previously mentioned, the four Lunetten forts are not marked on the maps from 1900, 1950, and 1955. Only with careful inspection can you see the subtle boundary lines to the east of the forts. This omission of the fortifications may have been a strategic choice to cover information about the defensive system in case the maps fell into enemy hands, particularly during the two World Wars. At the same time, the decision not to meticulously map disused military fortifications could reflect the general indifference towards military heritage, typical of policies prior to the revitalization efforts that have emerged in recent decades.

Urban green spaces planning and management.

Urban green spaces play a crucial role in compact city development, aiming to balance high-density urbanization with livability and sustainability (Haaland & van Den Bosch, 2015). These spaces offer a wide array of benefits to city dwellers, including environmental, social, and health advantages (Pauleit, 2003; Tzoulas et al., 2007; James et al., 2009). They also serve as important habitats for wildlife, contributing to urban biodiversity conservation (Goddard et al., 2010). Despite their multifunctionality, fitting these benefits into limited urban space presents a significant challenge (James et al., 2009). Prioritizing cultural ecosystem services such as recreation, aesthetics, and cultural heritage is essential in green space planning (Hillsdon et al., 2006). Access to urban green spaces has become a focal point in research concerning human wellbeing, given their significant health benefits (Barbosa et al., 2007).

However, the seemingly positive endeavour of increasing green space in peripheral areas may have unintended consequences, particularly in disadvantaged neighbourhoods. One significant challenge lies in the potential for such green space expansions to fuel gentrification dynamics. This process can significantly impact housing prices, rendering them less affordable for existing residents and potentially leading to the displacement of lower-income individuals and families. This shift in housing affordability often results in a demographic transformation, with higher-income residents replacing those with lower incomes. These changes, driven by the perceived desirability of green spaces, highlight the complex interplay between urban development, socioeconomic factors, and the distribution of environmental amenities (Wolch et al., 2014). Meanwhile, within densified urban environments, pressure on attractive green spaces can compromise the quality of the experience they offer (Arnberger and Eder, 2012). To address these challenges, stakeholder involvement and public participation are crucial in green space planning processes (Jim, 2013). Adapting existing green spaces based on residents' preferences fosters ongoing relevance and community support for sustainability goals (Smith and Billig, 2012). While green spaces offer a wealth of benefits, they often take a back seat to economic and aesthetic concerns in urban planning (Beer et al., 2003). This means we're missing out on a whole spectrum of advantages they bring to our cities: when we focus solely financial gains or the pretty pictures to post on Instagram, we overlook the vital roles green spaces play in our urban ecosystems. Beer et al. (2003) remind us that, through their pleasant appearance, these spaces are instrumental for creating healthier environments, fostering community connections, and preserving our natural world.

In summary, effective planning and management of urban green spaces require a nuanced understanding of their multifunctional benefits, strategic engagement with stakeholders, and a commitment to inclusive decision-making processes that prioritize community needs and sustainability goals.

Transformation of the Lunetten Fortresses

The Lunetten fortresses, located in the east of the city of Utrecht have undergone significant transformations since their construction in the early 19th century. This transformation encompasses physical changes in architecture and land use, adapting to military technological advancements as well as shifting societal needs. Constructed between 1822 and 1828, they were

strategically positioned in a crescent shape to defend the vulnerable Houtense Vlake from potential invasions. This area was particularly at risk because it is higher than the surrounding land, making it impossible to sufficiently flood for defence. Despite rapid technological advancements in the 1860s rendering the original structures somewhat obsolete, the fortresses maintained their strategic importance due to their intersection with key railway lines, crucial for protecting rail access to the heart of the Randstad region. However, during Utrecht's third construction phase (1867-1870), attention shifted back to fortifying the city's defences. Recognizing the need to bolster the existing fortifications, a second and outer ring of forts was conceived to complement the already-existing ring and move the defence line at a greater distance from the city center (Marulo, 2022). This expansion saw the construction of notable forts like Fort Rijnauwen, Fort bij Vechten, Fort Ruigenhoek, and Fort Voordorp, strategically positioned to enhance the city's defensive capabilities. The introduction of more far-reaching artillery diminished the strategic value of the first ring of forts, which included the four Lunetten fortresses, shifting the focus to the new defensive structures (Marulo, 2022). Just 40 years after their construction, the Lunetten fortresses shifted from being a primary defense system to a secondary one. Since the fortresses have become an ineffective defense system against new military technologies, necessary modifications and updates have been made. Moving into the 20th century, the Lunetten underwent significant modifications to adapt to evolving military tactics and threats. In the 1930s, Lunetten I, III, and IV were updated with reinforced concrete machine gun casemates, reflecting advancements in warfare technology (Gementee Utrecht, n.d.). During the Cold War era in the 1950s, Lunet I saw further modification with the addition of an atomic bunker (Hollandse Waterlinies, n.d.). This bunker served as the national headquarters for the Population Protection organization (BB), a reflection of the heightened concerns about nuclear threats during that period.

From military to civilian transition

Following World War II, the military relevance of the Lunetten fortresses rapidly faded away, prompting a slow transition towards civilian utilization. This shift marked a significant departure in the purpose and function of these historic structures and their surrounding landscapes. Today, the fortresses serve multifunctional roles, reflecting the evolving needs and values of the surrounding community.

Lunet I in Utrecht has evolved from a crucial Cold War military site into a dynamic community space. Originally, it housed the National Command Bunker for Population Protection (BB), established in 1952 to coordinate emergency responses, such as firefighting and medical services, in the event of bombings or even nuclear attacks. As nuclear threats grew, a new concrete bunker was added in 1960 to provide enhanced protection. Today, part of the site offers out-of-school care for children, and another section hosts the Stichting Bevordering Utrechtse Improvisatie (BUI) Foundation, a “creative workspace for young talents from Utrecht” (Visit Utrecht Region, n.d.).

The railway line from Utrecht towards Den Bosch and Arnhem runs between Lunet II and Lunet III, with both forts providing protection to this important route. Though construction of group shelters began in the lead-up to the Second World War, they were never completed. Today, Lunet II has transformed into a hub of creativity and learning, hosting workshops for the community's artistic and educational aspirations. One notable structure is the Wooden Mountain Shed (f2), built in 1895 for non-bomb-proof storage. The shed has been restored and repurposed for office and storage use while retaining its original exterior. Lunet II is currently used by the Utrecht Monument Guard (Gementee Utrecht, n.d.).

Similarly, Lunet III has become a lively community hub that connects its history with contemporary use. It houses the Ludens after-school care center 'Fort Kakola' in its cannon casemate, offering children a range of indoor activities and outdoor adventures. Scouting Salwega and the Vendel have also made Lunet III their home, further enhancing its role in youth engagement. The cannon casemate, restored by the municipality of Utrecht between 2010-2011, is shared between the Ludens Foundation and the Utrecht Monument Watch Foundation, which uses it as an office, workshop, and storage space.

Meanwhile, Lunet IV stands as an example of social inclusion and support, functioning as a healthcare fort in collaboration with ZOMO Zorg. It offers daytime activities for individuals with intellectual disabilities, providing employment opportunities at 'De Smaak van Lunet' lunchroom, the 'Loods IV' store, various workshops, and the adjacent garden 'De Tuin.' The fort features a lunchroom open six days a week and facilities for meetings, while the store sells bicycles, garden vegetables, and creative products, highlighting Lunet IV's central role in the neighbourhood.

Researching various websites of the municipality of Utrecht, the province, and the dedicated New Dutch Waterline site, it is easy to find information on the various associations and

activities taking place in each of the four fortifications. At first glance, each of these fortifications appears to be easily accessible to citizens for a multitude of activities and events. However, this is not entirely the reality. Through further exploration and interviews, we can uncover the nuances and challenges faced in truly opening these spaces to the community. A person living in the neighbourhood expressed: *“I think is already nice that is incorporated into the landscape it would be nice if you could also enter at multiple places, so some are not accessible or sometimes it just feels closed off and it would be nice to be allowed in everywhere”*.

This view is echoed by a Vera Driessen from the real estate department of Utrecht municipality, who provides insight into the current state of accessibility:

“Lunet iii is not really open; there is a scout and children’s day care and temporary management. Lunet iii is not ideal how it is now because only a few people can go and experience this place. Lunet iv has a day care in this café, a day care for grown-ups with disabilities. They have a really nice place there to work and to be part of maintaining this place. They clean, they cut... so it’s really nice.”

The municipality is actively working to improve the situation:

“What we are doing now is making a strategy for Lunet i, ii, and iii because those three have not been used in a way that contributes to our goals and our social policies and everything. When the gates are closed, people can’t go on it. It is a temporary situation; you want a tenant that contributes to those goals and wants to invest in those places. When you are in this temporary situation, that is difficult.”

Although historically conceived as four interconnected structures, the four Lunetten forts are now divided into two pairs, with the railway line serving as a distinct boundary between them. Additionally, they are also divided based on the various associations that occupy them, the functions they serve, and the activities they organize.

Lunetten i and ii find their place within Lunettenpark, forming integral components of its historical landscape, while Lunetten iii and iv are nestled within Beatrixpark. This division underscores the unique spatial arrangement of the forts, with each pair contributing to the distinct character of its respective park. From the interview with the expert from the municipality of Utrecht, it emerged that a recent project aimed to reconnect Lunet ii and Lunet iii via the construction of a bridge for bicycles and pedestrians. However, this project was subsequently

abandoned due to the visual impact the bridge would have had on the landscape. Intrigued by this, I inquired if alternatives, such as a tunnel that would avoid deteriorating the panorama, had been considered. I was informed that, while this is not currently the case, it is a good idea to keep in mind for the future.

Once secluded military installations, these areas have undergone a remarkable transformation into public city parks, offering a wealth of recreational, social, and cultural benefits to residents. This integration into recreational spaces symbolizes a departure from their past as restricted zones, now welcoming the community to revel in nature and historical heritage within protected environments.

Urban Encroachment and Preservation: The Lunetten neighbourhood

Over the years, urban expansion around Utrecht has forcefully advanced toward the once remote location of the fortresses. The Lunetten neighborhood, born from Utrecht's rapid urban expansion in the late 20th century, exemplifies the delicate balance between preservation and progress. Developed in the 1970s and 1980s, it integrates historical forts and natural landscapes, preserving vast green spaces highlighting the site's environmental and historical significance. The neighborhood's name honours these historic bastions, much like the Krayenhoff panorama pays tribute to the architect of the New Dutch Waterline. This naming choice not only commemorates the forts' historical importance but also transfer their story into contemporary urban life. It serves as a tangible link between the past and present, fostering a sense of connection and continuity within the community. Furthermore, by incorporating the forts' names into the neighborhood, residents and visitors alike are reminded of the site's historical and cultural importance, reinforcing the value of preservation amidst rapid urban expansion.

The transformation of the landscape from open, rural land to a vibrant suburban environment reimagined the forts' purpose. Once bastions of defense as part of the New Dutch Waterline, the forts now serve the local community in diverse ways. Despite these modern adaptations, Lunetten remains deeply rooted in its historical legacy. Efforts to honour the forts' heritage while meeting contemporary urban needs have created an interesting urban fabric where historical preservation and modern living try to coexist harmoniously. Green spaces surrounding

the forts have not only been preserved but also enhanced, offering residents recreational areas while maintaining the area's aesthetic and ecological integrity.

The forts' integration into Lunettenpark and Beatrixpark has preserved significant green spaces, maintaining a balance between urban development and historical conservation. Serving as a green lung, Lunettenpark separates the new Lunetten neighborhood from the nearby city center (10 minutes by bike). This park exemplifies a smaller-scale version of the green belt concept around the Randstad, providing residents with a tranquil natural space to escape the noise and stress of urban life. The preservation of the forts and their surrounding green areas has enabled this transformation, similar to how the broader New Dutch Waterline functions on a larger scale. Just as Lunettenpark offers a protected green space for local citizens, the New Dutch Waterline, with its network of historical forts, water works, and natural areas, serves as a significant green lung for the entire Randstad region. Both the local scale of Lunetten and the larger scale of the New Dutch Waterline demonstrate how the conservation of historical military structures and their environments can create enjoyable green spaces. These green lungs are crucial for providing recreational opportunities, preserving nature, and enhancing the quality of life over rapid urbanization. From the interviews, it emerged that the residents of the neighborhood particularly appreciate the presence of parks in their area. As expressed by one woman: *"I really love to go to the park and walk in the nature"*; another male resident said: *"It's a joy to be able to walk my dog around this beautiful park with its fortifications, especially in the evening after a long day of work."*

This enjoyment of parks by the residents of Lunetten, as well as those living today in other parts of the New Dutch Waterline, can be largely attributed to the Kringwet Act of 1853, which remained in effect until 1963. This law that prohibited the construction of buildings east of the line to facilitate potential flooding unintentionally enabled the preservation of open spaces for future recreational use.

Moreover, the opportunity for residents to now spend leisure time in an area that was once inaccessible to the public until the last century is a welcome change. It allows them to engage with a unique part of the Netherlands' military history and the history of Utrecht itself, offering a newfound appreciation for the significance of these spaces. The transformation into park spaces has involved landscaping efforts to make the areas around the fortresses more accessible and enjoyable for the public. These enhancements have included creating cycle lanes, pathways,

recreational facilities, and maintaining the natural environment to promote biodiversity and community well-being.

Landscape Evolution

In the 1860s, significant changes swept through the landscape surrounding the Lunetten fortresses with the introduction of two railway lines. These lines effectively divided Lunet i and ii from Lunet iii and iv, reshaping both the physical appearance and strategic significance of the fortifications. The railway connections not only increased accessibility but also diminished the relative isolation of the Lunetten, departing from their once remote location.

Following the railway construction, further alterations occurred with the establishment of the Waterlinieweg, a road traversing the eastern outskirts of Utrecht. Originating in 1942, the Waterlinieweg ran parallel to the Lunetten on the Houtense Vlakte, a pivotal segment of the New Dutch Waterline. However, the construction of the Waterlinieweg posed challenges for landscape preservation. The road necessitated substantial modifications to the natural environment, including the construction of elevated sections and viaducts that disrupted the landscape's continuity and visibility. Despite these impacts, efforts were made to mitigate the road's effects on the landscape. Modifications to the Waterlinieweg aimed to better integrate with the urban environment, such as reducing the maximum speed limit, replacing guide rails with concrete edges, and repurposing emergency lanes into bus lanes. These adjustments aimed to strike a balance between development and conservation, preserving the historical and ecological significance of the area while meeting the demands of modern transportation infrastructure.

Furthermore, the construction of the Galgenwaard Stadium in the vicinity added another layer of transformation to the landscape. The stadium's presence altered the visual and functional aspects of the area, serving as a focal point for sports and cultural events while also contributing to the region's economic vitality. Each weekend, when FC Utrecht plays at home, approximately twenty thousand spectators visit the area. This influx of people underscores the economic and recreational potential the area offers, showcasing its importance as a hub for community activity.



Figure 12 12 Het Utrechts Archief. (1936). Lunet I stadium [Photograph]. Retrieved June 3, 2024, from <https://hetutrechtsarchief.nl/beeldmateriaal/detail/c5f43d68-a37b-5c0b-9e222052dba5f2e7/media/589f7208-7571-3061-907b-3556de17c092?mode=detail&view=horizontal&q=lun>

Ecological Conservation and Sustainable Development

The revitalization of the New Dutch Waterline as a whole has been pivotal in conserving and enriching the natural landscapes intertwined with the defensive system. Restoration efforts and the adaptive reuse of military structures have been coupled with initiatives aimed at safeguarding and enhancing biodiversity within the waterline's vicinity. For instance, the establishment of green corridors and wildlife habitats adjoining restored fortifications has bolstered ecological resilience while promoting sustainable land management practices. Additionally, meticulous water level management and initiatives to restore floodplains have not only bolstered flood resilience but also augmented ecosystem services like water purification and habitat provision.

Preserving recent fortifications (19th and 20th centuries) not only involves heritage conservation but often extends to ecological conservation as well (Harris, 2011). As highlighted by

Vera Driessen: *“...for example there are no parking lots, so new tenants have to deal with those things, there are really a lot of special bees living on the fortresses and other animals, so the nature, biodiversity, cultural historical values have all to be taken into consideration so we can't just give it away to the first one, a lot of people want to say something about it”*.

This perspective illustrates the complexities involved in maintaining the forts of Lunetten. Various groups are involved in the stewardship of these areas, ranging from historians and architects to biologists and volunteers. Consequently, those interested in managing one of these structures must consider multiple aspects, including ecological, historical, and community values, as well as attracting potential investors who are not deterred by the numerous requirements that need to be addressed. From Vera's interview, it becomes clear that this process is anything but simple.

Additionally, greenery was a significant element of 19th-century fortresses, serving a masking function (Pardela et al., 2022). However, as highlighted by Bukal (2018), there exists a noticeable conflict between preserving the monument and safeguarding nature. This is also confirmed by Laurens Kik from Bosch & Rijn: *“We see that cultural and historical values of the New Dutch Waterlinie clash with the development of wind and solar parks and geothermal installations”*. Therefore, this conflict is further complicated by modern needs and developments. Nevertheless, despite these challenges, Bosch & van Rijn remains committed to facilitating sustainable energy solutions while respecting the cultural and historical integrity of the landscape.

While the preservation of these monuments is crucial for heritage conservation, it often involves interventions that may disrupt or compromise the surrounding natural environment. For instance, efforts to maintain the structural integrity of fortifications may require the removal of vegetation or alterations to the landscape, potentially impacting local ecosystems and biodiversity. Conversely, prioritizing ecological conservation may necessitate measures that conflict with the preservation of historical features, such as limiting human access to sensitive habitats within the fortification grounds. Alternatively, simply allowing nature to take over the fortifications poses its own risks, as unchecked natural growth could obscure and damage the structures, ultimately leading to their abandonment. This conflict underscores the complex challenges inherent in balancing heritage preservation with ecological conservation and highlights the need for nuanced approaches that consider both cultural and environmental values.

The pursuit of ecological and historical conservation and sustainable development goals within the context of the New Dutch Waterline has encountered its share of challenges. Potential conflicts arise between conservation imperatives and the demand for infrastructural development or urban expansion in neighbouring areas. Achieving a delicate equilibrium between preserving historical landscapes and meeting contemporary demands for economic progress and infrastructure necessitates meticulous planning and robust stakeholder engagement. Moreover, the introduction of modern amenities and recreational facilities to attract visitors to rejuvenated sites must be judiciously balanced with the conservation of delicate ecosystems and the safeguarding of endangered species.

Ecological and historical conservation often do not go hand in hand with sustainable development, and finding a balance between the two is not easy and can lead to conflicts. While the revitalization of these areas primarily serves the local community by offering opportunities for tourism, this aspect should not overshadow the overarching philosophy of sustainable development in the surrounding region, which is already experiencing rapid urbanization. The aim is to avoid a scenario akin to the '*city centre of Amsterdam*', where an overwhelming influx of tourists deeply affects the overall experience for those residing nearby.

5. The cultural value of Lunetten fortresses' redevelopment

Community Engagement and Social Impact

The revitalization of the New Dutch Waterline has had a profound impact on local communities, both socially and economically. Engaging communities in the planning and execution of revitalization projects has been fundamental, aiming to instill a sense of ownership and pride among residents. Through participatory processes, local stakeholders have been empowered to contribute their knowledge, ideas, and aspirations for the future of their neighbourhoods, fostering social cohesion and a sense of belonging. An example of this can be seen in the previously analyzed case study of “Werk aan Het Spoel” in Culemborg, where community involvement played a crucial role in shaping the project and ensuring it met the needs and desires of local residents. This case highlights how such engagement not only enhances the revitalization efforts but also strengthens community ties and enhances the overall sense of place.

Or at least, this is the theory. From my research, it seems that the level of involvement of citizens highly varies from case to case.

When I asked for clarification on how citizens are involved in the revitalization of the area of Lunetten, Vera Driessen frankly stated: *“I think we don't really do that, some of these temporary users and renting users have started a community cooperation called Lunettenparkmakers and they organize events..., so we mostly work with the help of the province of Utrecht.”* It appears, instead, that citizen participation is more actively facilitated by private companies like Bosch & van Rijn. As explained by Laurens Kik:

“During projects we try to involve stakeholders. Inhabitants can react on the plans which are partly based on our studies and local lobby groups are consulted actively.” He later continued: *“In the context of the project for the municipality, an online survey was held to consult inhabitants on where to place wind turbines or solar farms. Inhabitants had to decide if they preferred development in nature or cultural heritage sites. I don't have the exact numbers, but the community picked placement in or near the fortresses above turbines in nature.”*

Moreover, the transformation of historic military sites has created opportunities for economic development and cultural enrichment within local communities. The repurposing of abandoned fortifications into tourist destinations, cultural venues, or recreational spaces has generated employment, encouraged entrepreneurship, and attracted visitors, thereby revitalizing local economies and facilitating cultural exchange.

From the interview with Vera, it emerged that, at present, the city of Utrecht is almost exclusively focused on the maintenance of the forts and their surrounding areas. *"We as a municipality focus on the maintaining thing, we don't see it as our task to also organize activities (we leave this to the tenants). But is it only the tenants that should do it? Should we deal more also as the owner of those places?"*

This doubt raised by the expert is interesting, as a resident expressed a similar sentiment during an interview: *"I also think it would be nice if the municipalities do activities there too, for local people, that would be cool."* Another resident added: *"I don't really feel connected to the fortresses in that sense. I really like it, but you're not really that much invited to be part of it. You should really investigate by yourself, and it would be nice if people were encouraged to be more attracted to it. Because if it is a UNESCO heritage site, then it should be celebrated, right? That's super cool actually, so yeah, I think they should put more effort into incorporating locals with that."* The choice of the word "cool" by this resident highlights a sense of pride in the UNESCO nomination, suggesting that it adds value to the heritage site in her neighborhood. This perspective supports the idea that UNESCO designation can enhance a sense of national and local identity (Meskell, 2013), revealing one of the many political and social benefits inherent in this complex process.

Challenges persist in ensuring equitable access to the benefits of revitalization efforts across all segments of society. Economic disparities, demographic shifts, and pressures of gentrification can exacerbate social inequalities and displace vulnerable populations, particularly in areas undergoing rapid transformation. While community engagement processes have aimed to incorporate diverse perspectives and voices, ensuring meaningful participation and representation of marginalized groups remains an ongoing challenge (Bachani, 2021). As noted by Vera Driessen, another significant barrier to consider is the rent price. The municipality has the flexibility to lower rents for buildings used for social purposes, while commercial uses incur higher rents. However, since these structures are cultural historical heritage sites, the municipality must set a rent price

that, while lower than for commercial use, is still relatively high. This creates a challenge because management costs for these special heritage sites drastically increase due to the need to consider various aspects of ecological conservation, such as protecting native vegetation, preserving biodiversity, and restoring historical structures.

This presents a risk for investors, who may find it challenging to turn a profit, potentially leading to financial losses. Balancing the need to preserve these heritage sites with making them economically viable for investors is a complex issue that requires careful consideration and strategic planning. The expert then concluded: *"We are searching for exploitation strategy that works on those places, in this park development there are some goals, so what we want is that the fortresses in this park area to be used by tenants who also contribute to the goals in this area"*. The plan now in Lunetten is to find a right balance between commercial and social use of the structures, in order to make it profitable on one side and also social on the other. *"Our goal is that we make a strategy on Lunet 1,2,3 and then we balance in commercial and social organization, a balanced exploitation, with different types of tenants"*.

Peter Bos, in his paper "NDW: Implementation Leads to New Questions," highlights a critical societal question: *"In terms of society, the question is how to bring about a change in people's way of thinking. This more than anything will determine the success of the NDW. No matter how much money is invested in developing the physical landscape, if people do not acknowledge and engage in the story of the Water Line, every effort will be pointless."* From my perspective, the author seems somewhat cynical here. Even if citizens are not fully aware of the history of the line and its significance, if they choose to spend time in this green lung that has survived the rapid urbanization of the city of Utrecht, I still consider this a success of the renovation plan. The expert from the municipality seems to agree with me: *"People don't visit the place because it is a fortress but because they like to be there, then they learn about the place in another way and they become part of the story themselves"*

A crucial aspect that emerged from the interview with Vera Driessen is the absence of a new future plan. Currently, there are no concrete guidelines or long-term goals. As stated in the interview:

"Between the 70s and the 90s, the municipality bought the fortresses for a few guilders at the time, and there was also a vision in that time from secret and public spaces. In 1997, this

document was made, and it says, 'Okay, we're going to buy them, and we are going to make an organization that will oversee the restoration and use all those fortresses for social goals like recreation and other purposes.' Utrecht was very organized in restoring them and gaining money and subsidies for all those big projects. In the 00s, this idea worked pretty well, but now there is no other vision made for these fortresses, so almost 30 years later, we don't have a clear idea on how to use those spaces for civilian use. In fact, this 1997 idea is still working out."

She continued:

"What I am doing now in this organization is to make colleagues more aware of the fact that we have those fortresses. Okay, we have those places; we can use them for cultural goals, for social goals, for the wellbeing of all people, social cohesion, and all those goals, but we don't have a vision on that written. So I think it's really important that we do that, make a long-term plan."

In conclusion, the transformation of the Lunetten fortresses from military installations to vibrant community spaces highlights the complexities of balancing urban development with heritage preservation. The integration and protection of green spaces around these historical sites offers environmental and social benefits, though challenges such as accessibility and possible gentrification persist. Interviews with residents and experts reveal concerns about inclusivity, with one resident noting, *"some areas feel closed off,"* and also confirmed by Vera Driessen, *"only a few people can go and experience this place."*

Despite these efforts, a significant gap remains: no new vision plan for the fortresses has been made since 1997. This lack of a long-term strategy hampers the potential for fully integrating these spaces into the urban fabric in a way that meets contemporary needs. The parks surrounding the fortresses serve as crucial green lungs, providing recreational and ecological benefits that contribute to the well-being of Utrecht's residents. Effective management of these spaces requires a nuanced approach that considers both historical and modern needs, emphasizing stakeholder involvement and sustainable practices. The preservation of biodiversity and the careful management of natural landscapes around the fortresses exemplify the complexities of maintaining ecological integrity amidst urban pressures.

Community engagement remains crucial, as participatory processes foster social cohesion and ensure that the benefits of revitalization are equitably distributed. However, the lack of a new vision plan underscores the need for continuous, adaptive strategies to ensure these sites remain relevant and accessible. As Utrecht continues to evolve, the lessons from the Lunetten fortresses offer valuable insights into creating sustainable, inclusive, and vibrant urban spaces.

6. Conclusion

The transformation of the Lunetten fortresses from military structures to part of Utrecht's urban and cultural landscape illustrates both the achievements and weaknesses of adaptive reuse and heritage conservation. While this change has preserved significant historical sites and integrated them into the city, it raises important questions about accessibility and inclusivity. Despite efforts to harmonize the natural environment with new urban developments, the conservation of these artifacts has not adequately ensured that they are accessible to all citizens.

Reflecting on the Evolution

The Lunetten fortresses, constructed in the early 19th century as part of the New Dutch Waterline, were initially designed to defend against eastern invasions. Positioned strategically on the Houtense Vlakte, their crescent-shaped structures symbolized a sophisticated military strategy that leveraged the natural landscape for defense. However, as advancements in military technology rendered such defenses obsolete, these once critical fortifications faced potential neglect and decay.

Over the decades, a combination of structural modifications, landscape integration, and policy interventions facilitated their transformation. Reinforcements during the Cold War, the introduction of recreational spaces, and the adaptive reuse of these sites have collectively redefined their role within Utrecht. Today, these fortresses serve not only as historical monuments but also, partially, as vibrant community spaces that enhance the city's cultural, ecological, and social fabric.

The examination of the physical changes to the Lunetten fortresses revealed a complex interplay between preservation and adaptation. Structural enhancements, such as reinforced concrete bunkers, reflect attempts to maintain their defensive capabilities in response to evolving military threats. More recently, efforts to restore and repurpose these structures for civilian use have preserved their historical essence while infusing them with new life. However, as expressed by both residents and the expert from the municipality, only Lunet IV can be considered a success so far. Lunet IV stands out as being significantly more accessible and inviting than the other

fortresses. It provides inclusive spaces and social support for people with disabilities, making it a model for how historical sites can be adapted to serve contemporary social needs.

The surrounding landscape has also undergone significant changes, transitioning from purely defensive settings to multifunctional urban green spaces. This transformation has not only conserved biodiversity and green spaces but also provided the community with essential recreational areas in a highly urbanized city such as Utrecht. The integration of green spaces has created "green lungs" that offer respite from urban life and contribute to the ecological health of Utrecht. These areas serve as vital communal spaces where residents can engage in outdoor activities, fostering a sense of community and enhancing the quality of urban life.

Policy interventions, particularly the Dutch government's Nota Belvedere, have played a crucial role in guiding the adaptive reuse of these sites. The policy's principle of "*preservation through development*" underscores the symbiotic relationship between heritage conservation and urban progress. By promoting the sustainable integration of historical sites into modern urban contexts, the policy has facilitated the fortresses' evolution into vibrant cultural and recreational hubs. However, as stated by the expert from the municipality, policy documents were pivotal during the initial phases; in fact, the vision plan for the Lunetten fortresses in Utrecht was published as early as 1997. The absence of an updated vision plan has created uncertainty about future developments. This lack of a clear, current directive hinders long-term planning and the ability to secure funding and support for further improvements. A new vision plan is necessary to provide clear direction and ensure that the fortresses can continue to evolve in line with contemporary needs and values.

Community engagement in this transformation has been somewhat controversial. While the involvement of residents and stakeholders has ensured that the fortresses' revitalization aligns with community needs and aspirations, the level of accessibility and engagement varies.

Interviews revealed that the municipality does not adequately include local voices in the planning process. Although locals have their own associations and sometimes organize activities, more structured collaboration is needed to harness the full potential of community input. At the same time, private companies like Bosch & van Rijn strive to include residents in their projects, suggesting a model for how public-private partnerships can enhance community involvement. This dual approach highlights the importance of creating formal mechanisms for community

engagement, ensuring that all voices are heard and that the revitalization efforts truly reflect the needs and desires of the community.

In summary, while significant progress has been made in transforming the Lunetten fortresses, there remain areas for improvement. Updating policy frameworks to provide a clear vision for the future, along with enhancing community involvement, are critical steps to ensure that these historical structures continue to serve as valuable cultural and ecological assets within Utrecht's urban landscape.

Critical Reflections and Future Directions

Reflecting critically on the research approach, it becomes evident that while the cultural historical framework provided a comprehensive understanding of the fortresses' transformation, there are areas for improvement that could enhance the depth and breadth of insights gained.

From my work, it seems that restoration efforts in Lunetten focused primarily on managing heritage buildings and the adjacent green spaces, emphasizing the need for cost sustainability, with the aim of at least breaking even or even generating profit. However, this focus on economic sustainability does not adequately address social sustainability. While citizens express pride in these heritage sites within their neighborhood and city, their level of involvement in decision-making and access to these sites remains unsatisfactory. This situation confirms the failure of what Smith defines as an authoritative approach to heritage when dealing with urban requalification.

The decision to include an ethnographic component was crucial in highlighting these issues.

As a matter of fact, the ethnographic component reveals the current state of affairs from diverse perspectives, incorporating voices from both heritage experts and citizens—those who should benefit from these processes of renewal and integration.

Finally, the analysis of policies allowed for a broader view of various European and Dutch approaches, reflecting on the evolution of strategies adopted by institutions to integrate heritage sites into urban planning. In the case study analysis, we observed how shifts in international, national, and regional policies translate into practice, with the use of maps helping us to visually observe the transformation occurred in the area over several decades.

The combination of these three methods highlights how the evolution of the landscape and the transformation of the Lunetten fortresses have redefined their role within Utrecht's cultural landscape. Once secluded areas, today they are embedded within the Lunetten urban neighbourhood. The protection and maintenance of the fortresses as well as of the areas around them offers Utrecht's residents an interesting combination of green lungs and history. Moreover, the Unesco nomination of the site in 2021 further enhanced the importance of the site both nationally and internationally. However, while policy changes have effectively safeguarded the site and its landscape, resident involvement and accessibility in Lunetten's renewal projects remain limited, despite strong recommendations for community engagement in urban heritage renewal policies. Through the interviews, residents expressed a sense of proud toward the heritage site, however they are not satisfied with the current state due to lack of initiatives, activities and involvement. In the near future the municipality should therefore change its approach, by being more inclusive towards residents and further enhance social sustainability in the area.

To further enhance this research, adopting a more interdisciplinary methodology that incorporates perspectives from environmental science, sociology, and urban planning could provide a more holistic view of the ecological and social dimensions of heritage conservation. This approach would allow for a deeper exploration of how these fortresses interact with their natural surroundings and the urban fabric, providing a richer context for understanding their current role and future potential.

Engaging more extensively with local communities is another area where the research could be strengthened. Utilizing participatory methods such as focus groups, workshops, and surveys would yield richer and more diverse perspectives. This inclusive approach would ensure that the voices of all community members, particularly marginalized groups, are heard and considered in the revitalization process. Such engagement is crucial for fostering a sense of ownership and ensuring that the projects align with the needs and aspirations of the local population.

Moreover, conducting longitudinal studies that track changes and impacts over extended periods could better capture the dynamic nature of urban heritage sites. This long-term perspective would provide valuable insights into the sustainability and effectiveness of policies and community initiatives, revealing trends and outcomes that short-term studies might miss.

Additionally, comparative analyses of similar heritage sites in different cultural and urban contexts could provide valuable insights and best practices, allowing for the identification of common challenges and innovative solutions that could be applied across different settings.

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