

# Urban Planning and Greening Practices: A Case For Neighborhood Development in a Typical Urban Area

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**Abstract:** The work that follows aims at evaluating the urban area/neighborhood of “Agios Konstantinos” in the city of Larissa to the extent that it meets the criteria of green-sustainable design, as these criteria are included in the LEED-Neighborhood Development system methodology. The above methodology encodes the most important elements for green urban planning and provides a quantitative assessment system with key axes those of “smart location and connectivity”, “neighborhood model and plan” and “green infrastructure and buildings”. Nowadays, there is an ongoing debate on urban space and its problems. All urban elements, such as those of the built-structured environment, its open-public areas and its natural elements formulate the urban plot. At the same time, human activities greatly affect both the plot and the living conditions. Environmental issues are often disregarded in urban space and its planning process with damaging effects on cities and, more general, on urban settlements. The advantages and benefits of formally including environmental considerations in urban planning and integrating them into urban development strategies are many, as two of the most important “urban problems” are those of the gradual deterioration and degradation of the area’s microclima and the excessive consumption of energy resources.

**Key words:** Green neighborhood development, greening cities, LEED methodology, urban planning.

## 1. Introduction

Green neighborhoods are an integral part of the solution to the environmental challenges facing the planet [1]. Taking into consideration that human population has increased exponentially in the past 60 years, from about 2.5 billion in 1950 to more than 7 billion today, the above challenges are especially acute in cities, which also face issues like food security, economic competitiveness, and fiscal austerity. More than half of the world’s population now lives in urban rather than rural areas, and the urban share is predicted by the United Nations to rise to 70% by 2050, with the emergence of megacities of 10 million to 20 million people [2]. Rapid urbanization and natural resource stresses will significantly shape urban redevelopment and greenfield growth in the decades ahead, and the problems must be effectively

addressed if communities are to become more sustainable [3].

The Leadership in Energy and Environmental Design (LEED) rating system recognizes of those problems, coupled with awareness that the design and construction industry already have the expertise, tools, and technology to transform buildings and urban space and make significant advances toward a sustainable planet. LEED projects throughout the world have demonstrated the benefits of taking a green design approach that reduces the environmental harms of buildings and restores the balance of natural systems [4]. The LEED-Neighborhood System encodes the most important elements for green urban planning and provides a quantitative assessment system with key axes and modules for: “smart location and connectivity”, “neighborhood model and plan” and “green infrastructure and buildings”. The key role of the system is to evaluate new residential developments. It can also serve as a guide for environmental interventions at city level based on the

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following process: First, an assessment of the area according to the criteria of the system. Second, an identification of those criteria that could be improved. Third, a number of proposals for improvement [5].

The following work aims at assessing the neighborhood of “Agios Konstantinos” in the city of Larissa to the extent that it meets the criteria of green-sustainable planning and development, as these are included and developed in the LEED-Neighborhood Development system.

The study area is a typical and traditional urban area of the city of Larissa, characterized by the usual problems of Greek cities, such as dense and anarchic construction, narrow roads, absence of open-green spaces, complete absence of green infrastructure and buildings, incomplete tree planting and problematic traffic and mobility for both pedestrians and vehicles. However, it is also a neighborhood with special and autonomous characteristics, as it is defined by strong transportation axes, which create a sense of center-remote and proximity-isolation in relation to the rest of the city. The predominant use is that of “residential”. Focusing on buildings, those with a single use account for 86% of which 90% are related to a “residential use”. On the contrary, 14% of buildings are characterized with a “mixed use” structure, of which 91% have also as main that of “residential”. The next most frequent use is that of “commercial- professional activities” (e.g. shops and offices), which appear as secondary use in 86% of all mixed-use buildings. Construction activity in the last 20 years has lagged slightly behind the city average. About 67% of the buildings are one or two store buildings, with a fairly large percentage among them built after 1970 (42%) [6].

The work is divided in six parts: Part two, deals with the green planning concept adapted to the urban scale based on a bibliographical review. Part three presents the basic philosophy of the LEED-Neighborhood Development system, its modules and the way it is organized along its

individual issues. Part four describes the main features of the city of Larissa in terms of land use, construction, public space and infrastructure (ie the parameters that the LEED system examines). Part five is the section of results, which are listed following the following procedure: First, the neighborhood of “Agios Konstantinos” is rated according to the criteria of the LEED system and based on its “current development”. Second, ‘green’ interventions are proposed in line with the existing urban planning. Third, the neighborhood is re-rated and re-graded again, given the inclusion of the already proposed interventions. Part six summarizes and presents the main conclusions.

## **2. Bibliography Review: The Green/Environmental Dimension in Urban Planning**

Environmental planning has come to the fore in recent years. Its main objectives are the protection and the upgrading of the human living residential environment. Modern environmental planning is an evolution of design models proposed during the 20th century [7].

Urban development and expansion have always been one of the main problems of urban life and urban planning. In the city of the European North, the signs of urbanization have been evident since the Middle Ages, resulting, inter alia, in the environmental degradation and the designation of the city as a place unfit for human life [8]. Over the centuries, urbanization has generalized and, during the recent post-war period, intensified, with pressing trends towards the peri-urban and rural space [9]. Both in the city of the 18th century (i.e. that of the industrial revolution) and in the modern city, economic prosperity functioned in both cases as a driving force. Nevertheless, the two periods of time vary considerably. In the first period, economy was the sole objective of planning, resulting in the systematic degradation of the industrial city [10]. In the second

period, the environment comes first on the development agenda, as a result of the growing environmental problems of the last quarter of the 20th century [11].

The environmental dimension as a main element of spatial planning was the result of the economic crisis, which had an impact on various areas of human life, which was, in turn, the product of the stormy 1960s and the oil crisis of the early 1970s. An important milestone on this issue was the World Conference on the Environment in Stockholm in 1972 [12], which, in conjunction with a series of conferences worked cumulatively to shift urban thinking towards environmental planning and sustainable development, in the context of the humanization of urban life [13].

The term 'sustainable development' was introduced relatively recently at the Rio Summit in 1992 [14]. Since then, this term has been the focus, at least on the part of the target, of any effort to planning, and has been inextricably linked to sustainability, which is a related concept [15]. Indeed, the planning guidelines are defined with a view to achieving sustainability/sustainability [16]. In order to achieve this objective, the plans implemented, within the framework of state and public cooperation, take important account of the principles set out by environmental law, which are those of integration, prevention, precaution, remedial damage to the environment and the principle indicating that the polluter pays. Based on these principles, modern urban planning moves in parallel with environmental protection, whose its main objectives are:

- the protection and upgrading of the residential environment;
- the creation of a non-polluting city, which, at the same time, contributes to the protection of the countryside;
- the development of human cities, with an ideal size and population, in order to facilitate travel, promote sociability and alleviate urban sprawl at the expense of the countryside.

The above three objectives outline a long-term vision for modern urban planning, where social and productive cohesion is combined with the cultural and environmental identity of cities [17].

Urban green spaces are intersections between city and nature, artificial and natural environments [18]. Due to the strong relationship between nature and man, these spaces become necessary for life in the modern city, which, as noted above, tends to lose its physical characteristics and become an inhospitable habitat for man, who cannot fully enjoy the positive effects of its elements, such as greenery. Exploiting these benefits is also the main reason why environmental planning comes to the forefront of modern urban planning practice. In particular, the issues of greenery can be summarized in environmental and socio-economic benefits [19]. Reducing air pollution and urban noise, creating a better climate for cities, improving the aesthetics of the city, while acting as a habitat for species of fauna, thus giving the inhabitant a sense of the natural environment within the urban space are among the most important environmental benefits [20]. Green, however, has benefits for society and people with positive effects on their health [21], education and recreation, but also the economy. Finally, a key economic advantage directly linked to green is land values. Serena [22] notes that the level of values in the land trade is determined to a significant extent by the existence or not of urban public spaces, where green plays an important role because of the above data. For this reason, agricultural areas adjacent to green spaces are in greater demand and, by extension, higher value.

Summarizing, the environmental component is an important parameter for successful interventions at the level of urban planning. Modern needs to improve living conditions require proposals designed and implemented in the context of environmental awareness and protection. For this reason, urban planning has okay issues related to greenery, water and atmosphere as key planning issues and highlights practices, such as walking and cycling, as regeneration

methodologies. Indeed, as unorthodox as this may sound, the modern concept of regeneration lies not in the aesthetic reform and promotion of the landscape, but in the social revitalization of the areas, through the improvement of the quality of life of the inhabitants and the promotion of economic prosperity. In both of them, the environmental parameter is central.

### **3. The LEED-Neighborhood Development system**

The LEED-Neighborhood Development classification has been designed to express and quantify the key aspects of neighborhood sustainability. Understanding these concepts and their relationship to each other can provide citizens with the necessary guidance and technical ability to work on their own neighborhoods and communities.

The LEED-Neighborhood Development Assessment System is organized into three key modules.

- The “smart” location and connectivity of the neighborhood, where the key issue is the right decision on “where to build”.
- The pattern and plan of the neighborhood, where the key issue is the right decision on “what to build”.
- Green infrastructure and buildings, where the key issue is the right decision on “how to manage the environmental impact” [23].

For example “the smart location” criteria defines green neighborhood development as urban infill, brownfield redevelopment, or largely urban oriented development [24]. A logical and valid effort to combat unsustainable sprawl and greenfield development, its pre-requisite could be problematic for some projects that may not be truly urban but may not be contributing to sprawl either.

LEED-Neighborhood Development applies to neighborhoods and parts of neighborhoods. A neighborhood is more than territory within a boundary drawn on a map. At best, it is a place with its own unique character and function, where people can live, work, shop, and interact with their neighbors.

The most sustainable neighborhoods tend to exhibit high levels of walkability, a sense of place, social cohesion and stability, and neighborhood resiliency amidst changing economic and sociopolitical conditions. As summarized by architects Andres Duany and Elizabeth Plater-Zyberk [25], good traditional neighborhoods include: a discernible center, housing within a five minute walk of the center, a variety of dwelling types, a variety of stores and commercial activity, flexible backyard “ancillary” buildings for working or living, a school within walking distance, playgrounds near all dwellings, connected streets, buildings close to the street at a pedestrian scale, parking or garages placed behind buildings and away from street frontages, prominent civic and public buildings and a community decision process for maintenance, security, and neighborhood development.

The LEED-Neighborhood Development rating system is a checklist that recaps credits and conditions. It is used to assess the strengths and weaknesses of the development proposal, zoning plans, existing neighborhoods or neighborhood development plans. It can also be used as a source of standards and ceilings to be included in drafts, regulations or policy efforts on this issue. If interest focuses on a specific topic, such as bike lanes or accessible roads, or if a policy document such as a decree on the rational use of water or the creation of parks and recreation areas is evaluated, it can only be used in the classification sections related to this topic. This evaluation system is organized along the following topics:

### **4. The Main Features of the City of Larissa and the Neighborhood under Consideration**

The main characteristics of the Municipality of Larissa in terms of land use, construction, public space and infrastructure are as follows: the distribution of land uses is scattered without strict standards, while the layout of the three main functions that defined its historical center (administration, commercial activities, residence) followed the traces

**Table 1 The LEED assessment system structure.**

Smart Location and Linkage	Neighborhood Pattern and Design	Green Infrastructure and Buildings
Location	Walkable Streets	Construction Techniques
Ecosystems and Open Spaces	Compact Development	Energy Efficiency and Conservation
Contaminated Sites	Neighborhood Connections	Energy Production and Distribution
Transit-Accessible Locations	Mixed Uses	Water Efficiency and Conservation
Cycling Facilities	Affordable and Diverse Housing	Stormwater and Wastewater
Jobs and Housing Proximity	Parking and Transportation Demand	Green Building Process
	Parks and Recreation	Historic and Existing Building Reuse
	Universal Design	Heat Islands
	Community Participation	Recycling and Reuse
	Local Food	Light Pollution
	School Access and Design	

of the oldest urban tissue and was adapted to the needs of the city. The central districts of the city (‘Agios Achillios’ and ‘Agios Nikolaos’) collect land uses of commercial activities and administration, as well as a residence. Around this “core” area are the districts of ‘Agios Athanasios’, ‘Agios Konstantinos’ and ‘Agioi Saranta’, which constitute the wider center of the city with similar land uses. As far as the building correlation is concerned, in the center of the city there are still building blocks with old buildings that don’t cover the institutionalized (formal) building conditions. However, construction carried out has exceeded that of the legislated and permitted construction based on the existing urban planning in the city center. In relation to the quantity and quality of public space, public related space for green areas and utilities is further distributed as: Public services (1%), public areas of general interest (1%), education (3%), free public areas (8%), transportation network and outdoor parking spaces (23%).

The neighborhood under consideration is defined by a large triangle, with external boundaries the roads of ‘October 23rd’-‘Volou’ (south side), part of ‘The Heroes Polytechniou’ (east side) and ‘Axentiou-Nikitara’ (north side). It is a neighborhood with a total number of 110 building blocks, which cover an area of 102,006.39 m<sup>2</sup>. Its permanent population, based on the census of 2011 is 20,381 people (the second most populous in the city). The existing urban planning defines (a) Average Gross Housing Density: 110 at./Ha and (b) Average

Construction Factor: 1.3. On the basis of this current planning study, most of land uses are those of ‘exclusive’ and ‘general’ residence (Greek terminology), while there are also areas defined as urban center of level 1 (more categories of land uses). Based on the permanent population of 2011, the average density is estimated at 144 at./Ha (20.381/141.2), i.e. and it has far exceeded the urban planning forecast, which is 110 at./Ha. The maximum available area for construction amounts to 1,194,193 sq.m. Therefore with a saturation factor (l) = 0.7, there is a maximum capacity of 20,898 persons [1,194,193 (:) 40 ( ) 0.7 = 20.898]. Therefore, the capacity is almost exhausted (20,381/20,898 = 0.97).

**5. Results**

*5.1 The Neighborhood: An Overall Assessment*

The area is adjacent to other existing residential units. It is surrounded by a well-organized and connected transportation network, with several intersections, serving the residents on their daily commutes. As an area of the wider center it is one of the most densely populated districts with severe degradation problems. Efforts to upgrade the residential and public environment, on the part of the Municipality, were minimal to non-existent. The area shows signs of abandonment and decline. It is a middle- and low-income neighborhood with affordable housing but with strong signs of the current economic crisis plaguing the country. Within walking distance (less than the required 400 m), from anywhere in the area,



Fig. 1 The Neighborhood under Consideration.

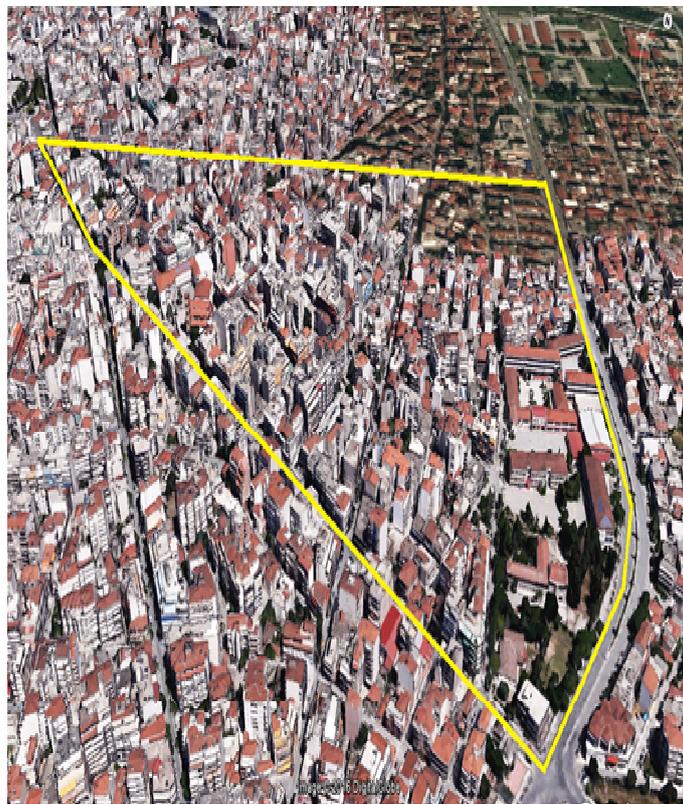


Fig. 2 The Neighborhood under Consideration-Perspective view.

there is access to a city bus stop, while the distance from the city train station and the trans-urban bus station is 800 m and 1,000 m respectively.

There is no recorded data to show the extent of the working areas of the inhabitants of the intervention area. What is certain is that the distances from the commercial and administrative center of the city are very small, while the distance from the train and central bus station are within the permissible limits for walking.

The intervention area can be described as an open community with buildings, the entrances of which are seen in public places (in particular on roads), with sidewalks on both sides of the road, although most of the time difficult to move due to small width and minimal maintenance. All buildings, including buildings used outside the residence, have direct access to the sidewalk. Uses such as shops, pharmacies, food stores, etc. are ground floor with large glass surfaces on their face, along the sidewalk. There are no blind faces of buildings, nor is there a large percentage of elevated ground floor. The average ratio of “building height to street width” ranges from 1 to 1 (for an average of 3 store buildings with an average street width of 10 m). The sidewalks are tree-fed, for the most part, but the trees do not provide sufficient shade during the midday hours.

The intervention area is compact, densely built consisting mostly of multi-store buildings of many apartments, within small plots, the size of which does not exceed 300 m. It is an existing coherent urban fabric with complete and connected urban development. The area as a purely urban area in the center of the city, consists of a dense network of roads with many intersections, and is fully connected to the other neighborhoods of the city.

There are multiple types of houses in the area, of various sizes, such as detached houses, apartment buildings with small and large apartments, maisonettes, two-store and three-store buildings. This diversity makes the neighborhood special and intimate,

accessible to its residents but also to prospective residents, since it is a community with plenty of housing options (old and new) for rent or sale and even with a high level of affordability.

Parking in the area is one of the biggest problems that needs study and improvement. The minimal existence of parking spaces (shared or private) forces drivers to park along the sidewalk, either on one or both sides of the road, creating a stifling traffic situation, with a road network not friendly, sometimes labyrinthine, that prevents drivers and pedestrians from operating in the area. The newest apartment buildings in the area have pilotis that acts as a car and bicycle parking lot for the tenants, transforming the faces of the buildings into continuous parking. Urban transport, with a fairly satisfactory fleet of buses, serves the area by facilitating the movement of residents. However, the high cost of the ticket and the absence of subsidized tickets, half the normal price or even cheaper, does not make public transportation attractive to residents or even competitive in the car.

Although the area is one of the most densely populated areas of Larissa and with a strong need for small “breaths” of free urban space and greenery in its fabric, it does not have a single such space. The complete lack of a park or square creates the image of an even more densely built and sometimes claustrophobic area. The positive thing of course of the area is that what it lacks exists in the neighboring areas, so that residents have easy access on foot to public places such as squares, parks and market places within a radius of less than 600 m.

The area has full coverage in school units of all grades, located at close distances, for students’ access to them on foot.

As expected, there were no specifications for the design of “green” buildings aiming at the optimal energy efficiency. The placement of buildings as well as building blocks were done by accident, without proper orientation, so that they have the maximum

**Table 2 Score by Axes and Basic Modules-Current Situation.**

Axes and Basic Modules	Score
Smart Location and Linkage	8/27
Neighborhood Pattern and Design	26/44
Green Infrastructure and Buildings	0/29
Innovation	0/6
Government priority	0/4
Total	34/110

**Table 3 The area—The “strong” and “weak” points.**

+	-
Accessible roads	Energy production and distribution
Compact growth	Waste management
Mixed uses	Design of green buildings
Economic and differentiated housing	Thermal islands
	Recycling-reuse

exploitation of solar energy. Any energy management efforts (use of renewable energy sources, reasonable use of water, waste recycling, rainwater management) are an individual matter and piecemeal. In recent years, an effort has been made by the state, through various household subsidy programs, to turn residents to the philosophy of energy saving by making the necessary interventions on their properties.

*5.2 Rating: Current and Future Quantitative Assessment*

As already mentioned, the neighborhood under consideration has been rated twice: First in relation to its current situation and then on the basis of a theoretical and proposed situation, as a result of concrete proposals and interventions.

The evaluation of the area shows that the strongest weaknesses concern the “green infrastructure-buildings” section (Rate = 0). In this context, the “strong” and “weak” points of the area, as they emerged from the rating, are for the former case “accessible roads, its compact growth- development, mixed uses and economic and differentiated housing”, and for the latter case “energy production and distribution, waste management, green building design, thermal islands and recycling-re-use”. On the contrary, the area meets 50% of the criteria of the “Neighborhood Template and Plan” module and 33%

of the criteria of “Smart location and connectivity”. With such results, it is obvious that a key axis of the proposals and interventions should be directed to “green infrastructure and buildings”, but this is particularly difficult to improve, as it requires interventions in the built environment and in the city’s infrastructure networks. Prior to proposing interventions, the study area could not be included in any certification level. Afterwards, however, the area can be certified in the first level based on the LEED system.

Based on the above rating a series of interventions has been elaborated, which increase and improved the overall score of the area by 12 points, i.e. from 34/110 to 46/110. The proposals and interventions concern 8 parameters, which are linked to specific criteria as Tables 4 and 5 show.

The verbal and technical description of those interventions and the impact they have on rating are described below.

Intervention 1: Connecting the pedestrianized city center with the intervention area through a network of pedestrian, bicycle and ‘mild’ streets.

- Creating a basic collection road network with parking in designated areas (Demand for parking and transport: +1).
- Conversion of all local highways to lanes with the aim of coexistence of pedestrians and cyclists (Accessible roads: +2).



them with key city reference points improving connectivity and accessibility.

- Reducing parking and limiting it along the main roads decongesting by cars and improving everyday life.
- Rehabilitation-redevelopment of the housing area Reduction of “local” pollution and improvement of the image of the area.
- Tree planting along main road axes and in public spaces (eg schools) Reduce sensible temperature and improve the image of the area.
- Construction of shelters along pedestrian routes as well as at the stops of SMEs improvement of everyday life.
- Creating crossings for seniors and children in concentration and route areas Reducing the risk of accidents and increasing safety.

## 6. Conclusions

The key role of the LEED-ND system is to evaluate new residential developments. It can also serve as a guide for environmental interventions at city level based on the following process: First, an assessment of the area according to the criteria of the system. Second, identifying those criteria that have room for improvement. Third, proposals for improvement.

The work dealt with the evaluation of the neighborhood of “Agios Konstantinos” in the city of Larissa in relation to the extent to which it meets the criteria of green-sustainable planning, as described in the LEED-Neighborhood Development system. The study area was assessed on the basis of specific criteria related to ‘smart location and connectivity’, ‘neighborhood model and design’ and ‘green infrastructure and buildings’. The study area was rated twice: First in relation to its current situation and then on the basis of a theoretical and proposed situation, which is the result of specific proposals and interventions. In this context the “strong” and “weak” points of the region, as they emerged from the scoring, are for the former accessible roads, compact

development, mixed uses and economic and diversified housing and for the latter energy production and distribution issues, waste management, green building design, thermal islets and recycling-reuse. Prior to the intervention proposals, the study area could not be included at any level of certification. After that, however, the area can be certified at the first level under the LEED system.

However, in addition to the above, the on-the-spot investigation has also highlighted a number of other problems and shortcomings, which do not form part of the above evaluation system, but need attention and improvement. For example: First, the opening of roads leading to dead ends. Such an intervention would increase the accessibility and connectivity of the region. Secondly, the pedestrian hiking of very small and narrow roads and the reduction of parking and the restriction of parking along the main roads. Such an intervention would lead to decongestion and improvement of the daily lives of the inhabitants. The improvement of everyday life includes interventions on the sidewalks to serve different groups of population as well as the construction of pedestrian rest points in specially designed areas with the appropriate urban equipment. Fourthly, the strengthening of tree planting along the main roads as well as in public areas (e.g. schools). Such an intervention would reduce the noticeable temperature and at the same time improve the whole area. Finally, the landscape of the area includes actions of acquiring the abandoned buildings through acquisition procedures by the Municipality and the conversion of their land into small outdoor spaces, as well as the restoration and regeneration of the building blocks of the so called “refugee houses”, which constitute a serious outbreak of contamination and degradation of the area.

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