Mapping Heritage in Vienna

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Vienna's 1st municipal district is an area dense with built heritage. A public map created in Google Maps shows the location of heritage building protection. It combines open data provided by the City of Vienna and the Federal Monuments Authority. The map has two functions: first, the map holds information on the 669 individual buildings that are protected according to the Austrian Monuments Law, providing information on the individually protected buildings in five layers. Among these layers, one shows the location of these buildings without further discrimination, while another layer shows whether buildings are protected by legal presumption or by decree. Additional layers show building characteristics such as the number of storeys, original roofs and use. By clicking on a building in any layer, additional building information appears on the left-hand side of the browser window, including alternate addresses, year of construction and architect. The second function of the map is to show different legal protection areas, such as the UNESCO World Heritage site "Historic City Centre of Vienna" and the "Protected Zones" according to the Building Code for Vienna. Viewers can choose between three layers visualizing the core and buffer zones of the World Heritage site, protected zones and the ensemble "Vienna City Centre". By selecting multiple layers at once, viewers can see where areas overlap and buildings therefore enjoy triple legal protection, but can also instantly locate gaps where this is not the case. The map visualises the complex legal construct that protects the built heritage in Vienna. It allows viewers to easily identify areas with dense legal protection and in addition provides easily accessible information on listed buildings.

INTRODUCTION

Vienna's 1st municipal district is an urban centre rich in built heritage. Located at the core of today's metropolis, the 1st district's built remnants are testament to the continuing development of urban fabric for more than two millennia. Despite extensive change as well as damage inflicted during World War II, today approximately 84% of buildings are more than 100 years old (see Fig. 1).
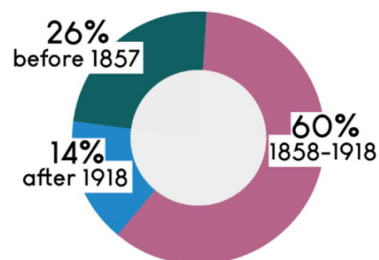

Fig. 1. Percentage of buildings by construction date in Vienna's 1st district

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During its development over 2000 years, Vienna evolved from a Celtic settlement to a Roman border town, to become the residency of the Emperors of the Roman Holy Empire and important cultural hub in the early modern period. In the middle of the 19th century Vienna was undergoing a phase of rapid growth, and the number of inhabitants rose steeply with ongoing industrialisation and subsequent urbanisation. The city centre's space was limited by the city walls and an adjacent area that was not to be built upon, the *Glacis*. The wall was originally designed to ward off potential invaders in the 17th and 18th century, but outgrew its usefulness as the need to expand and create housing soon outweighed the risk of an attack. In 1857 Emperor Franz Josef I. therefore decided for the city walls to be torn down and the Glacis area to be built upon, henceforth connecting the city centre with the surrounding districts [Franz Josef I. 1857].

The subsequent rush to construct on the newly liberated building space gave Vienna some of its most iconic buildings along the new semi-circular boulevard, the *Ringstraße*. While entire new neighbourhoods were built on the edge of the district, progress did not spare the old city centre's core. The demolition of the city walls allowed for new points of access to the centre, which in turn led to the redesign of whole streets – opening up axes through the district – and to older buildings being replaced by new ones.

Fortunately, Vienna's 1st district was only mildly damaged during World War II and few buildings had to be replaced or reconstructed. Even in the following decades, demolition of historic buildings and construction of modern structures was rare. The integrity of the historic building stock led to the city centre being inscribed on the UNESCO World Heritage List in 2001.

Despite the relatively recent inscription by UNESCO, the protection of cultural heritage has long been anchored in Austrian law. As propagated by Austrian art historian Alois Riegel at the beginning of the 20th century, a need to preserve a building's historic value was recognized. In 1923 the "Austrian Monuments Law" (DMSG) was introduced, which today still protects Austria's cultural heritage. The law defines cultural heritage as those assets whose preservation is in the public's interest.

The DMSG also stipulates that the "Federal Monuments Authority" (BDA) is tasked with the identification, listing and protection of cultural heritage. According to the DMSG any building with historical, artistic or other cultural significance must be protected if it is in the public's interest. This means that the BDA starts a process of evaluating whether this is the case. Once established, the listed status remains until it is revoked after a process initiated by application of the BDA itself. The listing status of a building is noted in the title register, and has significant limitations to building owners as any change within building substance requires permission by the BDA.

While the BDA also recognises ensembles as entities that can be protected, it is mainly concerned with the protection of individual object. Yet the functionality of a city works on a different scale and needs to consider larger entities, such as neighbourhoods and districts. In response to this demand for zonal protection, the City of Vienna introduced Schutzzonen (protected zones) in 1972, which are now legally stipulated in the Building Code for Vienna. Unlike the limitations of BDA listing, buildings within protected zones are only considered in terms of their appearance within the city scape. Proposed changes, however, need to be licensed by the city magistrate.

While change in the city is ongoing, Vienna's policy regarding cultural heritage management is also constantly developing and new issues may emerge and need to be addressed. New requirements in city planning may require the areas of protected zones to be widened but also reduced. A prominent example of this is the Heumarkt development projects.

As described above, there are three legal layers of heritage protection guarding Vienna's built heritage, each having different implications. The authors recognised the need to illustrate these layers in order to facilitate a unified understanding of heritage policy in Vienna, and to that end combined these in a readily accessible online map. This paper describes the process of how this interactive online map was created that visualises the location of built heritage.

The map is intended to facilitate the understanding of the extent of built heritage and listed buildings, as well as different parameters about them. The map provides viewers with the location of historic buildings which are protected according to the Austrian Monuments Law and also shows the extension of protection areas, such as the UNESCO "World Heritage" (WH) Site "Historic Centre of Vienna". The map can be used by interested members of the public, but also professionals working in the field of heritage policy and may be used to facilitate decision making in the future. The results of the map making process were presented as a poster at CHNT 23.

METHODOLOGY

The main goal was to create a map that can be viewed free of charge, is operating system and device independent, as well as user friendly. Google Maps was selected because it is a widely accepted standard, fulfils all previously mentioned criteria, and allows users to create custom maps without the need for additional software. While Google Maps is easy to use for those creating and viewing the map, it is somewhat limited in its function. There is no possibility for enhancing and customising the map through programming. Some viewers might require additional tools, such as adjusting the transparency of layers to create overlays. This is, unfortunately, not possible with this map.

The information included in the map is sourced from open data; the main task in creating the map was combining building data provided by the City of Vienna and the Federal Monuments Authority (BDA). Limited resources did not allow for all data to be cross-checked by the authors. The authors are aware that there is missing and faulty information, e.g. spelling inconsistencies, in the data sets, which were corrected when possible.

Two datasets were combined to create the first and mayor layer of the map "Denkmalschutz gesamt" (all listed buildings): The first dataset is the "Gebäudeinformation" [Stadt Wien 2017] provided by the City of Vienna, and includes around 1.500 buildings in the 1st district and contains additional information such as construction year and architect. The second dataset "Wien_2017" [Bundesdenkmalamt, 2017], provided by the BDA, is comprised of immovable heritage objects, including fountains, statues and tram stations in Vienna. Any objects in this dataset outside the 1st district and any objects that are not buildings were removed, resulting in 669 individual buildings considered for the base-layer of the map.

The 669 buildings identified in the BDA list were then matched to their corresponding entries in the dataset "Gebäudeinformation". Buildings may have several street addresses corresponding to entrances on more than one street, be they corner buildings or buildings that have a front and rear exit to different streets. Such alternate addresses were recorded in the map to ensure that viewers, who may not know all addresses of a specific building, can still find it on the map with the address they know.

In a next step, 669 polygons were drawn directly in Google Maps corresponding to the areas of the buildings on the BDA list. As the dataset "Gebäudeinformation" only includes point coordinates for each building, the "Baualtersplan Wien: innere Stadt" [Wehdorn et al. 2011] was consulted for establishing building borders. This hand-drawing of the building areas was necessary as the buildings delineated in Google Maps do not always correspond to the actual borders as established in the relevant BDA and City of Vienna documents.

The Google Maps base map was set to "light political", as this map includes only information on streets, building blocks, parks and rivers, while omitting most other, distracting information. Because it is less cluttered than the standard Google map, it helps viewers to focus on the essential information: the historic buildings. The language of the map is set to German, as the authors anticipate that most interested viewers will be German speakers.

One drawback of Google Maps is the limited ability to edit the polygon's additional information. As the aim of the map was to provide easy access to additional building information on BDA listed buildings, however, the software QGIS was used to combine spatial data of the polygons exported from Google Maps as KML files, with the building data as CSV files. A KML file created with QGIS was then imported back into Google Maps, thus displaying the relevant additional information directly in Google Maps.

When viewers select a polygon on the map, the following building information appears in a window on the left-hand side of the map: Name (identical to first street address), descript_2 (alternate street addresses), OBJECTID (ID in the dataset "Gebäudeinformation" by the City of Vienna), OBJECTID_B (ID in the dataset "Wien_2017" by BDA), STATUS (legal basis for listing), GESCH_ANZ (number of storeys), L_NUTZUNG (current use), BAUJAHR (year of construction), HA_NAME (house name), ARCHITEKT (architect), L_BAUTYP (building type), ORIG_PARZ (original allotment), ORIG_FASS (original façade), ORIG_KERN (original core), ORIG_FENST (original windows), ORIG_DACH (original roof).

RESULTS

The resulting map "Gebautes Erbe Wien 1010" contains ten layers. Eight of these were created to illustrate aspects of built heritage, one layer – "Bezirksgrenze I." – shows the district border, while one layer contains the Base map, which shows topography. Among the eight layers illustrating aspects of built heritage, five layers inform viewers on

individually listed buildings according to the DMSG: "Denkmalschutz gesamt" (all listed buildings), "Rechtliche Grundlage" (legal basis), "Geschoßanzahl" (number of storeys), "Dächer" (roofs) and "Nutzung" (use). These layers are to be viewed separately, one at a time.

The remaining three layers give information on protection areas: "Ensemble Wien Innere Stadt" (ensemble Vienna city centre), "Weltkulturerbe" (World Heritage) and "Keine Schutzzone" (not protection zone). These layers are to be viewed in combination with each other and in combination with "Denkmalschutz gesamt" to illustrate where protection areas overlap.

Individual building protection

The map layer "Denkmalschutz gesamt" shows 669 polygons representing individually listed buildings according to the DMSG, as found in the BDA dataset "Wien_2017". The polygons are coloured in dark green, providing a strong contrast to the base map (see Fig. 2). When clicking on a polygon, additional building information appears on the left-hand side of the map.
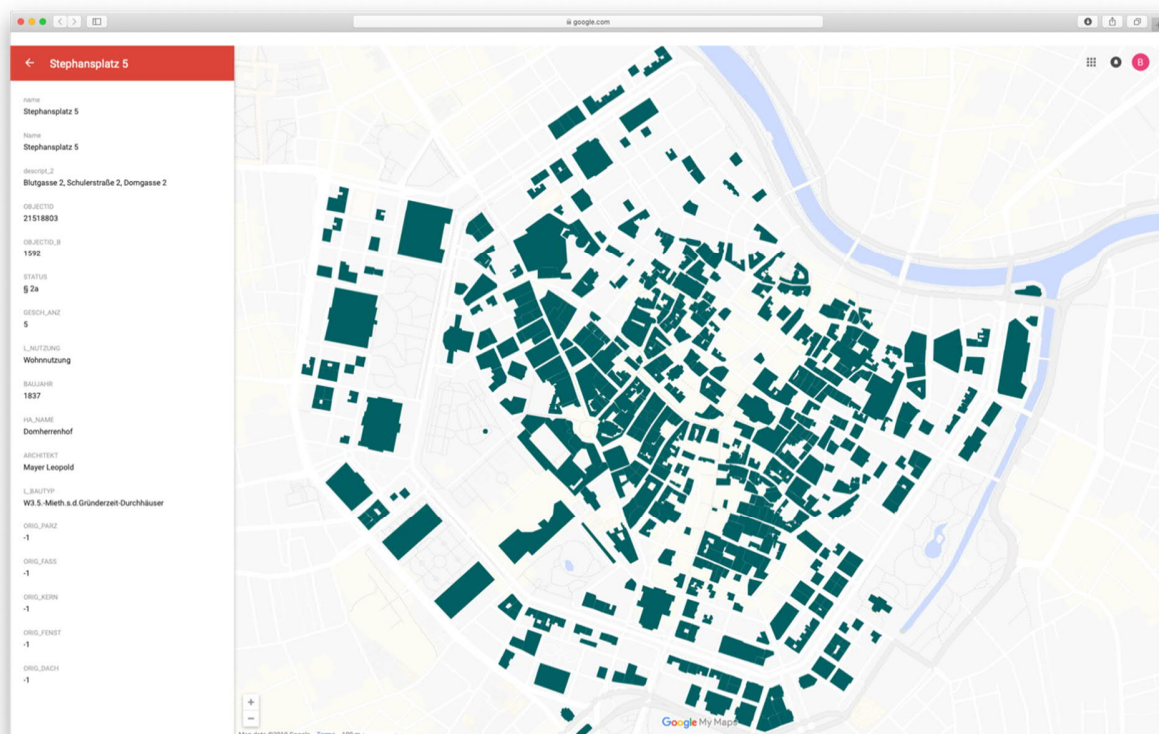

Fig. 2. Buildings on the BDA list (dark green) in Vienna's 1st district, (on the left) building information for the selected polygon Stephansplatz 5 *(Map data © Google Maps)*

Listed buildings account for around 55 % of all buildings in the district and are fairly evenly distributed. Noticeable gaps of listed buildings in built-up areas are located just north of the very centre of the district, in the north-east corner towards the Danube canal and also further along downstream the Danube canal. The latter area was completely destroyed during World War II and later rebuilt, which may explain the lack of listed buildings. The large empty area east of the centre (see Fig. 2), on the other hand, is comprised of several parks and public squares.

Four additional layers highlight several aspects of building information of listed buildings. Fig. 3a shows the layer Rechtliche Grundlage, indicating the legal basis for BDA listing. Up until 2009, buildings that were majorly owned by public or religious insitutions were listed by legal presumption (light green polygons), while privately owned buildings were listed by decree (blue). Since 2009, listing can only follow a decree by the BDA. The spatial distribution of either legal basis is fairly even across the district.

Fig. 3b shows the layer "Geschoßanzahl" (number of storeys), in which polygons are coloured differently according to the number of storeys of the corresponding building. The majority of buildings, 558, consists of 4 to 6 storeys, the most common number of storeys is 5 (purple) with 264 buildings. Only 20 buildings have 7 storeys or more (green palette), and only 58 buildings have 3 storeys or less. For 33 of the buildings, no information on number of storeys was included in the data; these are mostly churches or theatres where different building parts have different numbers of storeys. The spatial distribution of numbers of storeys is fairly even.

Fig. 3c shows the layer "Dächer" (roofs), which illustrates whether buildings still have their original roof (red polygons) or whether their roof was replaced (dark blue polygons). There are 359 original roofs compared to 309 not-original ones (with only one building lacking this information in the data set), and their spatial distribution is even. As roofs are suceptible to damage over time, by fire or water, it is noteworthy that so many original roofs still exist.

Fig. 3d shows the layer "Nutzung" (use), where polygons are coloured according to the buildings' current use. Light green polygons indicate commercial use and are located predominantly along the shopping streets, Kärnter Straße, Graben and also Opernring. Several large public institutions coloured in red can be found towards the east of the centre, clustered around the Imperial Palace complex. A slightly denser concentration of buildings with housing use, coloured in purple, can be found west of the centre.
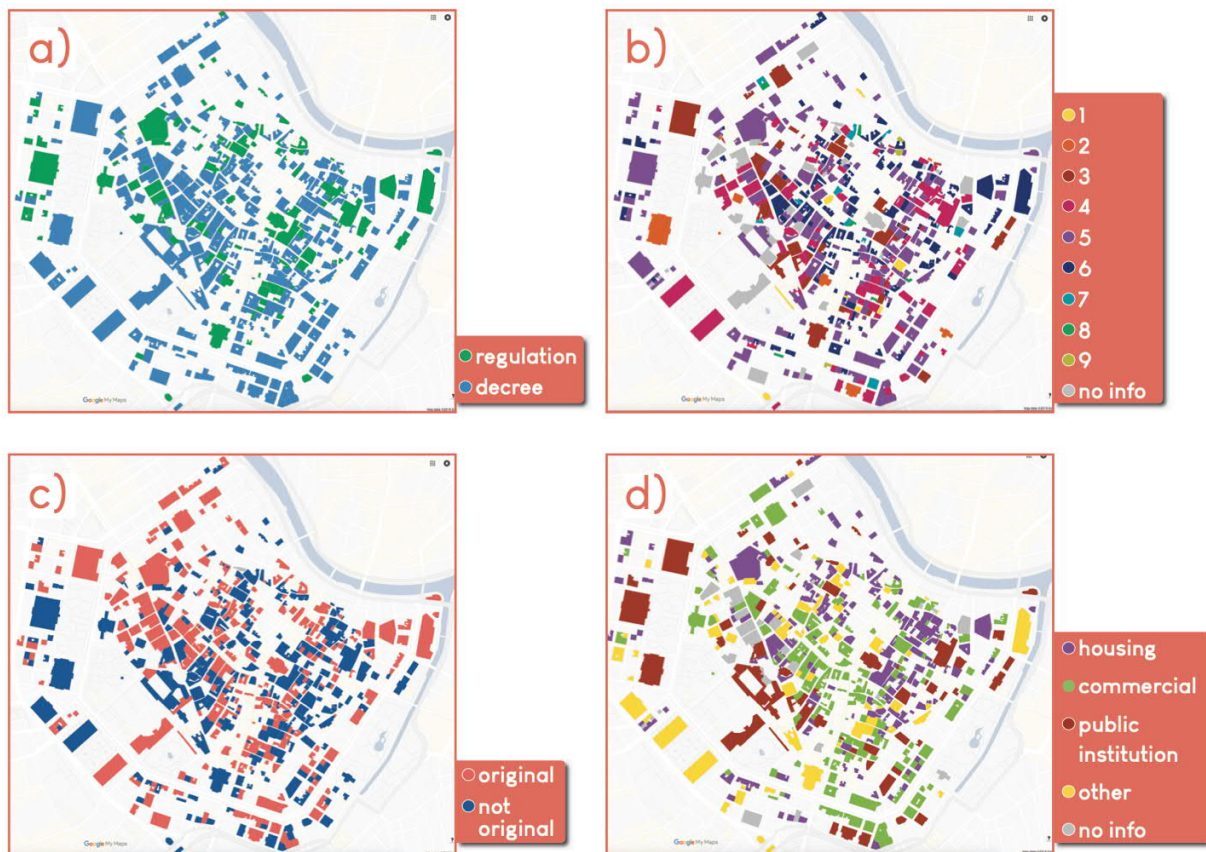

Fig. 3. Map layers: a) legal basis for BDA listing, b) number of storeys, c) original roof and d) type of use (Map data © Google Maps)

Protection areas

In addition to individually protected buildings, laws that concern built heritage in Vienna also define three legally distinct protection areas. These are included in the map in the following three separate layers: "Ensemble Wien Innere Stadt" (ensemble Vienna city centre), "Weltkulturerbe" (World Heritage) and "Schutzzone" (protected zone).

For easier legibility, the map also contains an additional layer which only contains the 1st district's border, which when selected, appears as a red line.

The first legal protection area is the "Ensemble Wien Innere Stadt" (ensemble Vienna city centre), its borders are defined by the BDA [Bundesdenkmalamt, n.d.] and its legal basis is the Austrian Monuments Law. In this layer, a green polygon shows the extent of the ensemble, which covers almost the entire 1st district. When combined with the layer Denkmalschutz gesamt (all listed buildings), see Fig. 4a, it can be seen that the area of the ensemble does not cover all of the 1st district's BDA listed buildings (dark green). Surprisingly, there are several listed buildings on the outer side of the Ringstraßen boulevard which are not part of the ensemble.

The second legal protection area is the UNESCO WH Site Historic City Centre of Vienna [Stadt Wien 2012]. The layer "Weltkulturerbe" (World Heritage) visualises the extent of the core (purple) and buffer zone (light pink). When this layer is selected together with the layer showing the BDA ensemble (Fig. 4b), viewers will notice a large overlapping area of the core zone and the ensemble (dark purple). Both protection areas exclude a small area along the Danube canal in the north-east of the district, where no individually listed buildings are located either.

The third legal protection area is the "Schutzzone" (protected zone) according to §7 of the Building Code for Vienna. It covers the entire 1st district, but does not fully correspond to the extent of the core zone of the WH site. In order to highlight these discrepancies, the layer "Keine Schutzzone" (no protection zone) was created. Here, light grey polygons correspond to the areas which are part of the WH site but not part of a protected zone. When selected together with the layer showing the WH site (Fig. 4c), viewers will notice several grey areas within the buffer zone, especially along the Danube channel. Two controversially discussed grey areas are located in the 3rd district, east of the centre: the area of the new train station Wien Mitte/Landstraße with adjacent high rise buildings in the puffer zone and the more recently excluded area of the Heumarkt development project within the core zone. While the former project was realised in the early 2000s despite concerns of its negative impact on the WH site, the latter project is still being fervently discussed.

Fig. 4. a) BDA ensemble (light green) individual buildings on BDA list (dark green), b) UNESCO WH site overlap with BDA ensemble (dark purple), c) areas within WH site not part of protected zone (light grey) (Map data © Google Maps)

CONCLUSION

This paper describes the process of how a map visualising the built heritage in Vienna's 1st district was created. The resulting map "Gebautes Erbe Wien 1010" is based completely on open data and is accessible online to anyone with the link[1]. The map provides interested viewers easy access to information on the location of individual buildings protected by the Austrian Monuments Law and building information collected by the City of Vienna. In addition, by adding layers to the map that illustrate different protection areas, it is possible to instantly see overlapping areas or gaps in zonal protection.

The combination of individual heritage buildings and zonal protection is unique to this map. Other maps, such as, for instance, the Kunstkataster Tirol [Land Tirol 2019] or Historic Wales [Historic Wales 2019] provide point locations of historic buildings, yet do not provide to information on protected zones. While the additional information on each asset in either map is very detailed, the maps are more difficult to use than the map of Vienna presented here.

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[1] https://tinyurl.com/y7pesvwo

The map presented here is accessible on any web-enabled device. This means that interested users can reference the map while walking through the city centre. Unlike in other cities, none of Vienna's protection zones or individual listings is marked on the actual houses or street signs, hence interested visitors and locals alike cannot know whether a building is legally protected. The map provides a means to connect vital information of a building's legal status to its physical form.

Combining all layers of heritage policy, the map may also facilitate the understanding of the discourse on controversial building projects in the city centre. The map is designed to encourage interested viewers to enhance their knowledge of the historic building stock in Vienna, and may be used by interested members of the public, researchers and policy makers alike.

REFERENCES

Bundesdenkmalamt. n.d. Ensemble Wien I, Innere Stadt. Retrieved from: https://bda.gv.at/fileadmin/Dokumente/bda.gv.at/Publikationen/Denkmalverzeichnis/Wien/Wien_I_Innere_Stadt_Ensemble.pdf on 14.09.2017.

Bundesdenkmalamt. 2017. Denkmalliste Wien. Unbewegliche und archäologische Denkmale unter Denkmalschutz 2017. Retrieved from: https://bda.gv.at/de/denkmalverzeichnis/ on 14.09.2017.

Franz Josef I. 1857. *Wiener Telegraf* 297 (1857, December 29). Wien.

Stadt Wien. 2012. Weltkulturerbe Wien. Retrieved from: https://www.data.gv.at/katalog/dataset/12426052-8803-4deb-8c89-9e78785f7dd2 on 14.09.2017.

Stadt Wien. 2017. Gebäudeinformation Standorte Wien. Retrieved from: https://www.data.gv.at/katalog/dataset/7a8aae59-71a4-4500-b38b-bdf15c7f627f on 14.09.2017.

Historic Wales. 2019. "Historic Wales". Retrieved from: https://historicwales.gov.uk/#zoom=0&lat=300000&lon=258000&layers=BFFFFFTFFTTT on June 19, 2019.

Land Tirol. 2019. "Kulturkataster Tirol". Retrieved from: https://maps.tirol.gv.at/tirisMaps/synserver?project=tmap_master&user=guest&view=sport_kunst on June 19, 2019.

Manfred Wehdorn, Günther Buchinger, Ludwig Varga, and Marion Schwarz, eds. 2011. *Baualtersplan Wien: innere Stadt*. Wien: Freytag & Berndt.