



The Role of Historical Data Regarding Water Infrastructure in the Spatial Development of the Nieuwmarkt Area, Amsterdam

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Historical information is an important resource for designing and sustainably developing contemporary cities, notably ones such as Amsterdam that have long histories. The historical information is embedded in physical places and structures as well as practices; it is also found in plans and texts that are held in multiple archives. It can be difficult to connect information about the past – e.g., building materials, construction technologies, plans and proposals – to contemporary needs and themes. Access to archives is not standardized, the material is not always digitized and it is not compatible with contemporary information systems, such as BIM and GIS. Information that has been organized in the past according to the criteria and values of the past does not always relate to current systems: think of historic handwritten documents, maps or drawings that are geolocalized, historical street names or terminologies. More attention is needed to effectively link historical data to sustainable development, while protecting the heritage of our historic cities. Doing this work is crucial: the information of today is the heritage of the future.



KEY THEMES



< Fig. 1 Nieuwmarkt with the Sint Antoniespoort and the entrance of the water passage that continues underneath the Nieuwmarkt up to the Kloveniersburgwal (Source: Stadsarchief Amsterdam/Han van Gool, 1990, BMAB00007000124_008).

Introduction

Historic cities like Amsterdam face multiple challenges such as energy transition, liveability, the reconstruction of canal walls and bridges, climate adaptation. Meeting the challenges requires a new approach to future sustainable design. Public space, above ground and underground, especially needs careful attention. In the Netherlands, the City of Amsterdam is currently working on a unique integral approach. In short, this focuses on:

1. Collaboration between all relevant stakeholders on strategic long-term, financial, tactical and operational levels.
2. Innovation to establish a data-driven workflow (analysis, design, management).
3. Integration of spatial, social and cultural processes in adapting historic cities for contemporary challenges.

This proposal is part of a new way of working together in the public space. We see on a daily basis that the current way of working, with a focus on independent domains, is not appropriate. We need new integral approaches that connect stakeholders in the public space. Relevant instruments are co-financing, data-driven approaches, and sharing technical solutions. We believe that historical data will play an essential role in creating durable solutions. This integral approach is currently being used in four areas of Amsterdam, one of which is the infamous red-light district in the Nieuwmarkt district.

Case Study: Nieuwmarkt in Amsterdam

The red-light district on the west side of the Nieuwmarkt is the oldest part of Amsterdam, founded in the Middle Ages (fig.1). Until the construction of Amsterdam Centraal station in

1899, the infrastructure of this part of the city was based on water transport and was reachable from the Zuiderzee, now called IJsselmeer. Over a long period of time, the municipality of Amsterdam has shaped this area through its policies. During the Second World War, the neighborhood became the Jewish Ghetto, and that was followed by a long period of vacancy. In the 1970s the subway was constructed and many buildings were demolished. The 1980s and 1990s marked a period of rebuilding. New reconstruction activities in the Nieuwmarkt area are ongoing today. The historical elements are still distinguishable in the built environment of the area: old buildings and water infrastructure are still recognizable, but not always directly visible.

Contemporary Challenges

Current approaches to sustainable development in the Nieuwmarkt area in Amsterdam require attention to diverse factors, including geological and geomorphological factors as well as socio-economic uses. Water management plays an important role in this context.

We see three primary issues:

1. Area-specific possibilities, limitations and obstacles are determined by historical development and human interactions, soil conditions and heritage sites in situ.
2. Redevelopment of an area means the re-use of historic and natural qualities of the area, and if possible, the re-use of water infrastructure.
3. Re-use requires insights regarding the area's potential, limitations and obstacles, above ground and underground.

Understanding and exploring historical data is

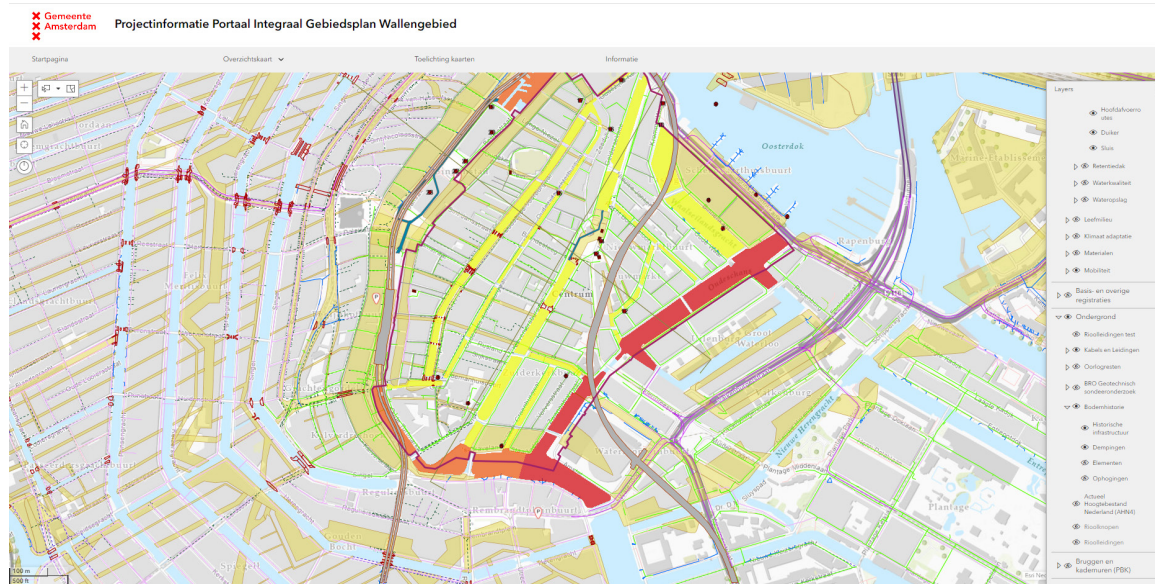


^ Fig. 2 Historical drawing of Nieuwmarkt showing a water passage underneath the Sint Antoniespoort (Source: Stadsarchief Amsterdam/Heinrich Holzmüller, KAVB00003000001).

limited by a variety of factors: access to data to start with. The re-use of data related to a specific site requires access to historical archive material that is organized according to institutions that produced the data. This means that the data is consultable in a way that is not always logical to contemporary minds. To consult archival material, you need to know which institute is responsible for the material. In many ways, this is a challenge. The physical environ-

ment develops institutional dependencies and the development phases are not parallel with the institutional developments. As a result, archival material sometimes gets disconnected from the institutional link that it relates to.

One way to consult archival material or historical data is by linked data (this means it has to stay in its original form but also be connected to other data systems). Data platforms for linked



^ Fig. 3 Amsterdam city center with the project area Wallengebied, the “red-light district,” an area where multiple challenges coincide, from water management and engineering to social transformation and heritage, and requires an integral approach by all actors in the area (Source: Wallengebied Integrated area plan, Project Information Portal, 2023).

data are ideal for creating more easily readable and editable ways of consulting historical data. Digital archives are being made more accessible. Those of the Dienst Publieke Werken (Public Works of the Municipality of Amsterdam) have been digitized to serve the Bridges and Canals program. A part of the archive has been made accessible through GIS applications via a research grant. Also, drawings of old sewage infrastructure are being compared with data about the current wastewater system to find pipes that are no longer in use.

Linked data can help relate archival material to contemporary systems such as BIM and GIS. That means you can leave the original archival documents in their specific location, but you can extract information that is relevant to contemporary builders and that allows them to understand what lies underground without digging. This is even more important in the case of underground infrastructure that is not tied to contemporary data.

Opportunities for Change (Transformation)

Successful examples of studying historical structures underground mean that city water management can be more efficient. A good example is the old lock Bijleveldschesluis underneath the Waag, in the Nieuwmarkt area. The lock dates from the fifteenth century and has been transformed into a culvert that connects the water of the Kloveniersburgwal and the Gelderse-kade underneath Nieuwmarkt square. The lock and culvert both prevent the Nieuwmarkt area from flooding in times of heavy rainfall.

Another example can be found in the thirty-three freshwater cellars under Amsterdam’s city center. The brick cellars were originally used as fresh drinking water cellars that collected the water of the Vecht. Some of the cellars contained over 200 cubic meters of water. Recently these cellars have been studied with an eye to their performing a new possible function as water reser-

voirs in periods of heavy rainfall and drought.

Other ways of using the underground infrastructure for periodic water storage also offer examples of efficient water management. A large part of the underground is occupied by artifacts that are no longer in use, for example, old sewage pipes which could provide another possible solution to the city's water storage challenge.

Lessons Learned

An integral approach is needed for the coming years to determine the best way to display historical technical data (fig. 3). Information from the past can be essential for future redevelopment on a broad range of themes. Three steps are necessary for success:

1. Organize the project in an interdisciplinary way. Take advantage of knowledge from historians, archaeologists, archivists, data specialists, and technical and water engineers who occupy different functions in science, business and government. Try to find mutual understanding through exposure and patience. In long-term projects, you must deal with different board terms, such as political appointments of limited time that are not aligned with the development periods of a city, and budgets that also expand beyond often limited budget periods.
2. Find ambassadors to convey the added value of the project you are collaborating on.
3. Accept differences and try to understand each other's language and motives and at the same time try to keep an eye on the bigger picture.

Negotiating water heritage is a study in collaboration.

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References

Riccetti, Alessandra, and Joyce van den Berg. 2020. *Werkboek: Integrale Ontwerpmethode Openbare Ruimte* [Handbook: Integral design method public space]. Amsterdam: Gemeente Amsterdam. <https://openresearch.amsterdam/nl/page/59863/deel2---werkboek>.

Water Knowledge Action Program. n.d. "Afwegen binnen het Integraal Gebiedsplan Wallengebied" [Considerations within the integrated area plan for the red-light district]. Accessed June 30, 2023. <https://www.kennisactiewater.nl/case/afwegen-binnen-het-integraal-gebiedsplan-wallengebied/>.



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