Enhancing resilience in a post-industrial city through the urban regeneration of the downtown district. A case study of part of downtown Lodz called Nowa Dzielnica

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Abstract. Lodz is a post-industrial city in central Poland, the third largest in terms of population and with the largest area of downtown districts in the country. The regeneration of historical districts is one of the main challenges of the local urban policy here, as in many other post-industrial cities. Urban regeneration is understood as cohesive changes implemented in terms of social, economic and spatial conditions on degraded areas, according to mechanisms introduced by the Urban Renewal Act. Another consideration is climate change, which requires an in-depth approach to design objectives so that they include certain solutions increasing the city’s resilience to climatic events. In accordance with the European Union’s policy, in 2013, the Polish Council of Ministers adopted the Strategic Adaptation Plan for sectors and areas sensitive to climate changes until 2020, looking forward to 2030. The implementation of this plan was entrusted to the Ministry of the Environment, in partnership with 44 cities with a population of over 100,000 residents, including Lodz. The city’s adaptation plan to climate changes until 2030 indicates that the most vulnerable areas of the city are those of high-intensity residential development. These areas are particularly vulnerable to the phenomena of urban heat islands, urban flooding, storms, and smog. The article shows the planning assumptions for the part of the centre called Nowa Dzielnica (New District). It is an interesting example of implementing local spatial policy at district scale, but also on a much larger scale than usually adopted in local plans. The Nowa Dzielnica downtown section was described in a sequence of four local land use plans. This constitutes an example of spatial management at local government level, which may define the direction of changes for downtown districts in other post-industrial cities. It serves as a good example of implementing changes for centres where both urban regeneration and resilience urban planning constitute important elements of urban policy.

1. Introduction
Lodz is a post-industrial city in central Poland, the third largest in terms of population, and with the largest area of downtown district in the country. In the historic heart of the city, there are obvious traces of its former industrial power [1], [2] with precious historic tenement houses, post-industrial building complexes, grand villas and palaces of factory owners. Still, the downtown area has not been modernised for many decades and the number of residents there has been decreasing dramatically (Figure 1). One of the main challenges for urban policy in Lodz, implemented through the “Back
to the Centre” project, is to improve the quality of space and life in its historic heart\(^1\) [3]. The local authorities have already implemented area revitalisation projects on almost 150 ha in the centre of Lodz, for which they have obtained the largest EU funding in the country. However, many of these valuable buildings and areas still need regeneration and spatial measures to help preserve their cultural heritage, increase investment opportunities and contribute to the revitalisation of this part of the city. This article discusses the planning assumptions for one of the historic districts of Lodz called Nowa Dzielnica, which is currently subject to changes in the land use plan as well as functional improvements that are set out and established under local law. The article shows change planning on a district scale regarding downtown Lodz, taking into account the principles of urban regeneration and resilience urban planning.

![Figure 1](image.png)

**Figure 1.** Location of Nowa Dzielnica in the country, city and downtown zone. **A.** Lodz’s location in Poland; **B.** The metropolitan area of Lodz. **C.** Nowa Dzielnica against the background of the metropolitan area. *Source: own study.*

2. **Theoretical section**

Improving the quality of life in city centres is one of the main challenges tackled in the European Union Regional Policy \(^2\) [4]. Planning for change in intensively urbanised areas with historic values requires a broad view of spatial, social and economic issues. The implementing rules for the urban regeneration of degraded areas in Poland are set out in the Urban Renewal Act, introduced to the Polish legal system in 2015 \(^5\). However, in times of increasing climate change, it is becoming ever more important to link urban regeneration processes with measures to ensure the resilience of cities to actual and anticipated climate changes. According to the EU policy, preventing the effects of climate change is one of the most pressing planning challenges. The new EU Strategy on Adaptation to Climate Change indicates that climate change is happening today, so we have to build a more resilient tomorrow \(^6\).\(^3\) The National Urban Policy defines the measures towards the urban regeneration of downtown structures, along with programmes increasing the city's resilience to climate change as very important guidelines in urban policy \(^7\). In Poland in 2013, the Council of Ministers adopted the Strategic Adaptation Plan for sectors and areas vulnerable to climate change until 2020, with an outlook to 2030 \(^8\). The implementation of this plan is being handled by the Ministry of Environment and its partners are 44 cities with populations of over 100,000, including Lodz. The climate change adaptation plan for Lodz, adopted in 2018, states that intensively developed residential areas are particularly sensitive to climate impacts \(^9\). These include the densely

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\(^1\) The implementation of the “Back to the Centre” spatial policy was set out in the document of the Spatial Development Conditions and Directions for Lodz, adopted by the City Council in 2018.

\(^2\) The importance of urban ecosystem efficiency is described in the European regional policy “Cities for future”, in force since 2011.

\(^3\) *Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate Change* from 2021.
built-up historic downtown parts of large cities. Lodz’s urban policy identifies improving the quality of life in the city centre as one of its main challenges. Spatial policies for the downtown districts are defined by neighbourhood-wide programmes [10-14]. One such project is the sequence of local land use plans being drawn up for the Nowa Dzielnica area.

3. Spatial and functional conditions

3.1. Historical background

Nowa Dzielnica (New Quarter) is an area of the city established in 1840 as part of the enlargement of the dynamically developing textile industry centre – Lodz. The town was enlarged by adding the area outside its eastern border; Nowa Dzielnica was created, with Główna Street as its transport axis. The spatial arrangement resulted from the simple layout of the neighbouring handicraft settlements. Initially, building plots were laid out in the western and southern parts of the district. In the eastern, reserve, part was intended as allotment gardens for the new settlers. The universal layout and size of the building plots were intended to enable the creation of a metropolitan residential area. Hence, within the study area there is a clear variation in the size of plots, from small with historic housing to extensive, often undeveloped, post-industrial plots. The railway was an important element in Nowa Dzielnica’s development. The textile industry began to drive the city’s growth, but over time the lack of convenient transport became a problem. In the middle of the 19th century, efforts were made to connect the town to the Warsaw-Vienna Railway, which had been established just over a decade earlier. The construction of the railway line began in 1865, and just three years later the first trains set off from the Lodz Fabryczna station to Koluszki. Nowa Dzielnica became an area located between the main traffic route and the only railway line in the city (Figure 2).

![Figure 2](image-url)

**Figure 2.** A – Nowa Dzielnica against the background of the city from 1840. B – Historical background to the development of Nowa Dzielnica. Source: own study based on M. Koter 1969.

3.2. Current conditions – studies of the spatial potential of the district

3.2.1. Development structure. Nowa Dzielnica is part of the historically shaped downtown; it has valuable cultural values and adjacent to major developments in the city centre. This area is located next to the main communication node in the city – the multimodal node – directly bordering the New Centre of Lodz – an area intended for new investments, in particular service, business and cultural functions. It also has the advantage of being in direct proximity to three large city parks, which are the starting point for building a green network of walkways and links for pedestrians and cyclists. One advantage that Nowa Dzielnica has is the existing functional diversity of the overall layout and a significant degree of “infinity” in the fabric of the city. Today, these features represent a potential that can be used to create new spatial value and a new quality of use. In addition,
the uniform height of buildings located in the discussed area is particularly valuable, as for the most part it fits in with the historical structure of the development. It is also an area of great cultural value, where many historically significant buildings have been preserved, with well-maintained nineteenth-century complexes of post-industrial buildings, some villas belonging to factory owners and whole systems of frontage buildings. In total, there are 15 buildings protected by the Historic Register and over 100 buildings listed in the Municipal Historic Register.

Despite the potential identified above, Nowa Dzielnica requires urgent spatial intervention on a number of levels. Changes need to be implemented not only in terms of urban regeneration transformations, but also in terms of increasing the city's resilience to environmental risks arising from climate change. The whole district is an area classified by city policy as being particularly sensitive, because it contains a high density of downtown residential blocks. The process of regeneration and adaptation of the urban fabric must cover several basic issues, in particular increasing the quality of space, protecting and replenishing urban ecosystems, raising the number of citygenic functions and activating the local community. Nowa Dzielnica is an area with multiple vulnerabilities to climate change. The most troublesome are the fragmentation of spatial structures, the unsuitability of the urban fabric for new functions, the inefficiency of water and energy management and the lack of a system of green spaces.

3.2.2. Transport system. The district's traffic inefficiencies are heavily influenced by its morphology, resulting from the history of the place, in particular the urban quarters based on a grid with large dimensions, which results in an undersized street layout that is not pedestrian friendly. The subdivision of the spatial structure largely replicates the historical layout of the industrial district from the 19th century. Quarters of excessive size contribute to the creation of inaccessible and often unused islands in the internal structure, contributing to the district's considerable lack of ability to adapt to climate change. This lack of accessibility and connectivity within the quarters hinders their use for new functions and results in a large number of vacant real properties and unused areas, as well as the fragmentation of the spatial and functional structure. The original layout of the public space is now aided by regular road crossings in a meridian direction, but the east-west links are missing. A comparison of the road layout of other European cities with the contemporary street grid in Nowa Dzielnica (Figure 3) shows that its density is low and is completely unsuited to pedestrian use. Such long distances between street intersections are convenient only for vehicular traffic. This has a negative impact on the functioning of the neighbourhood and the quality of life.

![Figure 3. The Nowa Dzielnica street grid compared to the layout of other European cities. A – Paris. B – Vienna. Source: MPU in Lodz.](image)

The road system lacks a clear traffic hierarchy, mixes inter-district, local and commuter transport for cars, without exclusive areas reserved only for people. As a result, the usable quality of public spaces decreases and causes poor traffic efficiency, thereby increasing CO2 production. The fragmentation of the transport system is also a problem. At present, the district constitutes a “road
link” between Piłsudskiego Street, which is a collector street at its southern border, and the New Centre, i.e. the city's developing business district to the north. Scheibler Avenue, a newly built main road has no continuation from the north, and there is no clear channelling of car traffic within the district. Eventually, vehicular traffic pours into the narrow 19th century streets, causing noise, pollution and obstruction to pedestrians. The quality of public spaces is also low due to their form of use and the lack of greenery in the streets (Figure 4).

![Figure 4. Impacts of neighbouring areas on the Nowa Dzielnica district. Source: own study.](image)

3.2.3. Generally accessible spaces. The main deficiencies of public spaces in the Nowa Dzielnica district include the limited greenery and its poor quality. The green areas are fragmented, isolated and unorganised. There is no apparent system of pedestrian links enriched with greenery and a visible lack of park spaces with a recreational function. The fragmentation of links in the city's structure of greenery and the lack of developed blue-green framework systems are pointed out as an apparent factor of the vulnerability to climate change. Dense development with little urban green space and water is susceptible to the Urban Heat Island effect, which will continue as climate change intensifies. The small number of public spaces is also a problem. The district has no “heart”. Historically, this was the town square – Rynek Wodny – which, was cut through by Piłsudskiego Avenue in the 1970s and completely lost its role as a public space. At present, instead of being a resident-friendly pedestrian space, it is a section of a heavily trafficked arterial road and a vast concreted-over car park. The transformation of the 1970s also changed the spatial perception of the square, introducing variable height proportions of the buildings and a completely different method of use.

4. Transformation directions and operational activities

4.1. Purpose of the changes
Planning for the changes to the New Dzielnica district began in 2015 with the development of an operational programme for the transformation of the district. It is currently being transformed into an area governed by local law according to the local land use plan. The objective of the measures was to carry out revitalisation and to increase the area's adaptability to changing environmental conditions, and ultimately to improve the efficiency of spatial and functional connections between the elements of the urban system. The planning documents assume the introduction of efficient transport organisation, improving the quality of urban infrastructure, including improved access to the sewage system and to the gas network as an alternative to fossil fuels.

A more rational use of the existing space within the quarters was also considered important. A coherent layout of public space with a high proportion of urban greenery was introduced
and extended to previously unused areas of post-factory buildings and urban wasteland. Another measure was to increase efficiency by making more effective use of existing resources, in particular to achieve better capacity of the transport system, to improve the availability of cycling paths, to increase the proportion of dedicated space for pedestrians, to make use of existing factory buildings, to improve energy efficiency by implementing renovations and to reduce air pollution.

4.2. Hierarchy and quality of movement in public spaces
Planning for the district transformation started with changes to the transport system. The primary objective was to improve the traffic flow from the New Centre of Lodz (located to the north) and to connect it to the primary collector road system. This channelling of the flow of vehicles has made it possible to solve the problem of uncontrolled “spreading” of vehicles along all the streets of Nowa Dzielnica. The realignment of the road system, enabled transit traffic to be channelled and provided an opportunity to transform the remaining roads. The plan is to change the cross-section of the streets, redefine their functional form and introduce greenery and street furniture (Figure 5).

Figure 5. Planning for the district transformation started with changes to the transport system. A – The existing road grid in the Nowa Dzielnica district. B – The designed layout of collective routes. C – The local traffic system. D – The arrangement of access traffic. E – The system of public green spaces. F – The layout of public spaces. Source: MPU in Lodz.

The planned changes also concerned the layout of public areas. A new system of spaces (mainly running east-west) was proposed in the form of green passages, pedestrian-vehicle routes and squares designated on the basis of undeveloped or underutilised plots within the quarters. This made it possible to connect the entire district via low traffic access roads and to introduce separate pedestrian traffic. The layout has been designed in such a way as to make it possible to achieve the desired “quieting” of the district and to shorten the access routes to the most important services and public buildings. The designed new pedestrian and pedestrian-vehicle routes have created a system of passageways enriched with plenty of greenery. Completely different functional cross-sections have been proposed for the access roads, introducing different priorities and allowing the introduction of rows of trees in the public space. Increasing the area of green space will ultimately reduce the temperature of the densely built-up area. The new rows of trees will help to reduce the Urban Heat Island effect and improve the microclimate of the narrow streets. The form of ‘wooners’, also known as ‘living streets’ or ‘city courtyards’, made it possible to create access to existing building plots, while allowing the streets to be transformed into human-friendly spaces. The listed buildings, if there was a valuable tree stock around, were integrated into the system of inter-quarter connections, making it possible to include the valuable buildings into the public space and give them proper spatial exposure.
4.3. Building and nature absorption

The project’s activities changed the balance between the building absorption capacity of the neighbourhood and the amount of public space, especially those with natural values. The aim was to achieve a space with a high degree of usability and a good quality of life. It was assumed that the scale of the district would be maintained. The average height of the existing buildings, largely as a result of historical conditions, does not currently exceed 18m. This is a scale that can be considered as human-friendly, as it allows a proper feel for the surroundings and shapes appropriate to the street proportions. The exceptions to this rule are individual residential buildings constructed in the 1970s. The design principles respected the existing heritage and called for continuity and additions fitting in with the existing urban fabric. The designed height should not exceed 21m, with point heights permitted where justified compositionally. Such conditions will help to preserve the character of the district in the future, which fits in well with the city as a whole, and does not intensify the building absorption points in the city (Figure 6).

Figure 6. Connections inside city quarters. A – New pedestrian and road links with a high proportion of green space. B – New investment plots. C – A mock-up of connections in the city structure on a section of Nowa Dzielnica. Source: MPU in Lodz.

The planned spatial changes envisaged the creation of a new district centre. Currently the place of social activity is the local market, an open-air trading place with a haphazard spatial form. In the course of defining the spatial changes, negotiations were held with the owners of the abandoned historical post-industrial hall next door, due to the planned relocation of the trading activities. The “market square” function was indicated for possible relocation into the existing old shed halls of the nearby Jarocinski factory, thereby freeing up space which could then be designated to become a district park, located in the centre of the district, incorporating already existing trees. (Figure 7).

Figure 7. Layout of public urban greenery elements. A – Status at the beginning of the revitalisation process. B – Status of planned public green areas in Nowa Dzielnica. Source: MPU in Lodz.

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4 The complex of post-factory buildings at 28/30 Targowa Street.
4.4. Local law, the implementation process
The implementation activities were preceded by the development of a transformation programme for the whole district. The Municipal Urban Planning Studio in Lodz identified priorities for operational activities and defined the necessary directions of spatial and functional changes, along with those involving the real estate management system. The area was divided into four sectors for which programming and planning work has been carried out, for two of which local land use plans have already been implemented.

Figure 8. Status before (A and B) and after introducing spatial changes (A1, B1, B2). A – Squares at the junction of Tuwima and Dowborczyków streets. B – Tuwima Street. Source: A. Lipińska.

The district is slowly changing its appearance. Public sector actions, particularly linear changes to the quality of streets and pedestrian routes, as well as private actions affecting individual buildings or clusters of buildings have contributed to this. Since 2018, the city has been carrying out revitalisation processes in the downtown area, improving the quality of street spaces and pedestrian routes, but also introducing new social functions into the city's fabric [11]. A process of change is also taking place in the Nowa Dzielnica area. Tuwima Street has already undergone a metamorphosis, with traffic-calming solutions and new planting of trees and bushes introduced (Figure 8). Green squares have also been created to order the space in the corners of the quarters. Individual urban facilities are also being renovated. The city's activities have led to a synergy effect in the form of private initiatives. Individual historical buildings and parts of historical complexes are slowly regaining their splendour, and the layout of street frontages is slowly changing. For several years now, the Social Housing Association is also involved in the development of new council housing on city-owned land, with the necessary technical infrastructure.

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5 Squares at the corners of Tuwima and Targowa Streets and Tuwima and Dowborczyków Streets
6 Municipal office building with social work facilities at 35 Tuwima Street, Day Care Centre at 33 Tuwima Street, creative workshops in the building at 52 Tuwima Street, Public Library at 46 Tuwima Street.
7 Spatial metamorphosis of the former Teodor Meyerhoff Factory (Dowborczyków 21), renovation of the Maurycy Tauman Factory (Dowborczyków 8), renovation of historical buildings of the Lodz Gasworks (Targowa 18).
8 Municipal buildings - 30 Wysoka Street, 98 Nawrot Street, 101/103 Przędzalniana Street.
Figure 9. Spatial conditions. A – A physical model of the space transformation of Nowa Dzielnica. B – Extract from the findings of the current local development plan. Source: MPU in Lodz.

5. Conclusions
Spatial planning in an era of increasing climate change faces new challenges. The changes visible in the environment have shone a new light on spatial planning in urbanised structures. In Lodz, one of the main challenges is to implement transformations for the densely urbanised inner city districts, as it is the city centre that is most exposed to increased problems related to climate change. The city currently has several urban programmes for the downtown area, which are introducing spatial changes on a neighbourhood scale. Many projects are already being implemented and the directions of change include urban regeneration and resilience urban planning [15].

The article shows the main design considerations for one of the historic districts – Nowa Dzielnica. The draft local law provides for the revitalisation of inner-city structures while preserving their historic identity. At the same time, the plans aim to improve the city's resilience to climate change. The assumed directions eliminate the fragmentation of urban structures, activate wastelands located within large historical quarters, adapt the urban structure to new functions, improve the efficiency of water and energy management services, and use existing resources, thereby increasing their efficiency. The planned transformations are aimed at reorganising the spatial layout of the entire district by creating better accessibility to the interiors of the large historic quarters, creating a coherent system of pedestrian-accessible spaces with plenty of urban greenery, improving the condition of the buildings and the technical infrastructure, and reusing degraded areas for new functions.

The implementation of the planned changes is expected to ensure that the environmental vulnerability of this part of the city is reduced. Implementing the objectives will also show that revitalisation programmes can become effective tools for preventing the negative consequences caused by climate change. Strengthening the links between regeneration and planning urban resilience is essential to ensure the long-term effect of improving the quality of life in degraded areas. The link between urban regeneration and the development of urban resilience to climate change fits in with ongoing European, national and urban policies (Figure 9).

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