



## Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens

### D3.1

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#### Report on the local demonstration case studies analysis

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WP3 – Gap analysis, Requirements and Solutions identification for cities

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## Executive Summary

This document presents Deliverable D3.1 “Report on the local demonstration case studies analysis” corresponding to the T3.1 “Local conditions, features, gaps in existing NBS and optimization metrics” of the Work Package 3 (Gap’s analysis, requirements, and solutions identification for cities).

Since the project is focused on multiple benefits of implementing Nature Based Solutions (NBS) in open public spaces for enhancing human health and wellbeing, this report analysis the current features and serves as the base for the further stages of the project. Following the initial local site analysis performed in T2.2 and reported in D2.2, this report is focused on defining further the local conditions and features of 4 Front Runner (FR) and 5 Follower (FL) cities’ case-studies.

The euPOLIS’ scientific and implementation paradigm is based on the Blue Green Solution (BGS) methodology of systemic urban development for sustainability, climate resilience and cost efficiency<sup>1</sup>. Its complex analytic GDPM (Goal Driven Planning Matrixes) methodology is disaggregated in its basic steps and components and customised here for the identification of gaps in existing NBS and sustainable planning technologies.

The euPOLIS 4 FR cities’ teams and supporting partners, as well as 5 FL cities’ teams described specific conditions and local features in FRs’ demo sites (DS) and FLs’ case studies (CS). These conditions include technical, environmental, and socio-economic status and analysis of gaps, and the possible interventions in FR and FL cities for enhancing the PH (Public Health) and WB (Well-being) of all citizens, including the relevant groups of stakeholders at each city.

The main body of this report contains 3 major parts: (i) Local conditions and demo-sites technical features (Chapter 2), (ii) Characteristics of existing natural elements and environmental issues (Chapter 3), and (iii) identification of the gaps in existing NBS (Chapter 4 of this report). The material needed for the Chapters 2 and 3 is obtained through the questionnaire Q1, Q2 and the Workshops performed in all 4 FR cities and through direct contributions of the cities and supporting partners. The material for the Chapter 4 is obtained through the questionnaire Q2 and the additional bespoken tool/table for the gaps’ identification in the existing NBS (Appendix 6). Additionally, material provided by FL cites has been analysed and included.

Diversity of the size and the scale of demo-sites (small scale in Gladsaxe and Lodz, and bigger scale in Belgrade and Piraeus) will facilitate extrapolation of the euPOLIS results to bigger scale at the level of whole city and to the other cities with similar climate conditions. Potential extrapolation area covers the climatic differences present in the whole Europe, from cold climate Scandinavian region to hot dry Mediterranean one, demonstrating the flexibility BGS/GDPM integrated system.

Systematical analysis of the existing NBS has enabled cities to identify several PH& WB related NBS gaps at all demo sites. This process has also enabled the FR cities to identify the potential interventions beyond their original planes. Those potential interventions will be discussed in more detail in following WPs.

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<sup>1</sup> Božović, R., Č. Maksimović, A. Mijić, K. Smith, I. Suter, M. Van Reeuwijk, (2017) *Blue Green Solutions, A Systems Approach to Sustainable, Resilient and Cost-Efficient Urban Development*, Climate\_KIC, EIT, European Institute for Innovation and Technology.



These analyses of local features and conditions, as well as gaps in existing NBS planning technologies, performed in this part of the WP3 (T3.1) and the results (contents of this report) set-up the stage for the work to be done practically in all other WPs but particularly in other two tasks of WP3, WP4, WP6, WP7 and WP8.

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## List of Acronyms / Abbreviations

Table 1. Acronyms/Abbreviations

Acronyms/Abbreviations	Explanations
AOI	Area of Interest
BGS	Blue Green Solutions
BVOC	Biogenic Volatile Organic Compounds
CS	Case Studies
DS	Demo sites
ESS	Ecosystem services
FL	Follower cities
FR	Front Runner cities
GA	Grant Agreement of the euPOLIS project
GDPM	Goal Driven Planning Matrix
IDU	Institute of Urban Development
MF	Multi-functional
PH	Public Heath
SUDS	Sustainable Urban Drainage Systems
TOD	Transit Oriented Development
Q1	Questionnaire 1
Q2	Questionnaire 2
Q3	Questionnaire 3
UHI	Urban Heat Island
WB	Well-being
WS	Weather station
WWTP	Wastewater treatment plant



## 1. Introduction

This deliverable D3.1 represents Report on the Task T3.1 activity on the gap analysis, requirements and solution identification for cities of the euPOLIS projects. It serves as a basis for production of the 3 other deliverables of WP3: D3.2 (Baseline status and indicators identification), D3.3 (euPOLIS Project Requirements), D3.4 (Specifications of the euPOLIS Case Studies). It contains 3 major parts:

- (i) Local conditions and demo-sites technical features, Chapter 2 of this report
- (ii) Characteristics of existing natural elements and environmental issues, Chapter 3 of this report and
- (iii) Identification of the gaps in existing NBS, Chapter 4 of this report.

The urban planning methodology adopted for the euPOLIS project is based on the innovative Nature Based System (NBS) and BGS (Blue Green Solutions) urban planning systems<sup>2</sup> and introduces systemic analytical and optimisation methodology based on the Goal Driven Planning Matrix (GDPM) system.

To develop GDPM, used in this report for the gaps in existing NBS identification, and consequently define the Project Goals, the site-specific conditions are being collected from the following sources:

- a. The inputs for 3 major parts of this report from FR cities teams and their supporting partners, and from FL cities teams.
- b. The data and information that are easily obtainable are collected first form the cities and their institutions, (euPOLIS bespoke) questionnaire Q1 and Q2, with preliminary collected answers in February 2021 and then completed answers in March 2021.
- c. Data on the gaps in existing NBS collected by the additional tool designed to help the gaps identification and to indicate interventions that might be desirable at FR cities DS.

The results from the Q1 and Q2 (Task 2.2) answers, provided by the FR cities, specify relevant demo site physical and functional characteristics. Indirectly, these answers also indicated concerns related to the utilisation of NBS contributing to the local PH&WB. The data obtained from the answers, with particular attention to identified concerns, in the following tasks will be converted into set of targets related to appropriate project goal. The set of possible potential euPOLIS interventions will be subsequently defined for each specified target. The obtained proposals are further analysed through the GDPM to arrive to final optimized results.

All sources of data are processed by cities and supporting partners, to produce a unified consistent set of data and information, which define baseline conditions and inputs for T3.2. and T3.3 in identifying the performance indicators of the existing NBSs and creating Project Requirements and specification of the euPOLIS case studies in all 4 FR cities' demo sites.

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<sup>2</sup> Ibid.

## 2. Local conditions and demo-sites features

### 2.1 FR cities DSs local conditions and specific features

One of the main objectives of the euPOLIS project is the implementation of a new urban planning methodology, based on BGS/NBS and enriched with cultural, geographic, and societal aspects of each demo-site. FR cities have different size and climatic characteristics and are situated in different countries in northern and southern Europe.

To identify the specific local conditions of every site two Questionnaires (Q1 and Q2) were distributed to the FR cities. The answers were collected in two phases: preliminary (presented in the D2.2) and the updated/completed version, results of which are presented in this report.

It includes the selected and analysed information about:

- DS's position in the city and its contextual location.
- DS's dimensional characteristics.
- Surface cover and construction materials description.
- Multifunctionality of buildings and diversity of uses of public spaces.
- Urban lighting elements, street furniture and signage.
- Historic features of the DS.
- DS's accessibility by public and private transport.

Following chapter contain the local conditions and specific features of four FR cities DSs.

#### 2.1.1 Belgrade DSs: Usće and Linear Park

Belgrade will demonstrate the benefits of the euPOLIS approach in two demo locations, Park Ušće / Zemun Quay and Linear Park at Dorcol.



Figure 1. City of Belgrade. Linear Park plan and its zones of influence



*Figure 2. City of Belgrade. Linear Park plan, zones 7 and 8*

The planning documents for the area are under development (a document example is shown in figure 1) and it should be ready by the end of 2021. The entire area of the Linear park is divided into 10 zones, with euPOLIS demo-locations provisionally being Zones 7 and 8 (figure 2). The old railway route will be developed into the exclusive linear park. The euPOLIS main NBS principles are already included into planning process as a part of the Planning Brief.

The Linear Park in Belgrade (zones 7, 8) is a completely new park planned to be created by transforming a derelict railway track from the old industrial storage building "Beton hala" to the Pančevo bridge on Danube (figure 3).

The Linear Park passes through diverse urban zones, from relatively well regulated and active zones beneath the Belgrade fortress, to the decaying areas of the Port of Belgrade industrial zone. With the planned realization of the Linear park, a complete transformation of the surrounding urban tissue is expected as well, which has already begun with intensive construction in lower Dorćol area in the last several years.



*Figure 3. City of Belgrade. Existing railroad tracks – out of use, to be dismantled*

In the surrounding areas of the planned park there are already diverse urban functions - from existing housing complexes, that already create defined architectural and urban areas, to the low-density decaying and slum housing that will be transformed; from business and commercial functions to storage and industrial buildings; from port and railway buildings and other transport-related functions to sports and recreation facilities; from devastated built structures to protected heritage such as the electric power plant Power and Light, Nebojša tower and other monuments.

The existing conditions on the planned location for the demo park shows that these are zones that are planned for complete transformation from port and industrial area of devastated built and natural environment, into a landscaped park environment.



Figure 4. City of Belgrade. Existing view of the future Linear Park area

Presently, as shown in the Figure 4, none of the planned facilities exist at the subject location, so the following park functions will be realized within the Linear park and the euPOLIS DS projects: bicycle and pedestrian paths, green areas of rest, gathering and leisure, playgrounds and park squares etc.

Ušće Park in New Belgrade is located at the waterfronts of Sava and Danube, and has the total area of approximately 91 ha, from the Hotel Yugoslavia to Branko's bridge on Sava.

The park provides multifunctional facilities for visitor's recreation. There is significant length of recreational walking, running and cycling routes. The amenities include the adjacent floating restaurants, very popular and characteristic for Belgrade, positioned against the Sava river promenade.

Other section of the park (Figure 5) is less developed in terms of park equipment but does offer some interesting kids playing and sports facilities. There is an artificial free-climbing facility, and two basketball courts. It includes a river promenade which represents a significant community socializing area. There are no other community usage defined areas.

This park has already been used for massive outdoor musical concerts and cultural gatherings. One of the most significant cultural buildings, the Museum of Contemporary Art is in the park. This building is a large potential for different types of cultural events.

The park Usce is specific for its location in the city central area, allowing open vistas towards the Belgrade fortress, the confluence of Sava and Danube, and the Large War Island.



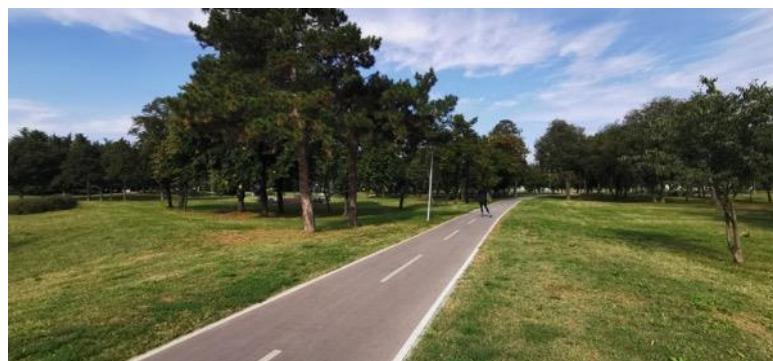
*Figure 5. City of Belgrade. Usce Park area plan*

In the vicinity housing and commercial functions are located: two business towers and shopping center "Ušće", the government building Palace Serbia, mixed-use blocks, Hotel Yugoslavia and the planned location of the future Philharmonic hall. The Museum of Contemporary art is located within the park.

Terrain morphology is mostly flat, excluding the river embankment, which is beneficial for creating bicycle and pedestrian paths and other park facilities.

The existing condition on the DS shows that the space is already used as a park, with existing running track, bicycle path and pedestrian path on the river embankment (figure 6). The Usce park is already one of the most important Belgrade tourist and recreational destinations. The adjacent rivers contribute to the large extent to this demo site potential.

The park is very well connected to the rest of the city with numerous transport facilities. It still represents the area for potential improvements in tourism, economy, social and environmental categories. The project task is to enhance these categories and introduce additional functionalities, such as public education in the advantages of euPOLIS approach.



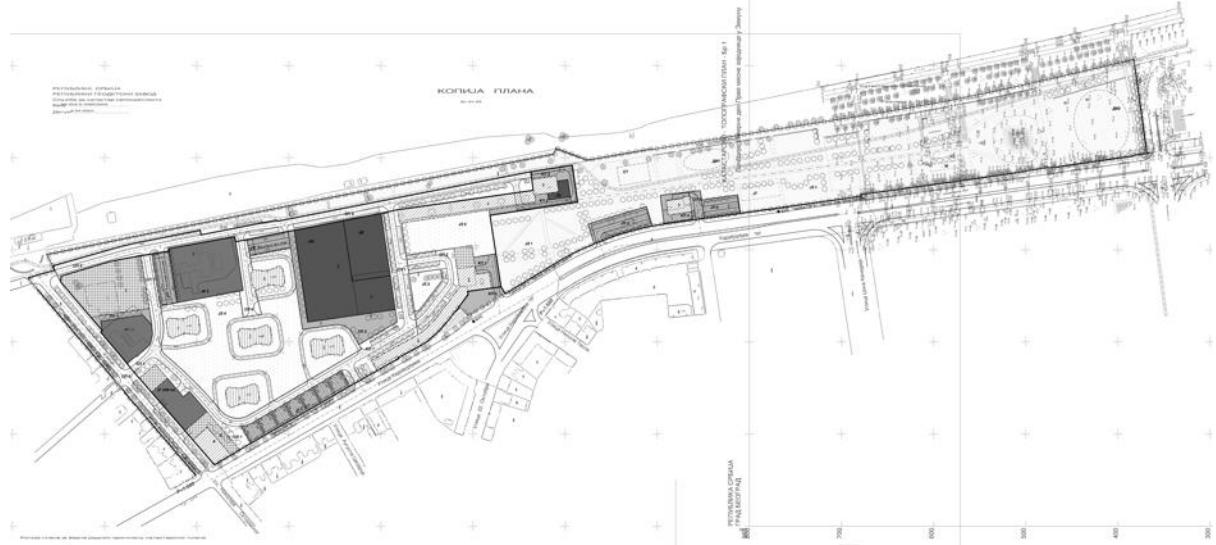
*Figure 6. City of Belgrade. Existing view of the Park Usce area*

Existing groups of trees in this location will be conserved and used, with additional planting in accordance with the principles of the euPolis project.

The detailed Master Plan exists for the park Usce. The euPOLIS team is presently negotiating with the City management the master plan updating to suit the euPOLIS project requirements.

The plan (figure 7) designates the whole area as a public park, with provisions for landscaping, paths and equipment. A public toilet location is also planned, within or adjacent to the possible euPOLIS micro location. Some of the planned paths and children's playgrounds have already been realized on site.

This plan consists of both public areas (mostly parks) and housing and commercial areas and other public facilities, designated by the plan. euPOLIS micro location is planned within the park area of the plan. The existing park areas are kept in their entire existing surface by the plan, which provides provisions and conditions for its reconstruction. The plan gives provisions for landscaping, introducing new pedestrian and cycling paths and introducing new cultural and commercial areas within the park, such as an art gallery, cafes, skating rink etc. It also plans for a new public toilet facility.

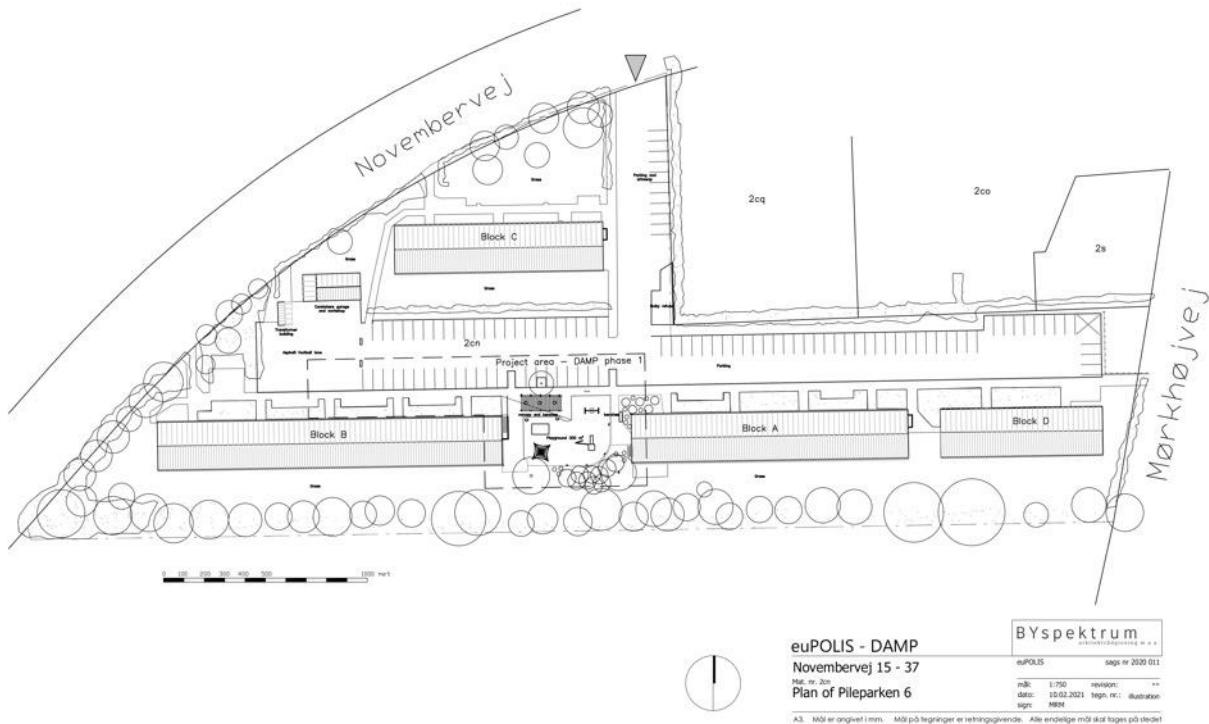


*Figure 7. City of Belgrade. Excerpt of the plan, Usce*

For both DSs master plans allow for introductions of commercial activities, located within removable or semi-permanent glass pavilions, designed in a way to not disrupt the landscaping and park facilities. These could house cafes, shops, local recreation hiring equipment facilities, or other commercial and public functions that are complementary to the park use and could increase the attractiveness of the location and the number of visitors. These pavilions can be places where local restaurants and craft stores can display their products to passers-by, and where urban gardens can supply fresh seasonal produce. The proximity of the river (and local marinas) allows for nautical tourism to flourish in the area.

## **2.1.2 Gladsaxe DS: Pileparken 6**

The Gladsaxe site includes Pileparken 6, built in 1969 and renovated in 2010. A social housing estate built by means of public funding. In return, the municipality can dispose over every third vacant home for housing purposes. Pileparken 6, a housing association, contains 4 apartment blocks, 117 apartments, 1700 inhabitants, 16 500 m<sup>2</sup> of property (figure 8).



*Figure 8. City of Gladsaxe. Master plan of the Pileparken, BYspektrum, february 2021*

The chosen site (figure 8) in Gladsaxe has different conditions as a result to city strategies, a local development project and the character of the housing at the site predefining a framework for the euPOLIS Urban Planning Methodology.

Mørkhøjvej (2 lanes) is the largest road of the area. It has pedestrian path and bicycle lanes. At road crossings the traffic is regulated, and islands have been constructed to slow down and make pedestrian passage easier.

An obstruction has been expressed among residents in the area as unsecure due to lack of lighting. What makes the residents feel unsecure are young people coming to the plot in the evening hanging out at the football lane. It is neighbourhood having a lot of social problems and occasional incidents with violence. Drugs are being sold in at different outdoor locations. The residents are afraid to get these problems at the plot. They feel unsecure in areas with little lighting because such areas attract street crime.

There is another road located south of the project site (Kildeager), which is more residential and therefore less traffic than Mørkhøjvej.

Figure 9 shows four recent photos showing the typical views of the Gladsaxe DS. At the site, the only common outdoor space that invite the residents to stay is the playground between the two building blocks A and B. There is a small canopy with benches beside the playground. Cafes, pubs and restaurants are very few in the area, and there are no outdoor servings. Within walking distance, a playground is under planning. This playground will be located between the library and Mørkhøj School.

At the east side of the plot there is a small grill/hot-dog stand. 200 m north of the site there is a small square with a small supermarket, baker, hair salon, hardware shop and a pizza restaurant. Across the street to the west of the plot there is a kiosk and a kindergarten. Across the street to the east of the plot there is a high School, Nørre Gymnasium.

Small playgrounds are to be found in the area (figure 9, photo 2). These are private playgrounds serving residents in the social associations around the site.

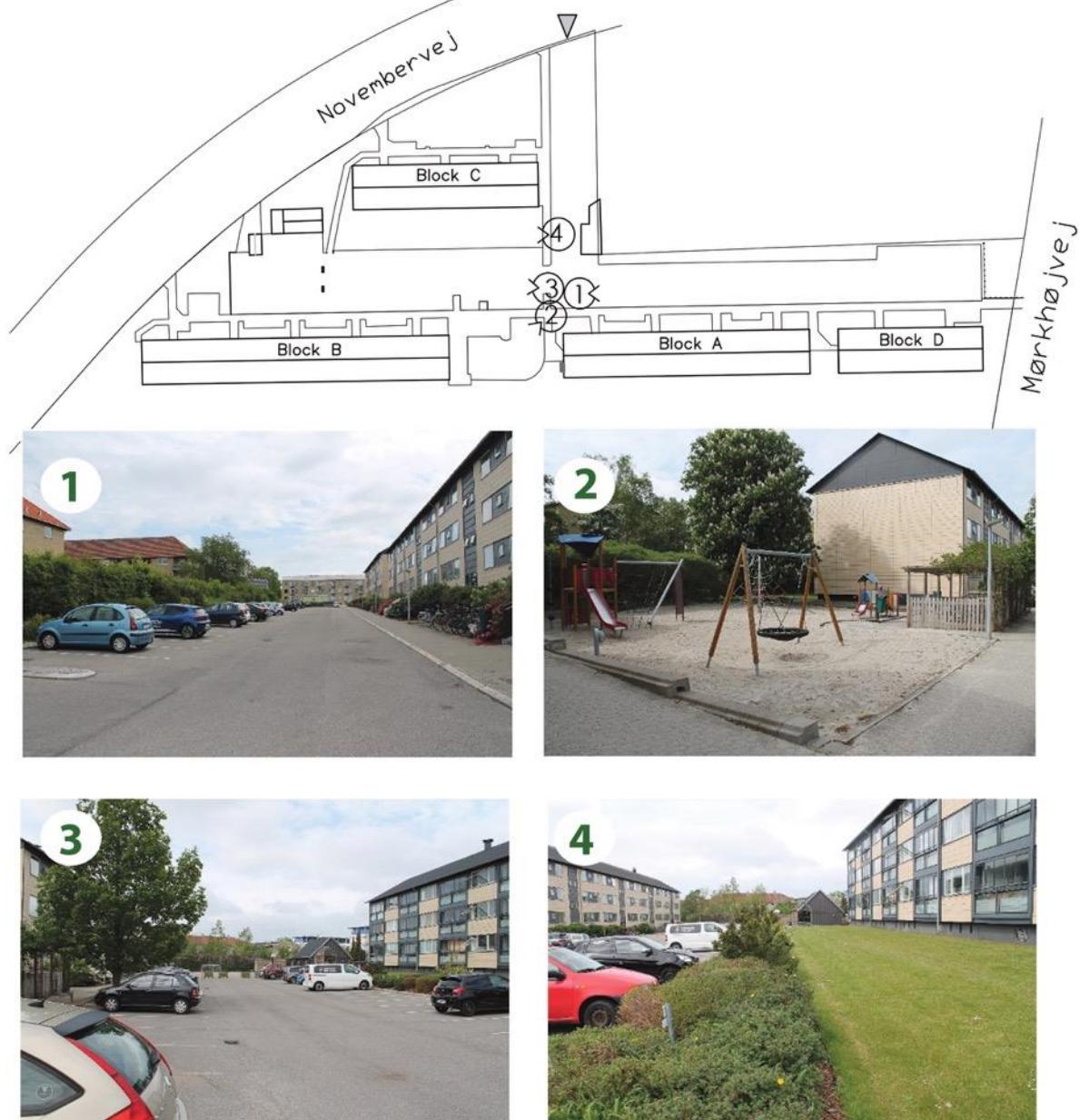


Figure 9. City of Gladsaxe. Four Views of the demo site Pileparken

Otherwise, there are no public meeting places in the area. At the site, the residents can borrow the common space in the basement of block B.

A part time caretaker is employed by the housing association and has an office at the site. A new garage for storing the machinery for landscape caretaking – a tractor for lawn-mowing, de-icing and snow clearing has been built at the site 5 years ago and offers room for a workshop and tools for handling small repairs on the buildings or the outdoor facilities. The budget for caretaking is reduced the past years, and to keep the high level of service the caretakers on other departments of the housing association in the area helps each other.

The design of the outdoor facilities has been made to keep maintenance simple and fast. This makes it possible for one person to keep and service the 117 departments and outdoor space.

Within the small area that the demonstration site represents, there are no walking lanes, but the use of bicycles is very frequent (figure 10).



Figure 10. City of Gladsaxe. View of the demo site Pileparken with cycles parking

However, the area lays in the close vicinity of several green areas with great possibilities for walking, jogging etc. From the demonstration site, there are easy access to most areas. The site is only residential, and all facilities are for the residents only. The facilities are in the basement of the buildings. They are worn but well kept. The facilities include toilets, communal laundry, meeting facilities for resident board meetings and a joint space for arrangements and shared use. The Basement contains storage for each apartment, storage for bicycles and baby carriages.

The design of the outdoor facilities has been made to keep maintenance simple and fast. This makes it possible for one person to keep and service the 117 departments and outdoor space.

The euPOLIS project is built upon the DAMP project in Gladsaxe, that is an urban climate adaptation demonstration program launched by the Municipality of Gladsaxe in 2018. The DAMP project aims to develop scalable green solutions to treat rainwater exclusively by evaporation. The techniques will be demonstrated in a full-scale project developed for the euPOLIS site in Gladsaxe.

The first phase of the DAMP project is shown in figure 11. The plan consists both of a new playground, vertical evaporation gardens and a small spring. The project is under development and will be constructed through 3 phases. First phase is expected to be implemented in the fall 2021.

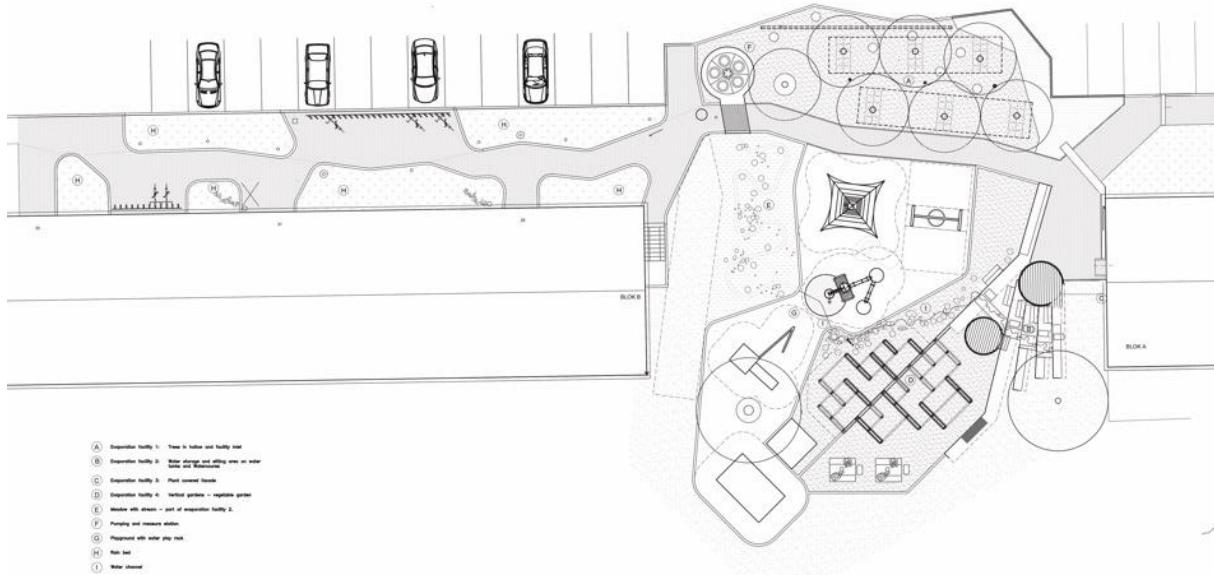


Figure 11. First phase of DAMP project in Gladsaxe

### 2.1.3 Lodz DS: Pasaz Anny Rynkowskiej

Lodz is a leading centre for innovation, education, and implementation in Poland. The city's management should be based on an efficient and integrated system ensuring access to information for all, based on the Strategy for Lodz. The activities of the city authorities are aimed at creating such conditions that all investments and actions are undertaken with respect for the ecological properties of land and water. In this sense, the goal is infrastructure which serves the functions and requirements of an environmentally secure city, is reliable, meets the needs of all the city's population and assures good status of aquatic ecosystems. This is possible by e.g., the application of ecological biotechnologies and the population's in-depth ecological awareness.

The area of Lodz demo site is covered by a master plan - the Green Polesie Programme<sup>3</sup> - and is located in the revitalisation area specified by a separate resolution and the Local Revitalisation Programme – it is significantly larger than the area covered by the Spatial Development Programme<sup>4</sup> (figure 12).

<sup>3</sup> <https://mpu.lodz.pl/opracowania/zielone-polesie/>

<sup>4</sup> Study of Spatial Development Conditions and Directions for the City of Łódź" adopted under the Resolution No. LXIXI/1753/18 of the Łódź Assembly of 28 March 2018, amended under the Resolution No. VI/215/19 of the Łódź Assembly of 6 March 2019.

[https://mpu.lodz.pl/files/mpu/public/STUDIUM/obowiazujace/zm\\_studium\\_2019/2019\\_SUIKZP\\_zal\\_1.pdf](https://mpu.lodz.pl/files/mpu/public/STUDIUM/obowiazujace/zm_studium_2019/2019_SUIKZP_zal_1.pdf)

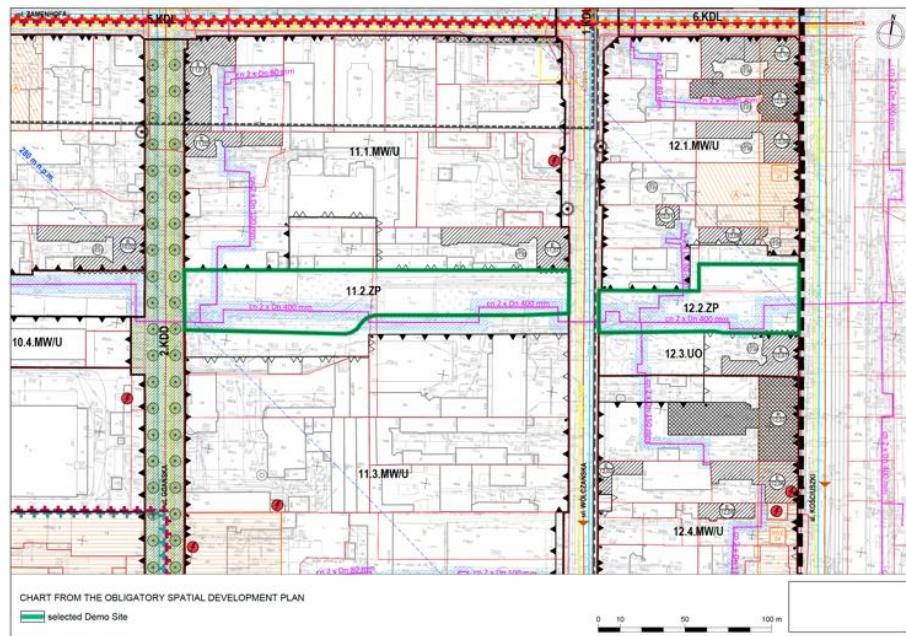


Figure 12. City of Lodz. Pasaz Anny Rinkowskiej demo-site and its cross section

Selected demo-site, shown in figure 13, is a downtown urban block and is a part of the W3B city unit (areas for transforming historic structure). It includes different functions: residential, sport and recreation areas, (open air food and drinks serving area), grounds for public greenery, transport, and technical infrastructure.

In the vicinity of the area under development there are mostly dense tenement buildings and more extensively developed post-industrial (former factories) areas. In the immediate proximity there are residential areas (often in poor condition), an extensively developed fire station area and a municipal kindergarten.

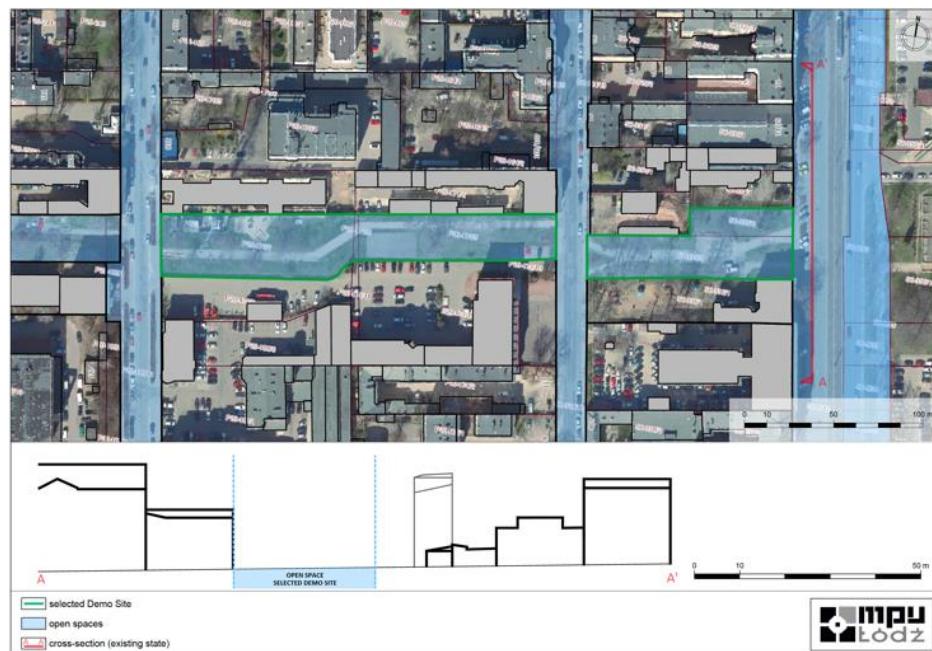


Figure 13. City of Lodz. Pasaz Anny Rinkowskiej demo-site open spaces and its cross section

In the vicinity of the area under development there are mostly dense tenement buildings and more extensively developed post-industrial (former factories) areas. In the immediate proximity there are residential areas (often in poor condition), an extensively developed fire station area and a municipal kindergarten.

The demo site is a pedestrian/bicycle connector, as shown in figure 14, (not passable for cars) between three main streets of the city centre. There is an outdoor gym (situated in an area directly exposed to the sunlight, so it can be uncomfortable during the summer months), playground and a few benches. There is also an unattractive, asphalted space in the square (probably the old playground) currently unused. Shading is provided in several places by surrounding buildings and existing trees.



*Figure 14. City of Lodz. Pasaz Anny Rinkowskiej demo-site.*

Main users of the public spaces are local inhabitants who take their dogs for a walk or passengers who want to take a short-cut through passage. The users of outdoor gym are also inhabitants of the neighbourhood. Moreover, the area covered by the project is a place where people in crisis or homelessness often stay.



*Figure 15. City of Lodz. Pasaz Anny Rinkowskiej demo-site. Lacks in comfort of pedestrian mobility*

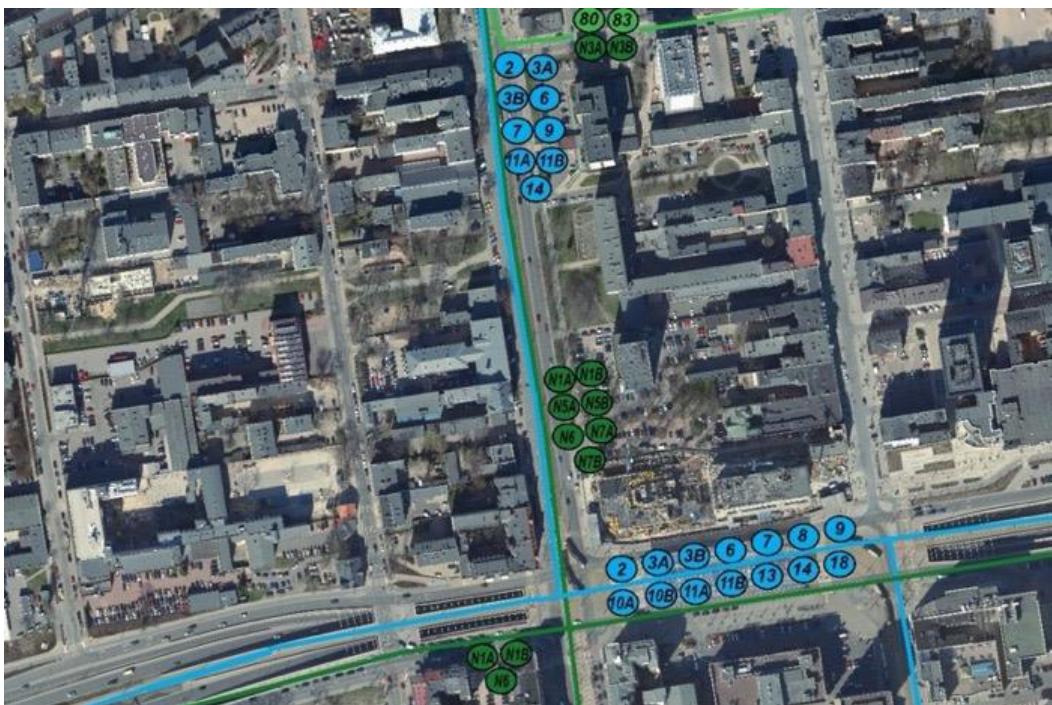
On the scheme, illustrated in figure 15, are evidenced several urban elements that hinder pedestrian mobility and safety. There is lack of pedestrian crossing at Tadeusza Kościuszki Avenue (figure 16) - it would enable reaching Piotrkowska Street via Henryk Jan Józefski Avenue.

Piotrowska street is a symbol and a vibrant core of Lodz – a historic shopping street which combines today trade with entertainment and gastronomy.



*Figure 16. City of Lodz. Pasaz Anny Rinkowskiej demo-site.*

There is a variety of public transport serving this DS and connecting it with the important areas of city of Łódź. In figure 17 are illustrated the bus lines (in light green), night buses (in green) and trams connections (in blue).



*Figure 17. City of Lodz. Potential of public transport connections*

In proximity of the DS, on 31 October 2015, a brand-new tram station was built in the center of Łódź at the junction of Piotrkowska and Mickiewicza Streets, connecting two of the city's transport axes: the

W-Z Route and the Łódź Regional Tramway (north-south). Christened by Łódź inhabitants as Unicorn Stable, the shelter under a colorful membrane roof can accommodate eight trams at a time. On 7 June 2019, a unicorn statue by Japanese artist Tomohiro Inaba was unveiled near the station, the important transport junction and represents a new landmark for the city. Another landmark in the area of Lodz's DS is the fire wagon shown in figure 18.



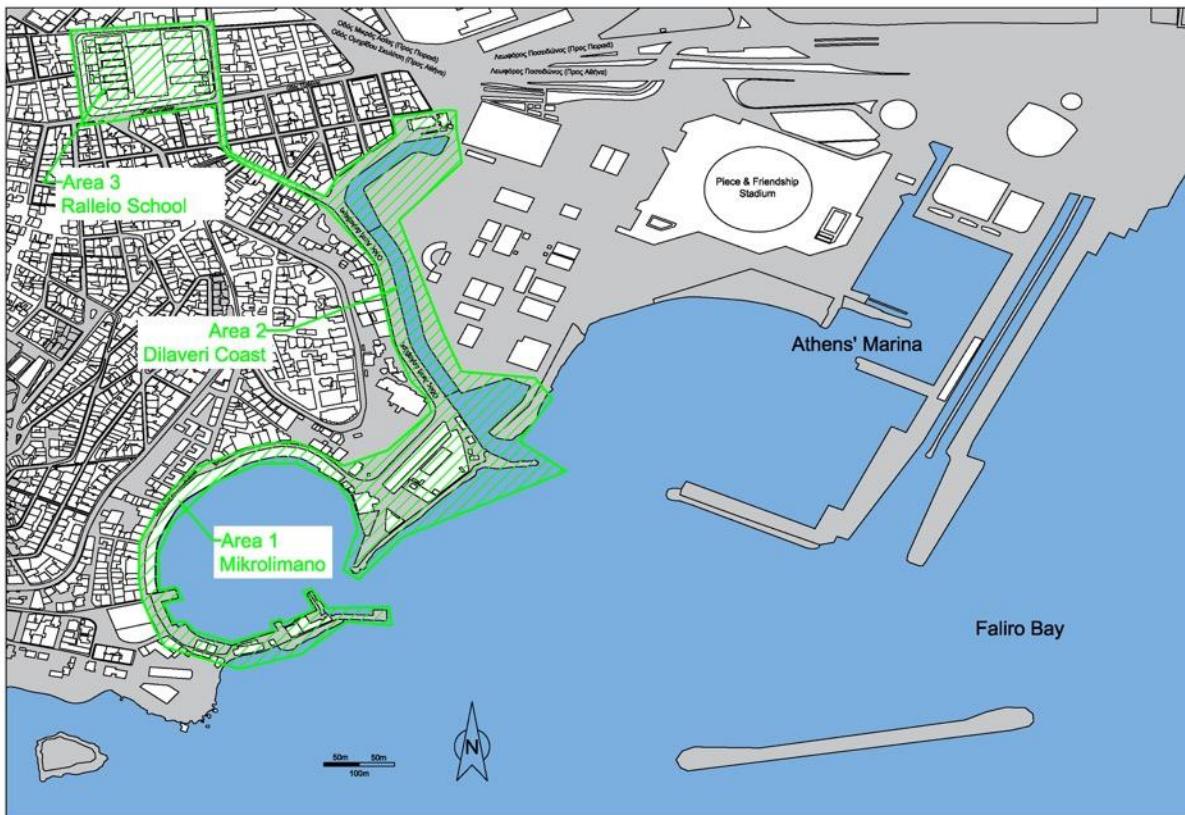
Figure 18. City of Lodz. Old fire wagon and mural in the DSs area

It is situated in a close proximity to the DSs and the National Fire Brigade building and is enriched by the presence of murals (figure 18) that represents another land art element closely related to the DS's local features and functional legacy.

#### 2.1.4 Piraues DSs: Mikrolimano, Akti Dilaveri and Rallion

Demo-sites of Pireaus are constituted of several directly connected areas in close proximity. As shown in figure 19, they are linked one to another, and consist of the Mikrolimano area (area 1), Riverine inland area in Akti Dilaveri (area 2) and Rallion Complex Pilot School (area 3). Currently the demo sites only constitute of on-street planting with opportunities for socialising.

For the renovation of Mikrolimano, there is a signed programming agreement with the region of Attica that aims to a total remake of the Mikrolimano promenade with a budget of € 5 million. Mikrolimano area, will be used as a site for the training of local city planners for pre-planning purpose. The “merge” / “consolidation” of Mikrolimano and Akti Dilaveri areas, will create a continuous coastal front.



*Figure 19. City of Piraeus. General layout of the proposed demo-sites*

In the following figure 20 are shown the plans for the undergoing renovation of the Mikrolimano area. Additionally, in figures 21 and 22, are shown the comparative images of current situation and the future plans in the area of the urban waterfront of Piraeus.

With the renewed promenade area, the Mikrolimano aims to have a more accessible character as visitors will now be able to walk along Koumoundourou Street and view the sea in the South where now they could see restaurants and cafés.

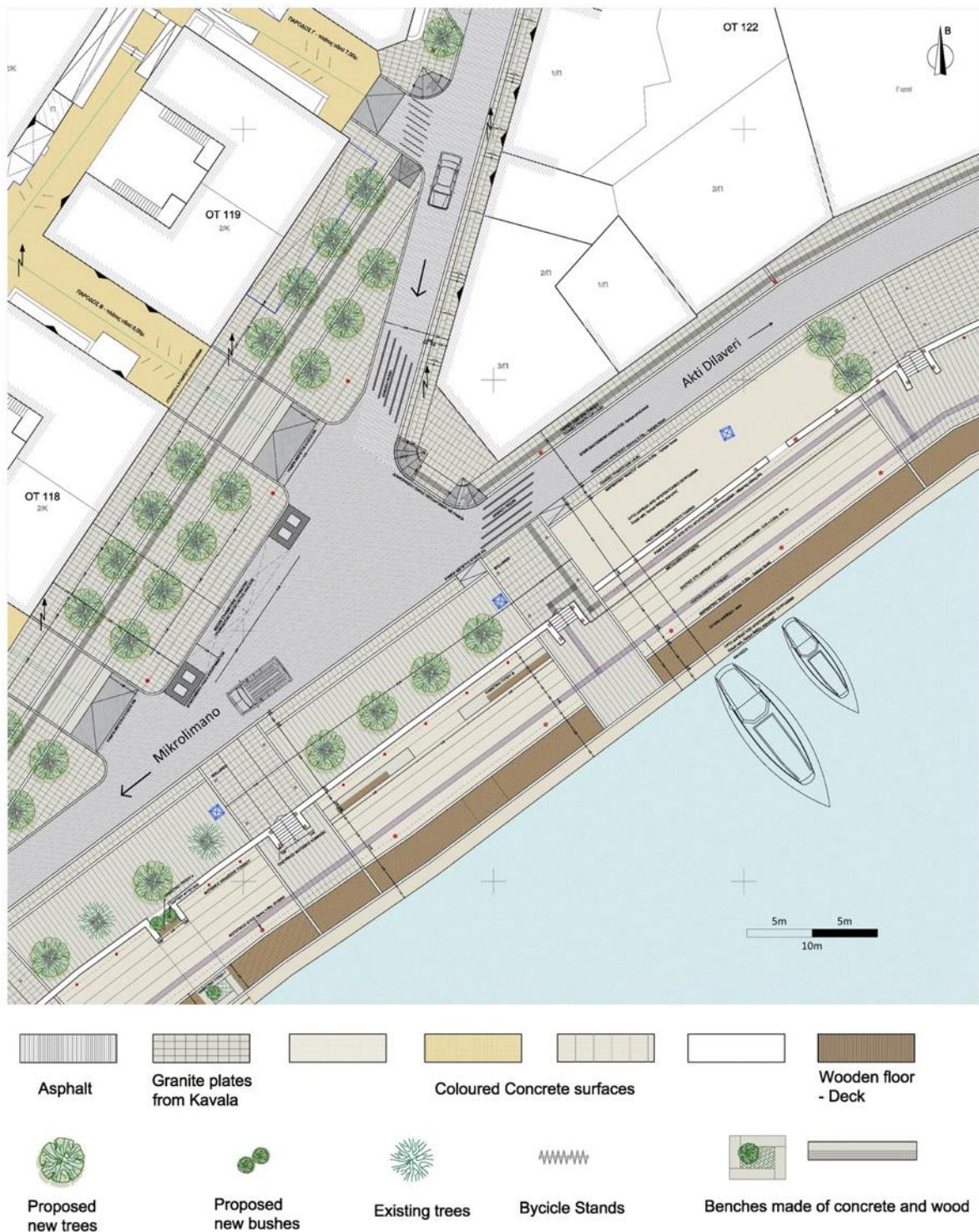


Figure 20. Plans for the undergoing renovation in Mikrolimano DS, City of Piraeus



Figure 21. City of Piraeus. Mikrolimano DS current layout (Source: Municipality of Piraeus)

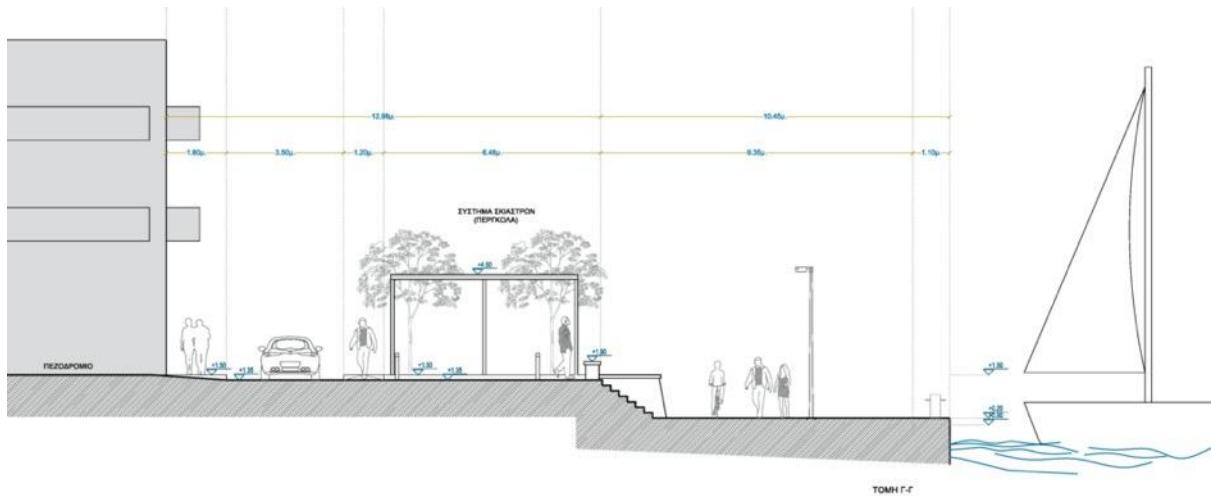


Figure 22. City of Piraeus. Mikrolimano DS proposed renovation (Source: Municipality of Piraeus)

The renovation of the west part of Akti Dilaveri Canal (shown with light blue hatch in the site description figure 23) is in the final phase of design. With green colour are shown the green open spaces that are going to be formed. There are also plans for the renovation of the east part of the Dilaveri Canal (the area is under the Peace and Friendship / SEF Stadium's control) that have not been announced to us yet due to the phase of the development.

In Akti Dilaveri Area, there are facilities and activities of hyper-local interest, such as theatres, stadiums, the marina and the sailing clubs and of course coffee shops, bars and seafood restaurants.

With the renovation plans for Akti Dilaveri, an extensive pathway will also be created, at both sides of the channel, and two wooden bridges connecting those. Moreover, an extension of the metropolitan cycling road is said to be created in the eastern side of the channel that will also bring more visitors at the area. Given the fact that there is also a summer theatre on the eastern side of the channel a lot of cultural potential seem to be present.

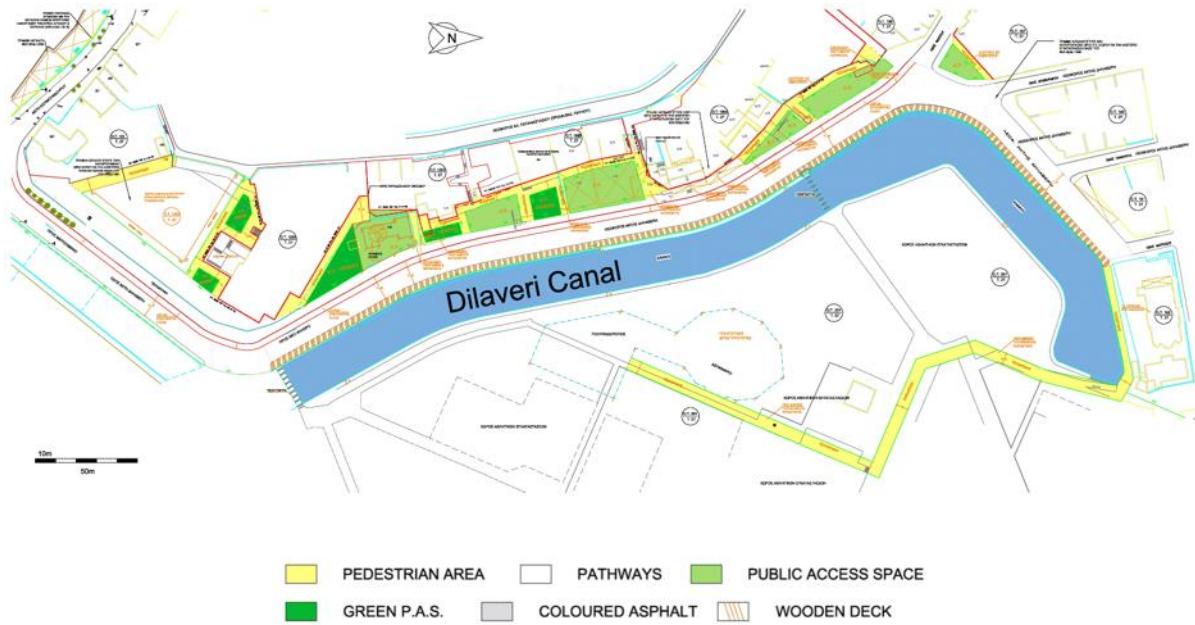


Figure 23. City of Piraeus. Akti Dilaveri DS preliminary renovation plan

One of the demo sites Area 3 (Figure 24) constitutes a school complex from which a building will be used to develop a green roof and a green wall. Furthermore, an NBS will be developed at the school entrance. The street furniture currently surrounding the school complex is in poor condition. A recycling unit is located on one of the school boundaries. A seating area is located at the entrance of the Ralleion School complex used mainly by parents during pick up times. The remaining green spaces surrounding the Ralleion School complex are used for walking dogs, seating and to traverse between destinations.

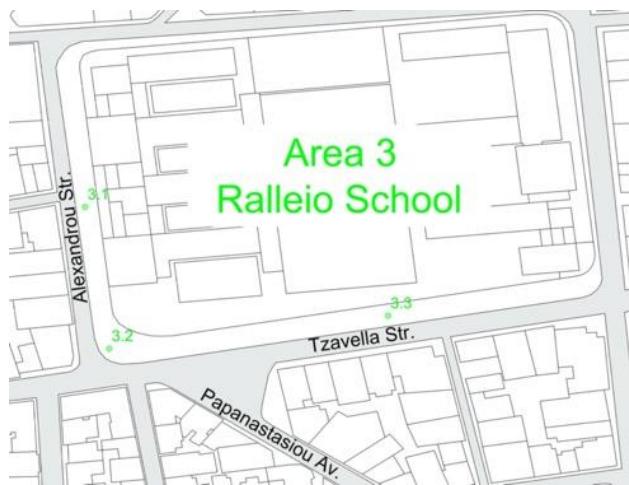


Figure 24. City of Piraeus. Akti Dilaveri DS preliminary renovation plan

The area is a school complex, where the introduction of NBS can have an educational purpose and where the students will grow a better nature conscience.

Ralleion School has an environmental union for educational purposes, where pupils / students are learning about the environment protection, plant cultivation methods, etc.

## 2.2 FL cities CSs local conditions and specific features

FL cities have different size and climatic characteristics and are situated in different countries from in northern and southern Europe, South America and China.

To identify the specific local conditions of every case-study, FL cities prepared the analysis, based on the Questionnaires (Q1 and Q2).

Following chapters contain the local conditions and specific features of four FL cities CSs.

### 2.2.1 Bogota' CS: *El Reencuentro*

Reencuentro is an important area of value for the city of Bogotá. As shown in figure 25, it contains large public spaces and city-scale facilities, such as the Central Cemetery; El Renacimiento Park; the District Administrative Centre; City Council; the Memory, Peace and Reconciliation Centre and "Corferias", a large events venue.

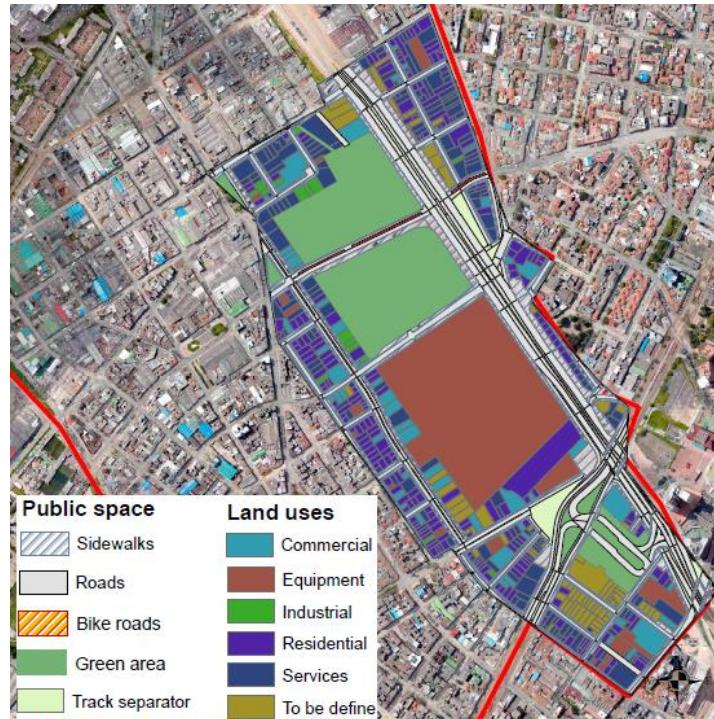
The 26th Street is this piece's articulating axis, which is where the north and south ends of the city meet and has an important historic and symbolic value (Figure 26). These are the reasons why it's called Reencuentro (Reunion). This axis also connects the project to other facilities such as the National University and the El Dorado International Airport as the entrance to the city.



Figure 25. City of Bogota'. *El Reencuentro* case study

For the euPOLIS project case study, a smaller area was defined (51.4 ha). The current surface covered in the study area is divided by the following land uses, shown in figure 26: commercial (2.68 ha), equipment such as schools, hospitals, meeting points and cemeteries (8.96 ha), industrial (0.46 ha), residential (5.69 ha), services that will be defined in the Master Plans (4.94 ha) and to be defined (2.38

ha). It also has 6.8 ha of sidewalks, 8.64 ha of green areas, 0.22 ha of bike routes, and 10.68 ha of main roads connecting the city centre with the facilities found to the east.



*Figure 26. City of Bogota'. El Reencuentro case study. Land uses and public spaces*

This zone is frequently used by citizens not only for transportation but for recreational purposes as well (figure 27). On Sundays, the study zone is part of an event known as "Ciclovia" whereby the local Council allows the main road of the city to be used by cyclists and pedestrians only and not by motorized vehicles (e.g., car, bus or motorcycles) during an established time period. Also, some facilities of the study zone promote the presence of different types of visitors as the Central Cemetery and the Centre of Memory, Peace, and Reconciliation that was founded in 2008 as a place to dignify the memory of the victims of the social conflict of the country. In this place, citizens can use the public space to enjoy the artistic expositions and as a meeting point to create a collective memory.



*Figure 27. City of Bogota'. El Reencuentro case study. Recreational use<sup>5</sup>*

<sup>5</sup> <https://bogota.gov.co/que-hacer/recreacion-y-deporte/ciclovia-de-la-carrera-7-y-calle-26-sera-modificada-partir-de-este-d>

It is considering a strategic centre of the city because it consolidates both high level urban operations and interventions related with public and occupational systems that establish the land occupational model. Although, it requires the implementation of public and private projects to ensure the best physical and functional conditions.



*Figure 28. City of Bogota'. El Reencuentro case study. Density population*

The potential development of the study zone is related in the support capacity of El Reencuentro project. The capacity of support is related with the relationship between the functional public infrastructures of the city, such as the mobility systems, the public space systems, the equipment systems, the patrimonial systems and the public services systems; with the actual and future conditions of population, population density (figure 28), potential buildings and land uses.

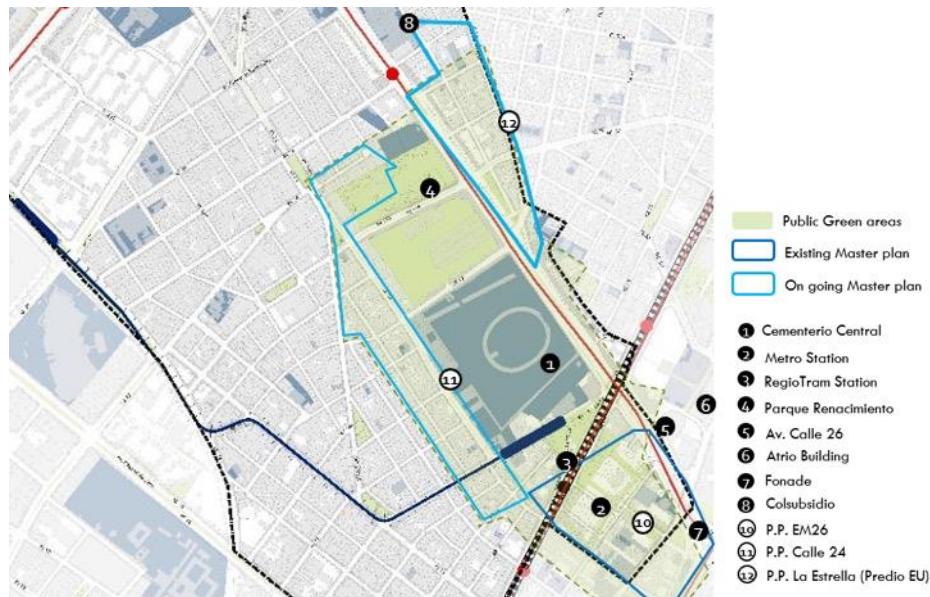


Figure 29. City of Bogota'. El Reencuentro case study. Transport scheme

Nowadays the study zone has 2 stations of Transmilenio<sup>6</sup> (a bus rapid transit system). However, the partial plans the renewal plans called “Calle 24” and “Estación metro calle 26” that are being formulated include a renovation and greenery strategy of the public space, and the design of the centre of public transportation connections of Transmilenio, the future METRO, and an important station of the advanced regional transportation system – Regiotram<sup>7</sup> (transport scheme shown in figure 29).

## 2.2.2 Fengxi New City CS

Fengxi New City of Xixian New Area is located in Shaanxi province of China, close to the historic city - Xi'an, with a planning area of 143km<sup>2</sup>. It is the ruins of Fengjing of the Western Zhou Dynasty, which is the earliest city in China. Now the 46km<sup>2</sup> of its core area is already constructed as business parks, residential areas and public spaces. Great importance is attached to green development in Fengxi New city. The green space ratio of Fengxi New city is about 50% and its percentage of greenery coverage is about 60%.

Regarding Sponge City<sup>8</sup> construction, since 2011, Fengxi New City has introduced the idea of regional rainwater management and Low Impact Development into its city planning, and actively carried out research and practise. In April 2015, Fengxi New City has been selected as one of the first batch of pilot Sponge Cities by the Chinese government. Also, in July 2019, it was authorized for the global ecological demonstration pilot project of hydrology by the United Nations educational, scientific and cultural organization (UNESCO).

Currently, Fengxi New City promotes the concept of sponge city throughout the entire city, and it has finished a lot of successful projects, including sponge neighbourhoods, roads, parks and other public service projects. Urban drainage and water-logging prevention capacity has been significantly

<sup>6</sup> <https://www.transmilenio.gov.co>

<sup>7</sup> <https://www.railwaygazette.com/projects-and-planning/bogota-regiotram-de-occidente-contract-awarded/55530.article>

<sup>8</sup> World Future Council Website: <https://www.worldfuturecouncil.org/sponge-cities-what-is-it-all-about/>

improved, and the quality of the water environment has continued to improve. Meanwhile, Sponge City in Fengxi New City is not only focus on rainwater harvest and urban flooding control, but also focus on urban public spaces construction, river protection and restoration, as well as biodiversity, just as NBS. By promoting sponge city construction in Fengxi New City, Now the whole city's ecological environment is greatly improved.

The development of green energy is another successful of Fengxi New City (figure 30). Here, the city uses deep geothermal energy to replace coal or natural gas for heating in winter, which is very environmental, green and sustainable. Now the city has compiled some standards and technical guides for the development of deep geothermal energy. Fengxi New City is working to toward building an integrated energy system, to build a lower-carbon, more ecological, sustainable and healthy city.



*Figure 30. Fengxi New City Case Study. Project visualisation*

As to accessibility by public and private transport, Fengxi New City will be built with small blocks and dense road network, and intercity railway, subway and intelligent rail transit will be constructed with TOD<sup>9</sup> (transit-oriented development) mode, to integrate transportation hub, business, catering and other life service functions and to build a green and low-carbon city. Fengxi New City will also comprehensively promote advanced technologies such as passive buildings, healthy buildings and prefabricated buildings, with a view to build an ideal city model that integrates city and people, city and ecology harmoniously.



*Figure 31. Fengxi New City Case Study. View.*

<sup>9</sup> <http://www.tod.org>



Currently, Fengxi New City, currently in construction (figure 31) promotes<sup>10</sup> the concept of sponge city around the whole city and have finished a lot of successful projects, including sponge neighbourhoods, roads, parks and other public service projects. Urban drainage and water-logging prevention capacity has been significantly improved, and water environment quality has continued to improve.

### **2.2.3 Limassol CS: Public Garden**

The Public Garden of Limassol is located in the city centre (Limassol is located in the southern coast of the island), right in the heart of the city and at the coastal front of Limassol's touristic area, as illustrated in figure 32. Its location gives the opportunity of being visited not only by the local people but also by tourists, as it is very accessible, near to many accommodation services and in walking distance from the famous Limassol's embankment and the pedestrian street.

Limassol Municipality aims to create a green area for the public (locals and tourists) to use it during leisure and exercising time, introducing green paths for motivating the public to walk. The vision is to succeed a transformation of the existing Limassol's public garden to a garden with all kinds of Cypriot and generally Mediterranean shrubs and herbs, with trees along the way and benches for people to rest after their walk, exercise or even to enjoy their afternoon coffee.

The public garden is a well-known popular sightseeing place due to the existence of the house of the "Garden's Theatre", which hosts various performances and concerts especially during the summertime and for the occasionally special events, festivals (like charity events), and the Cypriot annual wine festival. It is also houses the Limassol Zoo, which gives an added value to the garden concept and makes the area an ideal family spot. Currently, there is a playground inside the garden, some old exhibition buildings with references to historical activities, some paths for walking along and some trees that provide small shading areas for the visitors.

As dimensional characteristics, the Limassol's public garden has a surface of 59729 m<sup>2</sup> and its surface consists of approximately 10% asphaltic, 10% bricks/tiles/concrete/dash and 80% of ground earth/soil. There is one prefab kiosk and a listed building, while the Zoo (that covers almost the 15% of the public garden) contains prefab cages, covered by hard ground and various info points along the sidewalk. Inside the garden there is a square and a playground for children near the kiosk/cafe, and there are sidewalks along the paths. Limassol's Public Garden is considered a cultural heritage place as it was constructed during Cyprus was a British Colony, which gives the whole place strong local identity and recognizability.

<sup>10</sup> World Future Council Website: <https://www.worldfuturecouncil.org/sponge-cities-what-is-it-all-about/>



*Figure 32. City of Limassol. Public Garden and its accessibility*

As a place, it is both local and touristic territory which hosts various and wide range social groups (such as married couples for walking, singles, parents with children, teenagers, multicultural/immigrants/tourists). Inside the garden there are benches across the park for giving the opportunity to the visitors' rest under the trees' shading areas, chairs mainly at the kiosk area and trash bins.

As it was mentioned above, the garden is located in the city center near the coastal front in the main Limassol touristic area, which gives it a high accessibility rate as the general public is in position to access it with various means like cycling, private vehicles, public transport/bus and even walking. There are 3 main bus stops near the garden in different directions (in walking distance) and there is also a very usual bus line (number 30 that both local people and tourists use), which has a frequency of every 5-10 minutes to the whole coastal front and Limassol touristic area.

#### **2.2.4 Palermo CS: villa Turrisi**

The historic agricultural estate of "Villa Turrisi" is located in the western part of the city of Palermo, as illustrated in figure 33, in a plain once named "Conca D'oro" (gold basin) in association to the fruit's colour of the large number of citrus trees present there. Today most of the agricultural lands surrounding the old city have been built up. The building surrounding the area covered by this study is mainly residential and is characterized by poor architectural quality. The building expansion of the 1960s, in addition to sacrificing the greenery, also razed a large part of the ancient agricultural estates, from the 18th and 19th centuries, owned by the nobles and their beautiful manor houses.

Spots of green areas as Villa Turrisi Park remain still now and the municipality's project is to safeguard them and create a network of urban parks, whose physical connection should be a linear greenway park equipped with cycle-pedestrian paths.



*Figure 33. City of Palermo. Villa Turrisi Case Study.*

The green area extends for over 250,000 square meters (25 hectares), for a perimeter of approx. 2.5 km.



*Figure 34. City of Palermo. Villa Turrisi Case Study.*

Most of the area consists of agricultural land. The role played by the presence, among the dense residential area, of a considerable amount of tree vegetation placed within this residual agricultural land is of undoubted value. This vegetation (figure 34) and in particular the continuous supply of new oxygen that it produces, allows to ensure high advantages to an area characterized by a considerable vehicular flow with the relative contributions of pollution from exhaust fumes.

Two streams of considerable importance flow in Parco Villa Turrisi, the *Passo di Rigano* canal and the Borsellino stream. The *Passo di Rigano* canal is, after the Oreto river, the main watercourse that flows in Palermo. It is a torrential canal that collects water from several small tributaries that descend from the north-west area of the city of Palermo; among these streams we find the Luparello, the Celona, the *Mortillaro*, and the same Borsellino which joins the *Canale Passo di Rigano* right inside the Park. All canal and streams are currently fully channelled and covered by concrete.

The two waterways are easily identifiable from the satellite photos because, after the concrete cover, they look like common roadways. In certain sections the slab is in precarious conditions, to the point that it is possible to see the iron frame. Furthermore, despite the transit bans (marked with signs), the slabs are regularly travelled by cars and large means of transporting goods.

There are several disused historic buildings around the park, important both for their beauty and for the historical value they represent. In particular, there are several remains of hydrophore architecture of Arab heritage as water towers, water reserves, wells, irrigation systems, elements of the old Palermo-Camporeale railway line complete with a station, Torre Mango, some elements of the destroyed Villa Turrisi-Bonvicino (of particular interest is one of the accessory bodies of the villa, survived today and which has a hexagonal plan), and other architectural assets.

For the private part there are sports facility with tennis courts, productive buildings and illegal buildings.

Dimension of public spaces in the case-study area is Approx. 26.000 square meters. At the moment the park area is not equipped for the public (there are no squares, street furniture, playgrounds), it only has green areas and private commercial activities.

There is neither public lighting system in the park nor other facilities, except for the roads that cross/delimit it. The park area is crossed by a main road axis with a sidewalk and is served by the tram and the bus line. There is also a car sharing parking.

The park takes its name from the estate of Villa Turrisi owned by Turrisi-Colonna (of Bonvicino) Barons, extended for a large part of the park itself. The Turrisi estate was built in 1859 by aggregating state-owned and privately owned land that belonged to the Starrabba princes of Giardinelli. Today of the ancient complex only a few cottages remain and the stone pillars and the (secondary) entrance portal (moved from the original location).

The fund was among the main centres of agricultural experimentation that in the nineteenth century. marked the territory of Palermo. In fact, it must be remembered that Baron Nicolò Turrisi, in addition to being an important politician (mayor, parliamentarian of the Kingdom, etc.), was a brilliant agronomist and that in his estate he kept part of his experiments<sup>11</sup>. After the early 1860s, the Baron retired from political life and settled in Passo di Rigano. Here he creates a model garden and dedicates himself to the rational breeding of rabbits and the production of honey with hives. He was in fact an innovator in water systems and the estate was also known for having one of the largest and most modern wells in the Palermo countryside. The estate had an articulated land irrigation system based on an underground drainage duct, approximately 1.5 km long, whose current existence, if proved, would deserve protection as a historic work of hydraulic engineering.

## 2.2.5 Trebinje CS: Otok

Trebinje is the southernmost city of Republika Srpska and Bosnia and Herzegovina (figure 35). It has characteristics of Mediterranean city. Trebinje is located at a significant crossroads, on a line that was of great economic importance in the Middle Ages, because it connected Dubrovnik (Ragusa), as the largest Adriatic trade place and the other parts of Balkan. It is located in the valley of the river Trebišnjica, on the borders of Bosnia and Herzegovina, Montenegro and Croatia, at the foot of Mount Leotar. The altitude of the urban part of the city is 275 m.

<sup>11</sup> G. Brucoli, *Una tutela attiva per il patrimonio identitario locale*, in M. Leone (a cura di) "Nuovi Paesaggi urbani per la campagna di Palermo, Roma, Aracne, 2007



Figure 35. City of Trebinje. Otok Case Study.

The case study, called “Otok” (meaning Island in English) is located on the left bank of Trebišnjica river. The river island was formed between the riverbed and the tributary of the river Trebišnjica<sup>12</sup>.

The area used to be a large cherry orchard, and in addition, its peripheral part towards the water surface was used for recreational purposes. In the wider urban area of the city (figure 36), it occupies a central place and green space. Horticultural objects are also elements of cultural and historical heritage. Theirs spatial form, manner and intensity of use in the city are indicators of the specificity of the city, and as structures of unique and special features they transform and change over time. Degradation of green structure is a phenomenon that indicates conflict in the process of city development, but also evidence violation of the environmental value of Trebinje. Horticultural facilities do not satisfy either quantitatively or qualitatively. The total area of green structures in the narrowest part of the city is still insufficient according to normative and actual needs. Sustainable green development can be provided only by Intertwining natural, created and general influencing factors based on planning settings in all phases of implementation. According to the existing urban plan, the location of the case study was treated as a protection zone along the river Trebišnjica, which is a 96.5 km long sinking river. It used to be the largest sinking river in Europe, before the construction of hydroelectric power plants.

Hydropower plants are one of the causes of river devastation, and now design practices should change and rely on renewable energy sources and its savings. The plan is to adopt a new urban and regulatory plan that would turn the subject location into an attractive space in the service of all citizens. The location is well connected to the traffic matrix, it is easily accessible by car and pedestrian access, but it is necessary to develop infrastructure on the site itself because the location is an undeveloped space. The area is covered with grassy areas and the embankments have been made for the purpose of arranging the riverbed and flood protection. In case of high-water levels, the area in question is partially flooded. In order to determine the detailed characteristics of the terrain and to make permanent flood protection, it is necessary to do a geological study. The green structure on the site is modest and not of great importance in terms of biodiversity. The area, covered by the CS is approximately 15,5 ha. The main road divides this area into two parts: 5,5 ha and 10 ha. On the smaller

<sup>12</sup> Vukojevic d., *Geomorphological specific features of Trebinje as tourist attraction*, Journal of the Geographical Institute Jovan Cvijić, Januar, 2011

part, the construction of sports and the recreation centre is planned, and on the larger part housing and hospitality facilities, hotels, etc.



*Figure 36. City of Trebinje. Otok Case Study. Bird's eye view*

The experience gained in the euPOLIS project on specific aspects of Innovative planning, customised to the development of the karst region, and specific NBS/BGS will be used in cities with similar geomorphological features. As seen in the wider urban area, the boundaries of the case study are formed by live urban streams of exceptional beauty.

Due to the Mediterranean climate with short mild winters and hot summers and a lots of sun during all 4 seasons, this place has a great potential for sustainable development of specific forms urban life. Solar energy would be a significant potential for the location of the case study if the thoughtful design of space in the vertical sense and the disposition of the built structure in space were considered. The city has started with the construction of bicycle and pedestrian paths along the river canal. A row of plane trees has been planted along the landscaped canal, which will provide natural shade in the future. It is planned to build public lighting through solar panels.

Diversity of the size and the scale of FR demo-sites and FL case studies will facilitate extrapolation of the euPOLIS results to bigger scale at the level of whole city and to the other cities with similar climate conditions.

### 3. Characteristics of existing natural elements

#### 3.1 Characteristics of existing natural elements (non-built environment) in FR DSs

In the local demo-sites analysis the special attention is dedicated to the existing natural elements. This analysis includes the characteristics of natural elements in FR DSs, such as:

- Quality of trees, shrubs, grass and other NBS.
- Approximate area covered by shrubs and grass.
- Approximate area covered by water surface bodies.
- Land use data: areas covered by other permeable surfaces; area covered by non-permeable.

This chapter also contains the overview of the potential environmental issues on the site:

- Specific climate characteristics
- Presence of Heat Island effect
- Percentage of shading in critical summer months
- Protection from winter winds
- Air paths and breezeways
- Biodiversity features
- Interactions between the site natural elements and the surrounding buildings

##### 3.1.1 Belgrade DSs: Usce and Linear Park

Two demo-sites in Belgrade have different characteristics of existing natural elements.

In the DS Usce in Belgrade (figure 37), there is a number of different types of trees at both park sections. The existing trees and greenery are not distributed in an adequate manner and in relation to existing amenities. The micro-location for project NBS interventions will be selected to best blend into the existing landscape design. The quality of pedestrian walkways as well as recreational routes is generally good, but with potential for certain improvements. As in some sections there is no satisfactory quality of pedestrian walkways. The main pedestrian walkway is the waterfront quay, while there are no developed paths within the park.



Figure 37. Local vegetation of the Usce demo-site area in Belgrade

The area contains non polluted, healthy soil. The nutrition quality will be established during the euPOLIS monitoring process. There are some areas where permeability quality might be influenced by euPOLIS project. There is no area covered by water bodies in Usce or Liner Park.

*Table 2. Approximate area covered by trees planted on permeable surfaces, shrubs and grass, Usce, Belgrade*

	<b>S1</b>	<b>S2</b>
<b>Total area (m2)</b>	60,000 m2	29,300 m2
<b>Permeable area (m2)</b>	43,500 m2	24,300 m2
<b>Impermeable area (m2)</b>	6,500 m2	5000 m2
<b>Roofs (%)</b>	0	3,5%
<b>Streets (%)</b>	0	0
<b>Sidewalks (%)</b>	0	0
<b>Parking places with trees (%)</b>	0	0
<b>Parking places without trees (%)</b>	0	4%

The presence of the following indigenous trees in Linear Park Area are shown in figures 38-39 currently has no specific functionality.



*Figure 38. Local vegetation of the Linear Park demo-site area in Belgrade*



*Figure 39. Local vegetation of the Linear Park demo-site area in Belgrade*

There are several environmental issues to mention in DSs of Belgrade. Generally, there is presence of UHI heat island effect due to the wrong Albedo effect and materialization of streets and some walkways. The Subjective feeling in the area indicates that there is a presence of the Heat Island effect. Additionally, buildings around the zone are made of high thermal inertia materials exposed to the outdoors which has negative heat island effect. Summertime temperatures are higher in the area one to two hours, and up to 3 h after sunset. Shading is considered insufficient for the users' well-being.

Both park sections are offering facilities conducive to the overall public well-being enhancement. This all shows vast potential for improvements. The negative effects could be defined as coming from two sources: one is pollution from the surrounding traffic and the other would be not always responsible behaviour of park visitors.

Expected impacts of climate change in the area are decrease in the number of rainy days, prolonged dry periods and increased daily mean temperature. The actual City data will have to be analysed for the more adequate estimate of these risks.

There is ground water energy potential that was not exploited to date. There is also interesting wind energy potential due to the Kosava wind from Danube. The average intensity of solar radiation in Belgrade is about 1400 kWh/m<sup>2</sup>/year, which is high energy potential.

There are no wastewater and site water management advanced solutions applied at this demo site. The wastewater is connected to the city sewerage system and surface water management does not exist at the required level.

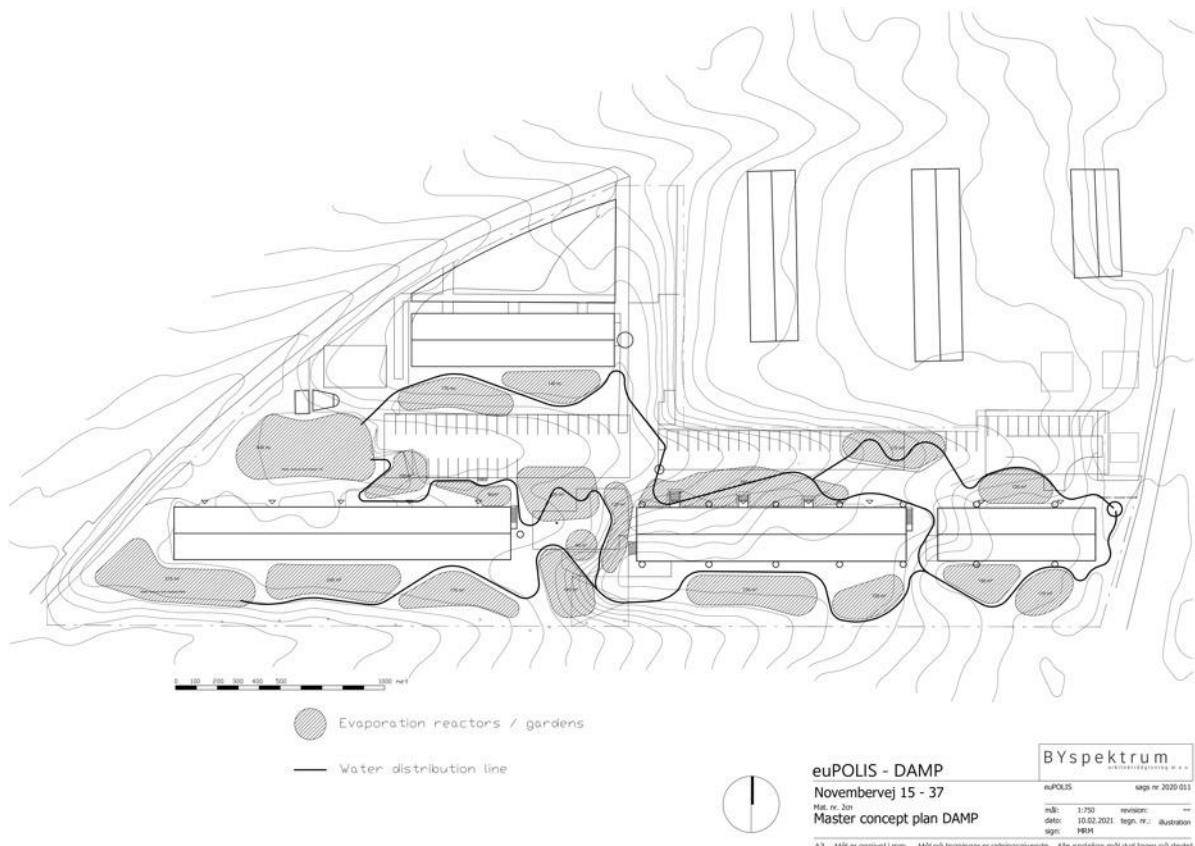
The city of Belgrade is currently making efforts to introduce at least basic waste management principles at the city level. Hence, there is serious potential for waste management and recycling from demo sites as well.

There is no study on the extent of biodiversity in the area.

### **3.1.2     *Gladsaxe DS: Pileparken 6***

The DAMP project in Gladsaxe is an urban climate adaptation demonstration program launched by the Municipality of Gladsaxe in 2018 (figure 40). The project team consists of 8 private and public partners including the University of Copenhagen and the Public Water Utility, landscape architects, engineers, researchers, and biologists. The DAMP project aims to develop scalable green solutions to treat rainwater exclusively by evaporation. The techniques will be demonstrated in a full-scale project developed for the euPOLIS site in Gladsaxe.

The project is based on interdisciplinary cooperation involving the local municipality, the Water Utility service, architects, engineers, scientists, biologists, residents, and operating staff to achieve green recreational solutions to obtain local management of water exclusively based on evaporation.



*Figure 40. Concept plan of the demo-site area in Gladsaxe*

The area of Gladsaxe DS is characterized by different existing green areas (number 1 in figure 41) and species of vegetation that include: Syringa vulgaris (number 2 in figure 41), Viburnum tinus (number 4 in figure 41), Viburnum bodnantense (number 1 in figure 41). Plan, shown in figure 41 is indicating the position of the species on the demo-site.

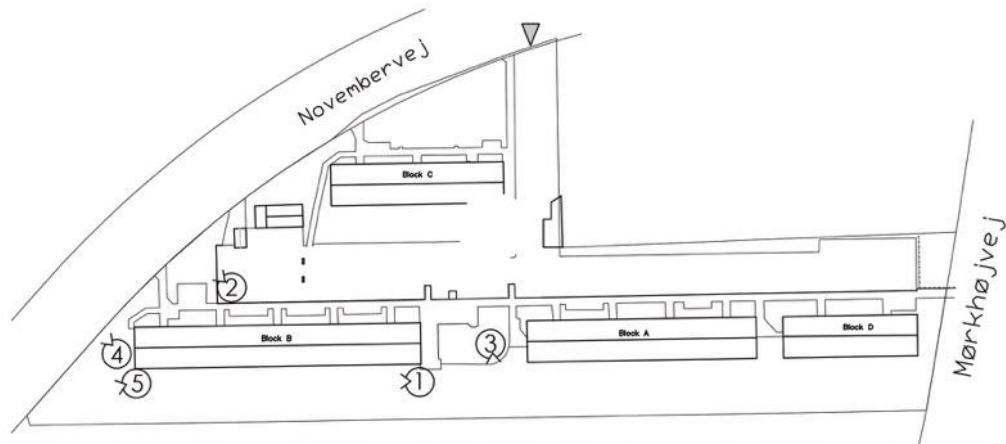


Figure 41. Gladsaxe. Selection of plants present on the DSs area

Pileparken 6 is placed quite central to other nature areas such as Utterslev mose, Gyngemose Syd, Høje Gladsaxe Park, Gyngemose nord, Kagsmosen, Fæstningskanalen, and Viemoseparken (Figure 42). This highlights the potential of colonisation by the local species from these areas to the future implemented NBS in Pileparken 6.

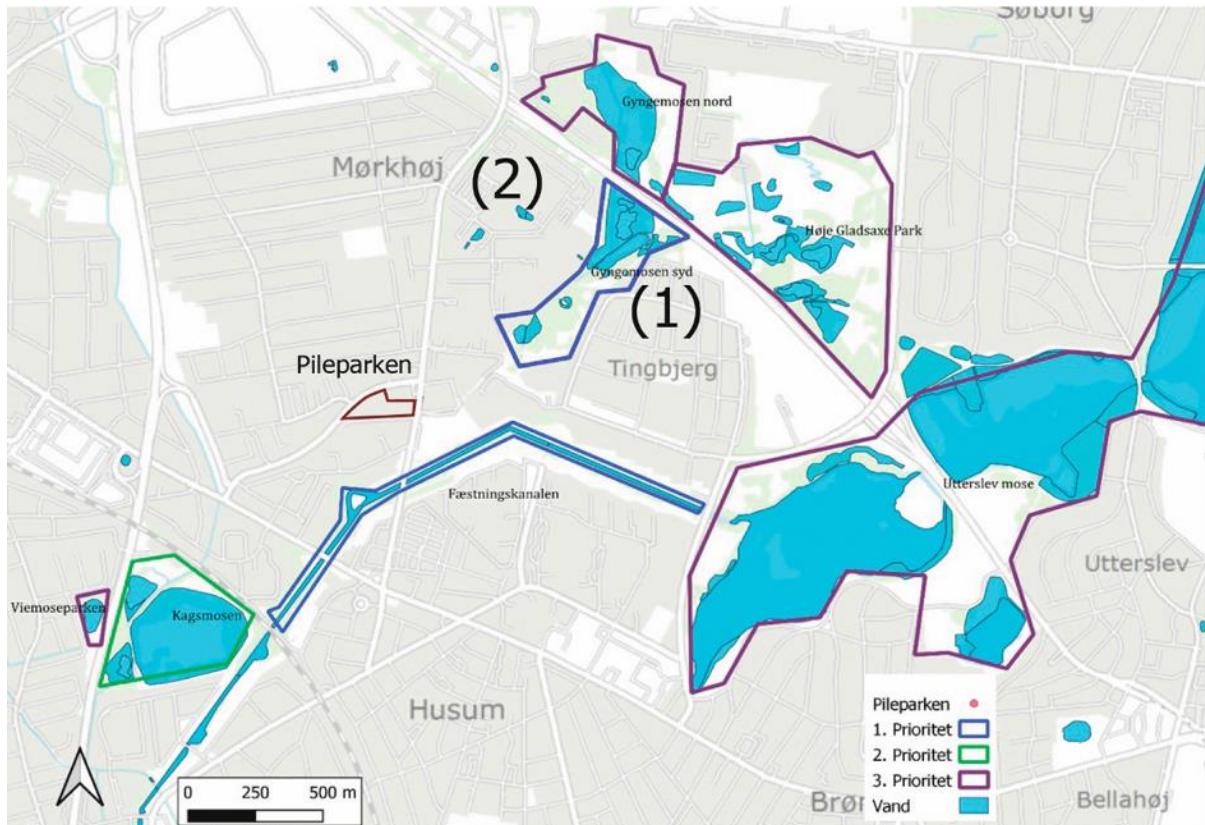


Figure 42. Concept plan of the demo-site area in Gladsaxe

Some monitoring has been performed in some of these nature areas, especially in Gyngemose syd and near Gyngemose Park. Some species there have been identified, such as the EU protected species, Annex II from the Habitats Directive, *Triturus cristatus*, and more common species such as *Bufo bufo* and *Lissotriton vulgaris*.

Some of the ponds and lakes within Gyngemose Syd, TV-byen and Gyngemose Park are protected by the Nature Protection Act §3 from the Danish Ministry of the Environment and Food<sup>13</sup>. This law specifies that no changes of habitats must be made on lakes and rivers that are less than 2500 m<sup>2</sup> unless one has a permission from the local authority. Therefore, it can be expected that the present biodiversity is not very affected by humans and can develop without too much disturbance. These protected surroundings of Pileparken can potentially be biodiversity hotspots while Pileparken could become a stepping corridor between these protected areas, when the local species would use as a foraging area, hibernation or even breeding place for some of them.

Throughout euPOLIS, a comprehensive monitoring will be performed on site but also in the close surroundings to assess the potential of colonisation of local species. This includes Amphibians, birds, bats, insects (e.g., butterflies, dragonflies), macroinvertebrates. The nature-based solutions with water bodies will attract most likely first the

<sup>13</sup> Promulgation of the Nature Conservation Act, LBK nr. 240, 2019, Ministry of Environment and Food <https://www.retsinformation.dk/eli/Ita/2019/240>

water insects. In the summertime, the dragonflies may come to the new created pond for foraging and rest in the surrounding vegetation.

In general, the soil in the area, consists of heavy clay-soil. This means, that rainwater cannot easily penetrate the upper soils, meaning that local seepage of water is not possible (or allowed), as this most likely will affect the secondary groundwater levels locally, risking water in basements etc.

Challenges regarding raising secondary groundwater, is observed in increasing number of areas in Denmark. Therefore, the project with the ambition of handling all rainwater through on the about local evaporation, is of great interest of Gladsaxe Municipality, as well as many other municipalities, utility companies, production companies and universities. This type of installation might have great potential in Denmark, as well as the rest of the world.

Pileparken 6 consists of a large lawn area in the Southern part of the residential area, with a “tree raw” called here “forest edge”, which delimits the area from the road. Some tree species have already been identified but a comprehensive assessment of the quality of the existing trees will take place later in the project (Figure 43).

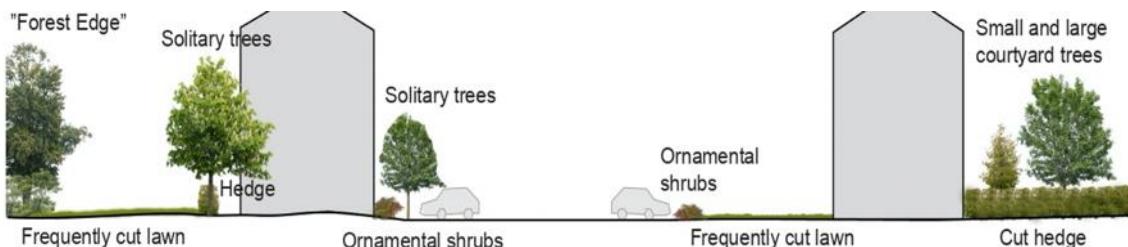


Figure 43. Cross-section scheme of vegetation types in Gladsaxe DS, Pileparken 6

Besides the large parking lots, there are two other lawns rather small in the Northern part of Pileparken 6. As illustrated in the scheme (Figure 43) There are isolated trees and ornamental shrubs around the buildings. Some of the tree species e.g., *Aesculus hippocastanum* provide substantial shading areas. *Aesculus hippocastanum* has also an excellent capacity at binding gaseous pollutants. It can bind fine particles, like *Sorbus aucuparia*. The existing tree species also provide support for biodiversity thanks to its fruits (*Sorbus aucuparia*, *Aesculus hippocastanum*) and flowers (*Syringa vulgaris*).

Events with flooding of hallways and basements in the western block are occurring due to heavy rainfall. The existing lawn does not retain enough stormwater runoff. The lawn is frequently cut in the area, not allowing wild plants to grow. The large parking lots makes the area impermeable.

However, some of tree species provide important risks of allergies, such as *Quercus frainetto* and *Fraxinus excelsior* (figure 44).

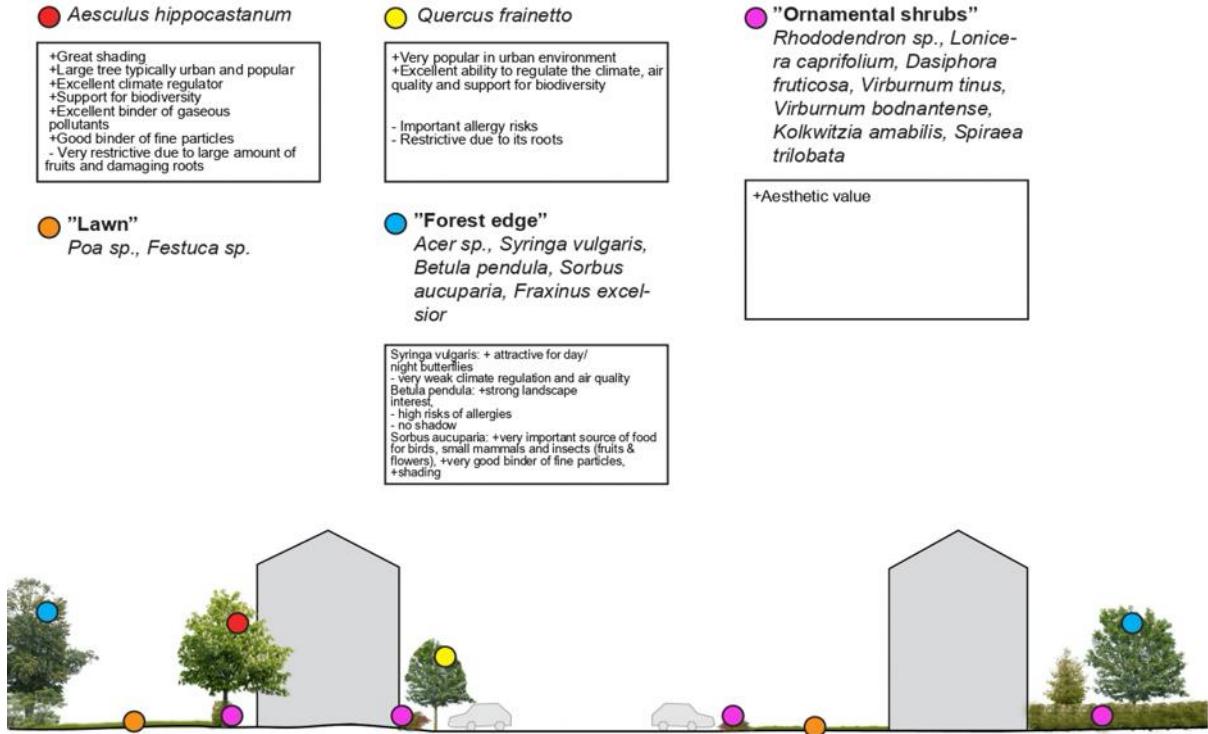


Figure 44. Description of vegetation structure and its functions in Gladsaxe DS, Pileparken 6

No UHI has been made in the municipality. This has not been a focus in Gladsaxe municipality yet. The dominance of cool seasons in Denmark has not traditionally raised any concern.

But as the city grows, the focus on health and well-being becomes more and more a central topic, and the recent years the summers have been warmer and longer. Reducing the UHI effect has therefore begun to be conducted in Denmark.

The issue about UHI is expected to be a topic in the DAMP project since the increasing of local evaporation will have an effect on the local climate and temperature.

The DAMP project introduces a new approach to handle rainwater locally in urban context. The facility stores and exposes water at the terrain. The recreational potentiality of the water will be explored through the development of the project.

The evaporation technology will attract more biodiversity by creating new habitats at the site. The new flora and fauna will have both a recreational and an educational potential. By combining the evaporation facility with kitchen gardens, it is a wish to create an ownership to the facility among the residents. There is a potential for integrating them in preserving the new nature-based solution.

The evaporation facility is expected to have an impact on both the local natural environment and the social behavior. The new urban space is expected to draw attention both educational by visits to the site by the local schools and by visitors having a technical interest in the plant or simply being curious.

### 3.1.3 *Lodz DS: Pasaz Anny Rynkowskiej*

The Environmental Management Department of the City of Łódź Office undertakes a wide range of actions aimed at implementing blue-green infrastructure solutions in the city. Implementation of the issues will take place in future years. It is likely that they will be carried out in parallel with the investments of the euPOLIS program as well as after their completion.

Eight geological boreholes in the immediate vicinity of the plots included in the euPOLIS project, i.e., plots 335/6; 335/5 and 336/1 as well as 172/5 and 172/7 precinct S-6 in Łódź, were analysed on the basis of data available on the portal of the Polish Geological Institute.

All boreholes were drilled to the depth of about 10 m.

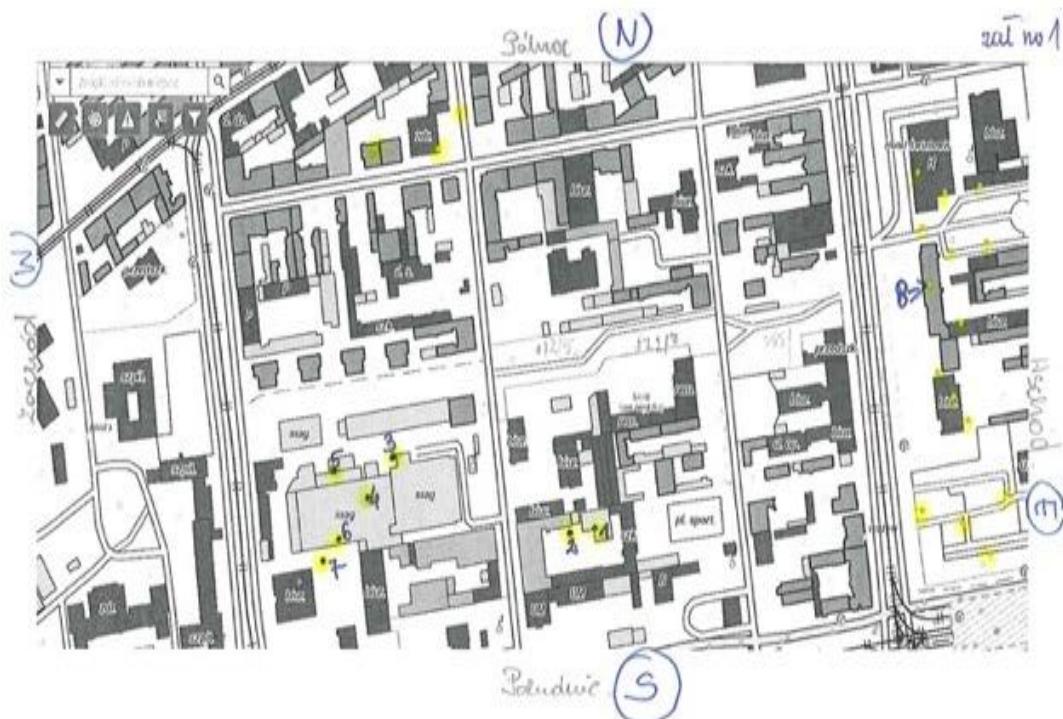


Figure 45. Geological boreholes in Lodz DS

The largest number of boreholes in the immediate vicinity of the project plots is located in the south-western direction (boreholes no. 3,4,5,6,7), two boreholes on the southern side (no. 1 and 2) and one borehole (no. 8) on the eastern side (Figure 45).

All of the analysed points have in their top layer non-construction mound, sometimes with a layer of sand - in total up to 2 m depth. Above 2 m depth there are numerous Quaternary sandy or silty clay layers with an average thickness of 8 m.

In figure 46-47 are shown views of the existing green areas and vegetation in Lodz DS area.



Figure 46. Existing green areas in Lodz DS



Figure 47. Existing green areas in Lodz DS

The project area certainly has a soil character similar, if not the same, as the analysed areas. However, in order to make an unambiguous assessment of the soils for the purposes of the project, it would be necessary to commission boreholes to be drilled within the indicated plots.

The relief of the terrain was also analysed. The slope of the terrain on plot no. 335/5 and 335/1 runs towards the west. The lowest areas on these plots are located in the western parts. The slope on plot no. 335/5 is 0.8 %. The slope on parcel 335/1 is the steepest at 2.1%.

On parcel 335/6 the slope of the land is visible in the central part of the parcel and is less than 1%. Therefore, analysing the terrain profiles and its relief, the western edges of the plots are the most favourable from the natural and economic point of view to be used for the construction of green and blue architecture. In the natural depressions of the land, taking advantage of surface runoff, rain gardens and other facilities not requiring permeable ground may be established.

Infiltration conditions will allow the establishment of such a garden, structurally a typical garden requires, a depression of 20-40 cm. They are established on land having slopes not exceeding 12%. In the area covered by the application on the basis of data from the geoportal can be seen "underground" remains of former objects, during earthworks can be found building remains.

The part of the area is protected from winter winds by other buildings and by trees, the passage Gdańsk-Wólczańska provides no protection. Additionally, the whole demo site is located in West-East direction – the most frequent wind direction.

*Table 3. Lodz, DSs permeable and impermeable surfaces*

Area	Description	M2
Permeable Surface	lawn with greenery	5352
Permeable Surface	sand (playground)	293
Impermeable Surface	sidewalks	1763
Impermeable surface	parking	106
Impermeable surface	concrete (playing field)	247
Impermeable surface	concrete (infrastructure)	17
Impermeable surface	building (tenement house)	448

The demo site is located in the very core of Łódź UHI. The general information about temperatures and UHI is of low resolution. There are two stations which can possibly be used for UHI estimates – meteorological station of the Lublinek airport (city outskirts) and the Lipowa monitoring site (close to the demo site). There are also maps of UHI for the whole city scale.

Current data indicate that the highest values of UHI are observed during cloudless calm nights (Fortuniak et al. 2014). The typical UHI intensity in Łódź under such conditions reach 4–7°C in summer and 2–30°C in winter (Kłysik and Fortuniak 1999, Fortuniak et. al 2006), however, the highest values of urban-rural temperature differences (8–90°C) do appear from time-to-time in the winter season (Fortuniak et al. 2014). During heat wave episodes, the city temperature at night remains a few degrees higher than the rural one. An analysis of the July 2006 heat waves in Łódź (Szcześniowska and Wibig 2008) showed that temperature in the city can remain above the acceptable threshold for a few consecutive days and the city population has no night-time rest from hot temperature. The measurements made on two EC towers at Lipowa show that surface albedo for the central part of Łódź can be estimated to be at a level of 8–10% (Pawlak 2009).

Detailed information about temperature in the demo site will be provided based on in-situ thermal camera monitoring and local meteorological station installed as part of NBS construction. The implementation place itself is a green area located between tenement houses and other buildings in the city centre, with a sidewalk running along it and two rectangular areas of paving stones and asphalt. The continuous thermal monitoring will enable to track spatial, seasonal, and daily patterns in temperature changes, as well as monitoring of impact of NBS implementation.

In the evenings, at 19.00h CET, the town is almost always warmer; the UHI is at the first stage of forming, and its intensity usually reaches 1-2°C. The fast growth of thermal contrast, which starts late in the late afternoon and continues approximately until midnight<sup>14</sup> (Fortuniak 2006). Over 80% of nights are characterized by surplus heat in towns, amounting to 2-4°C, and sporadically to 8°C and more<sup>15</sup> (Kłysik and Fortuniak 1999).

No biodiversity research was conducted in the demo area, neither in the centre of the city as a whole, mostly because it was not considered as a place suitable for biodiversity.

<sup>14</sup> Kłysik, K., Fortuniak, K. (1999) Temporal and spatial characteristics of the urban heat island of Lodz, Poland. *Atmospheric Environment*, 33, 3885-3895

<sup>15</sup> Kłysik and Fortuniak 1999

### 3.1.4 Piraeus DSs: Mikrolimano, Akti Dilaveri and Rallion

Piraeus is blessed with the Mediterranean climate (or dry summer climate) which is characterized by dry summers and mild, wet winters. The main cause of Mediterranean, or dry summer climate, is the subtropical ridge, which extends northwards during the summer and migrates south during the winter due to increasing north–south temperature differences. Taking also into consideration of the coastal character of the areas and the fact that the heat capacity of water is higher than that of air, water provides more stable temperature conditions. As a result, no local weather extremes are to be expected.

The demo-site's areas in Piraeus are characterised by variously consistent range of vegetation. Current planting condition of DSs Area 1, Mikrolimano, can't be provided due to the undergoing renovation of Mikrolimano.

The planting condition of Area 2, Akti Dilaveri, is non consistent. There are “tree” lines consisting of Washingtonia sp. (left) and Phoenix Canariensis (centre) as well as small bushes (right), such as Nerium Oleander, randomly placed (figure 48).



Figure 48. Piraeus. DS Akti Dilaveri (area2). Existing vegetation

Along Akti Dilaveri the quality of the palms is medium, while the quality of the shrub planting is poor. Pruning of shrubs along Akti Dilaveri takes place 3-4 times per year and pruning of palms once per year. There is no irrigation system along Akti Dilaveri and no watering takes place.

The planting surrounding the Ralleion School Complex is diverse and constitutes of planting beds and trees forming mixed tree avenues. The purpose of the planting is mainly ornamental. Though some benches are placed near the planting, it does not provide shade because of the orientation of the bench position in relating to the planting. The perimeter of the planting beds is planted with hedges that are pruned to a certain height (approximately 70 cm from ground level) and the interior is planted with various shrubs and trees. The planting beds are located along the boundaries of the school while on the opposite side along the roads there are pits planted with various trees forming mixed tree avenues. Overall, the planting is well maintained (selection is shown in figure 49), and the plants look healthy with the exception of some of the tree species such as *Morus* sp. and *Populus* sp. that will require to be replaced. The paving slabs surrounding the tree pits of some tree species such as *Populus* sp. are displaced and broken caused from the underground root system. In several tree pits and at

places within the planting beds there are dog faeces. The total area of the planting described above is approximately 525 m<sup>2</sup>.

The quality of the shrub planting surrounding Ralleion School complex is medium, while the quality of some trees is poor due to diseases. Pruning of shrubs surrounding Ralleion School complex takes places 3-4 times per year and pruning of trees once per year. A drip irrigation system is used to water the shrubs surrounding Ralleion School complex while trees are not irrigated.



*Figure 49. Piraeus. DS Ralleion School (area3). Existing vegetation*

The planting offers limited opportunities for people – plant interactions and use as a buffer zone and the hard landscape constitutes mainly of concrete paving slabs contributing to the urban heat island effect and surface rain off. Develop accessible green roofs and potentially a vertical farming wall at the library of RCPS. The school's library roof and facade provide such opportunities and could raise pupils' awareness to NBS.

Piraeus is an extremely densely populated area, then has only a few quality public access areas. The design approach has been concrete based for decades and the green spaces have been poorly

designed, constructed, maintained and conditioned for various reasons. Table 4 shows the total areas in m<sup>2</sup> and land cover data.

*Table 4. Piraeus. Three DSs areas. Total area [m<sup>2</sup>] and land cover data*

Area	1*	2*	3
Total Area [m <sup>2</sup> ]	15,125	81,926	19,988
Permeable Surface [m <sup>2</sup> ]	1,000	20,164	2,021
Permeable Surface - Planted [%]	10%	25%	50%
Impermeable Surface [m <sup>2</sup> ]	14,125	45,511	17,967
Impermeable surface - Roofs [%]	72%	8%	-
Impermeable surface - Streets [%]	17%	9%	48%
Impermeable surface - Sidewalks [%]	3%	8%	19%
Impermeable surface - Parking Spaces [%]	8%	2%	2%
Impermeable surface - Courts [%]	-	-	31%
Impermeable surface - Unused [%]	-	73%	-
Surface water bodies [m <sup>2</sup> ]	-	16,251	-

This is also the case for our three areas of Interest (Aol). As mentioned above, Area 1 is undergoing a renovation process and Area 2 is designed to undergo one (thus the “\*” marks next to the area numbers in the table above) so the numbers provided correspond to the condition before the renovation as the areas after the renovation should determine after the constructions. The first row of Table 4 has an approximation of the total area of the Aols which is then divided to permeable (row 2) and impermeable (row 4) surfaces.

Piraeus City, as part of Attica, has a centralized water treatment system that provides quality drinking tap water. As for the wastewater treatment, Attica has a centralized wastewater treatment facility located in Psytalleia island. All sites are very densely built so the site's upgrade due to NBS won't give opportunities for new constructions. However, the whole renovation of the area could motivate the upgrade of the existing properties and the potential relocation of some new citizens in these neighbourhoods could be possible too.

Biodiversity is limited throughout the demo sites.

### 3.2 Characteristics of existing natural elements (non-built environment) in FL CSs

#### 3.2.1 Bogota' CS: El Reencuentro

The majority of the surface in the study zone is hard, with exception of the presence of the El Renacimiento Park, sidewalks and small green areas. There are not any NBS implemented in the study zone, although, there is a total of 6035 trees in El Reencuentro zone. Some examples of the species are: Tomatillo (*Solanum oblongifolium*), Acacia Negra (*Acacia decurrens*), Acacia Gris, Acacia Japonesa, Fucsia Boliviana (*Fuchsia boliviana*), Caballero de la noche (*Cestrum nocturnum*), Tinto (*Solanum spp.*), Sauco (*Sambucus nigra*), among others.

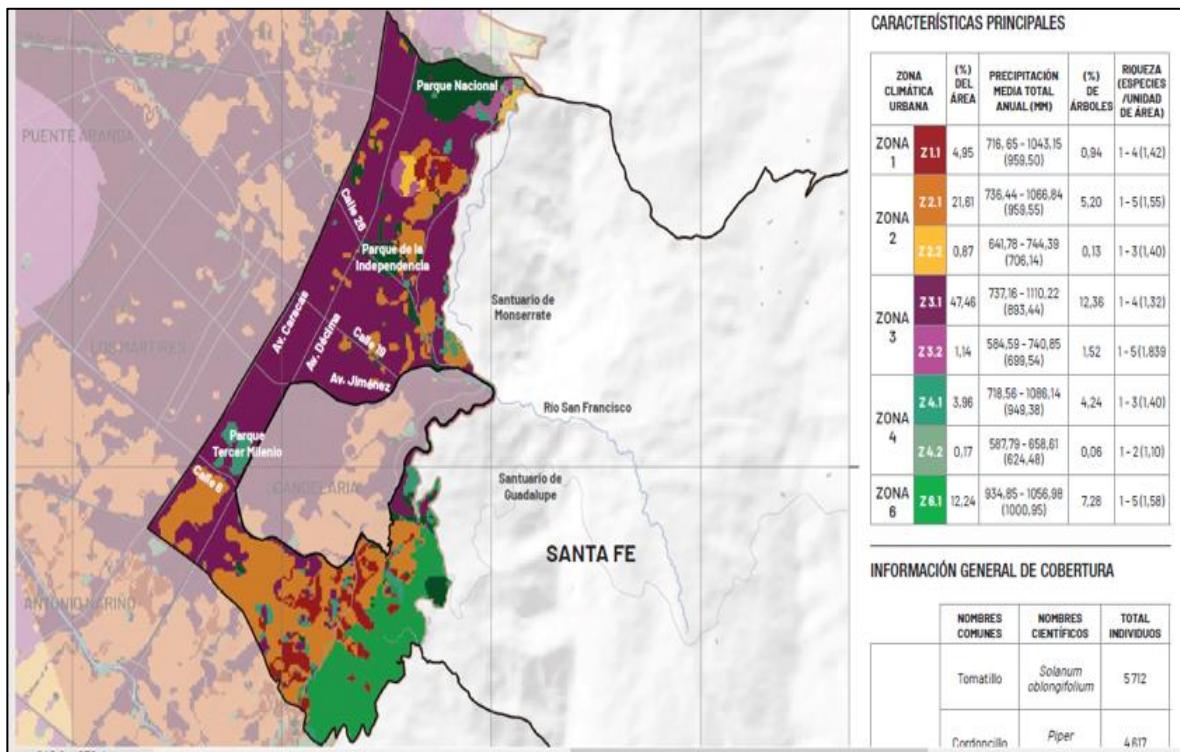


Figure 50. Urban Environmental classification of Bogotá (El Reencuentro- Zone 3.1)

Accordingly, with the urban environmental classification of the city, illustrated in the figure 50, developed by the Botanical Garden and Universidad de los Andes<sup>16</sup>, the case study is located in zone 3 (sub-urban 3.1). The zone is principally used for commercial and institutional proposes with a low vegetable density in comparation with the mean of the city. The low population density of the zone makes it desirable for the development of green areas. Mine while, the proximity to the main roads of the city and the industries represents high temperatures and high exposition to pollution and particular matter in the zone.

#### 3.2.2 Fengxi New City CS

The overall landform is high in the south and low in the north, and the main urban area is relatively flat (Elevation map shown in figure 51). There is a large area of I grade collapsible loess distributed in the central part. Generally, the collapsible loess of Fengxi New City is of low grade and the soil

<sup>16</sup> Jardín Botánico de Bogotá. Manual de coberturas vegetales de Bogotá, D.C.2020

permeability is good (the average permeability coefficient is between  $1 \times 10^{-6} \text{m/s}$ ~ $3.8 \times 10^{-5} \text{m/s}$ , and the soil permeability in the western part of the central part is relatively poor).

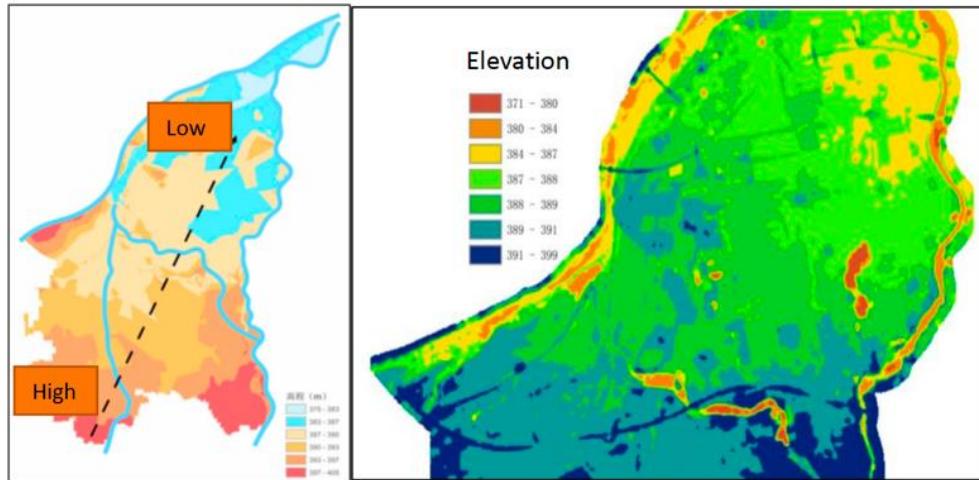


Figure 51. Elevation map of Fengxi New Town Administrative Region (left) and Core Area (right)

The average annual precipitation of Fengxi New City is about 520mm, within which from May to October the precipitation is relatively high, and the maximum precipitation happens from July to September (figure 52). In summer, the precipitation is mostly in the form of heavy rain.

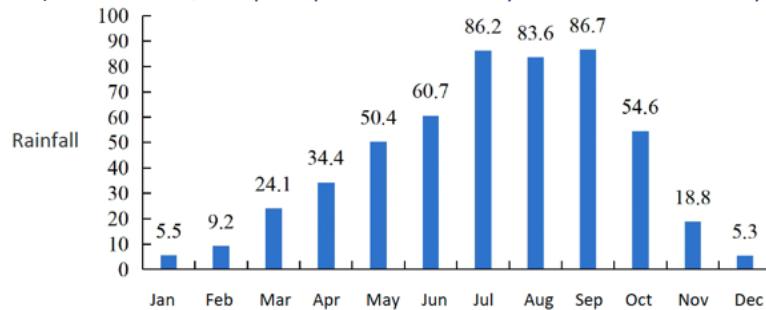


Figure 52. Fengxi New City monthly average rainfall

Fengxi New City has a short duration (120min) rainstorm type, which is mainly characterized by front type single peak rainfall (rain peak coefficient  $r=0.31$ ) (figure 53). Therefore, it is suitable to adopt the source dispersed low-impact development measures for runoff control.

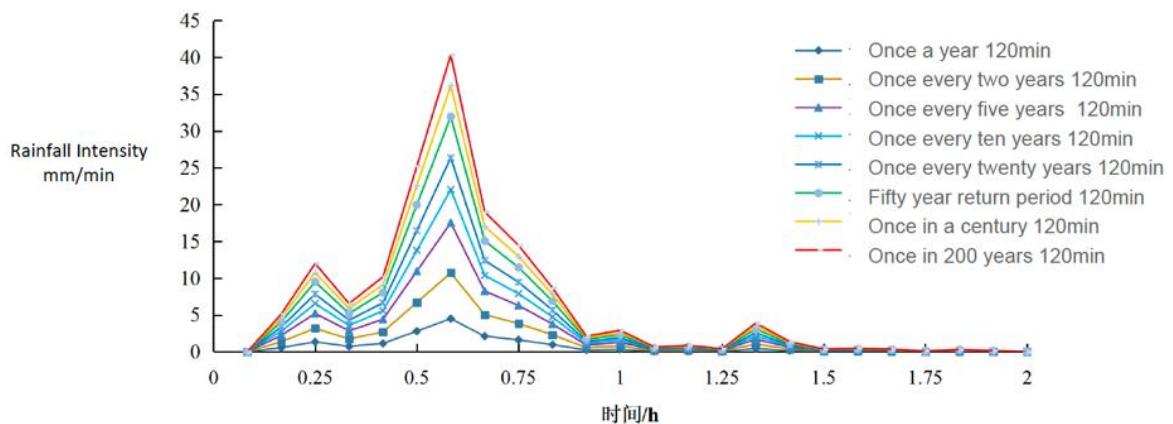


Figure 53. Short-duration rainfall patterns with different return periods in Fengxi New City (120min)

All the residential areas and business parks in Fengxi New City has been built with sponge city concept. Rain garden, bioretention zone, permeable sidewalk, roof garden can be seen everywhere.

Fengxi New City has three mail rivers. Now due to the sponge city construction and other river restoration measures, all the rivers are protected and with clean water, very beautiful scene and rich biodiversity.

Fengxi New City is located in semi-arid and semi-humid continental monsoon climate zone. Due to sponge city construction and NBS, the city's heat island effect is not serious.

### **3.2.3 Limassol CS: Public Garden**

The types of terrain inside the Limassol garden are soil and cement and its surface is covered by approximately 30% of vegetated soils, 30% of draining surfaces and 30% of raingardens. The quality of trees, shrubs and grass are primarily perennial.

Regarding the vegetation, an approximation of 40% area is covered by shrubs and grass while a 5% area is covered by tanks and water surface bodies in general. Due to the perennial trees, the park is considered as oasis dew during high heat season and summertime (especially in Cyprus that we have almost 6-7 months of summer) and all trees inside the park, as illustrated in figure 54, provide a percentage of almost 75% shading during the critical summer months.



Figure 54. City of Limassol, Public Garden's vegetation

Apart from the trees, shrubs, herbs and grass, the Limassol public garden houses also the Limassol Zoo, that increases even more the biodiversity of the place.

### **3.2.4 Palermo CS: Villa Turrisi**

The soils are predominantly clayey, half with surface fillings. The presence of surfaces consisting of bare earth, therefore without insulating flooring, allows rainwater to penetrate the subsoil and recharge the already very low aquifer of the Palermo plain. The area in question should be protected because of the need to maintain the possibility of recharging the groundwater in operation.

For more than two thirds of its surface, the site has residual, but still partially productive, surfaces with citrus trees located north of the Canale di Passo di Rigano; to the south of the canal there is a substantial area of "abandoned mixed tree crops" and in the south-eastern portion of the site, included between the imposing cypress grove and Viale Leonardo da Vinci, there is an extensive uncultivated area where a repopulation emerges with native and endemic species of the

“Boccadifalco” quadrant of the Landscape and Plant Biodiversity Map (Raimondo and others, University of Palermo).

From a floristic point of view, there are numerous species of plants in the park. In addition to mandarins and lemons, there are various native and non-native plants, including cypresses, medlar trees, laurels, pomegranates, hackberries, figs, prickly pears, mulberries, peaches.

Of particular interest is the fact that the villa, after the 1950s, was surrounded by rows of cypresses arranged precisely on the perimeter avenues, so as to form an articulated circular design with the aim of delimiting the fields planted with mandarin. Part of the marvellous design that is still visible today from the satellite (figure 55).



Figure 55. City of Palermo. Villa Turrisi satellite view

Following table 5 shows the botanical presence in the area.

Table 5. Arboreal botanical presences in Villa Turrisi, Palermo

<b><i>Arboreal or arborescent botanical presences indicated in estimated order of number of existing species:</i></b>
<i>Hackberry (Celtis australis)</i>
<i>Laurel (Laurus nobilis)</i>
<i>Lemon (Citrus limon)</i>
<i>Tangerine (Citrus reticulata)</i>
<i>Evergreen cypress (Cupressus sempervirens)</i>
<i>Olive (Olea europaea)</i>
<i>Arborescent prickly pear (Opuntia ficus indica)</i>
<i>Myrtle (Myrtus communis)</i>
<i>Wot (Juglans regia)</i>
<i>Common medlar (Mespilus germanica)</i>
<i>Canary Island Palm (Phoenix canariensis)</i>
<i>Ailanthus (Ailanthus altissima)</i>
<i>Judas tree (Cercis siliquastrum)</i>

Palermo has a sunny Mediterranean climate. The city is located on the northern coast of Sicily, in an area exposed to the cool mistral wind that blows from Sardinia, but also to the sirocco. The sirocco, the wind from Africa, is able to increase the temperature by several degrees (it can exceed 20 ° C in winter, and touch or exceed 40 ° C in summer).

Palermo is one of the most exposed areas of the Sicily because the wind comes from inland areas (and not directly from the sea as on the southern Sicilian coast), and in addition there is an effect of air compression due to the fact that the wind descends from the mountains. In fact, around Palermo there are mountains about 1,000 meters high.

From April to October the weather is hot, from November to March it is mild. July is the driest month. The presence of densely populated residential housing districts with buildings averaging 7/8 floors causes islands of heat in the summer months. An undoubtedly positive aspect is the beneficial contribution to the decrease in temperature produced by the humidity developed by the large amount of vegetation still present in the area which compensate for the excess heat caused by the massive presence of buildings all around. The sensation perceived by passing near these tree-lined agricultural areas is that of a pleasant coolness. Percentage of shading in critical summer months is approx.50%. Rather than protection from winter winds, the case of Palermo needs protection from summer winds (sirocco).

The case study area is among the few surfaces placed upstream of the ring road still free from buildings of considerable height (or compact buildings) and it's also the only ones that allow the entire flow of air, North-South and vice versa, to cross the city at low altitude. For this reason, an almost constant air flow is concentrated in it, which produces a constant air exchange, with high benefits for the surrounding residential areas, in terms of reducing the levels of pollution from exhaust gases.

*Table 6. Birdlife reported with higher frequency in Villa Turrisi, Palermo*

<b>Birdlife reported with higher frequency:</b>
<i>Common Barn Owl (Tyto alba)</i>
<i>Blackcap (Sylvia atricapilla)</i>
<i>Owl (Athene noctua)</i>
<i>Hooded Crow (Corvus cornix)</i>
<i>Kestrel (Falco tinnunculus)</i>
<i>Blackbird (Turdus merula)</i>
<i>Eurasian magpie (Pica pica)</i>
<i>Cooked Eye (Curruca melanocephala)</i>
<i>House sparrow (Passer domesticus)</i>
<i>Common nightingale (Luscinia megarhynchos)</i>
<i>Common greenfinch (Chloris chloris)</i>
<i>Serin (Serinus serinus)</i>
<i>Collared parakeet (Psittacula krameri)</i>

The park is an oasis in the city for many animal species. The extensive vegetation is the ideal habitat for various species of birds of prey (Table 6), both diurnal and nocturnal, including owls, barn owls, kestrels and buzzards. Many birds in summer, forced by the frequent mountain fires, move to this green area, the closest to the west mountains.

### 3.2.5 Trebinje CS: Otok

Location is all covered by vegetated soil, the former orchard is completely destroyed, and the site has no valuable horticultural facilities, only low wild vegetation. The whole area is surrounded by water and provides opportunities for the development of recreation on the water. The prevailing winds during the year blow from the direction of north (N), northeast (NE), northwest (NW), then from south (S), southwest (SW) and southeast (SE).

That is understandable if there is one in view of the influence of the surrounding mountains and wind-channelled passes in the stated directions, as well as the fact that they are at a higher altitude during the year prevailing winds from the northern quadrant, especially in winter when the bora wind is frequent. Just the biggest average wind speeds of 4.2 m / s occur during north-northeast winds, i.e., during storms. Frequency of silence in Trebinje is weakly expressed and they make up only 12% of the total number of cases winds during the year. When it is in terms of changes in the frequency and intensity of climate extremes, statistical analyses show that in this area one can expect a larger increase in the upper extremes of climatic elements. That in the case of these two climatic elements mean that the maximum daily air temperatures would more and more often exceed the previous one's climatic extremes, with increased frequency and longer duration of hot weather waves in the summer. In case of precipitation, more frequent disasters with higher intensity of short-term rains or higher frequency of storms accompanied by thunderstorms and hurricane-force winds can be expected. In order to preserve natural resources in the area, more efficient protection of human health and material goods, as well as providing more favourable conditions for life and activities in urban space, it is necessary in the planning, design and construction of buildings and settlements, industrial and hydraulic objects to use the benefits of the local climate (especially the existing favourable conditions for use renewable energy sources, primarily hydropower and solar energy).

The overview of current environmental conditions and use of vegetation has demonstrated that in most of cases the use of green elements was mostly motivated by its aesthetic/ornamental value, whereas in the euPOLIS we unleash the other potentials with implementation of additional BGS elements where needed.

## 4. Gaps in the use of existing NBS planning and modeling technologies

The setting-up of provisional GDPM was significant for the T3.1 Gap analysis process. Using this planning methodology we have produced the check list comprising all theoretically possible NBS interventions related to the PH&WB improvements, and related to indirect benefits in social, environmental and economic category. This list was produced to enable city stakeholders to identify which of PH&WB enhancement NBS's are missing from the demo sites. The advantage of this list was the fact that it also offered to cities potential Nature Based Solutions and NBS related interventions that might not have been identified through the original planning process.

The Template was submitted to the front runner cities to enter required information. The FR cities, with the assistance of their supporting partners, have populated table as required.

The euPOLIS expert team has analysed the answers and subsequently organized independent meetings with each city to discuss the submitted data.

The purpose of these meetings was to:

- a. encourage cities to check previously submitted documentation and establish full coordination between original demo sites descriptions, priced specification of proposed works at demo sites and this, last set of potential site interventions derived from the Gaps Analysis table.
- b. to offer to the cities opportunity to check whether originally proposed interventions are optimal and a chance to possibly define any other potential demo site intervention that might not have been identified through the standard planning process.

As a result of this approach, each city team has actually identified additional and alternative opportunities that will be analysed in detail during the WP6 planning process. At that stage the original list of interventions will be adjusted and final list of required construction works produced.

Based on the results from the above described meetings the finalized Gap Identification Tool tables for each demo site were produced (enclosed in the Appendix 6).

### 4.1 Template for DSs missing NBS elements (gaps) identification criteria

The material for this chapter was obtained through the question about the gaps in existing NBS planning and modelling technologies in the questionnaire Q2 and the additional bespoke tool/table for the gaps' identification in the existing NBS (Appendix 6).

#### 4.1.1 Gaps in existing NBSSs in Belgrade DSs

The gaps in existing NBSSs in Belgrade's DSs are analysed in the table 7 (Appendix 6.1). The Gap analysis Implemented In the city of Belgrade has revealed number of specifics related to the demo sites: The gap analysis was based on the demo site Usce Park and Its characteristics. This demo site can be already considered as a PH&WB high quality public place. Despite its obvious qualities the euPOLIS analysis has revealed number of gaps to be considered as perfect areas for the NB based solutions that could Improve outdoor environment positive Impact on PH&WB. Since the other Belgrade demo site, the Linear Park, has yet to be developed into a park with positive Impact on surrounding population, it was decided that the gap analysis applied to the park Usce fully covers the desired approach and solutions at the Linear Park site.

The Belgrade planning teams have realized, through the GDPM template used as a basis for the gap analysis, that the euPOLIS Interventions In the parks could be planned in the more versatile manner than originally perceived, hence the note "to be discussed" against number of Items In the GA table.

#### **4.1.2    *Gaps in existing NBSs in Gladsaxe DS***

The gaps in existing NBSs planning in Gladsaxe, are presented in table 8 (Appendix 6.2). The euPOLIS interventions in Gladsaxe DS will be based on DAMP project. The NBS in this demo-site will be focused on water quality and purification as well as on further development on forced evaporation techniques. Gladsaxe team is planning a small wetland, a lake and a football field that will as well be a water reservoir. The plan consists both of a new playground, vertical evaporation gardens and a small spring.

There is no urban gardening with food production in Gladsaxe. But the Municipality has established five demonstration gardens in the Gedvad-Møllemark, a residential district with villas and private gardens, together with five garden owners and a landscape gardener. The idea of the gardens is not to create urban agriculture but to show how homeowners can handle rainwater on their own land and pave the way for more voluntary solutions.

The gardens are located in a 21ha area with 300 households, where the municipality and the utility company has disconnected rainwater from the sewer and instead treated the water by local natural filtration and evaporation through green solutions in gardens and along roads. Citizens will be reimbursed 3.200 euro from the utility company if they take care of the rainwater themselves.

The upcoming resident involvement project in Pileparken is being planned together with the local resident board to define building of a common vegetable garden.

At present time, a new wastewater plan for the municipality of Gladsaxe is in public hearing. If the plan is adopted, there will be new demands that all rainwater must be separated from the grey wastewater. In some areas the rainwater will be led to existing recipients, in other areas more rainwater might be handled locally and on the surface. As the plan is still a draft, the plan is not part of the material sent with this questionnaire. At the demo site, infiltration is not possible. Here evaporation is the only option to handle rainwater locally.

In this area, the sewer is fully developed, meaning that all wastewater (gray and rainwater), is discharged to the sewer, and treated on wastewater treatment plant.

Tap water is supplied by the regional water utility company, and there is no water shortage in the Gladsaxe area.

The demo site area also comprise a large, paved parking area, surrounded by ornamental plants and a long narrow lawn in the southern part of the area and another smaller lawn in the northern part of the site. The area is managed by a local caretaker who cuts the grass on a regular basis, not allowing wild plants to grow and providing relevant habitats for the local biodiversity. The caretaking is characterized by work that can be carried out efficient and with simple work tasks (mowing by garden tractor and machine pruning).

The area is surrounded by trees providing shade in the southern part of Pileparken 6, but the outdoor space has limited activities, and the potential recreational green spaces are not being used.

During heavy rain events the basements and the hallways on the western part of the site gets flooded. The housing association administration wish to find ways to manage the surroundings in a more environmental and climate resilient manner. This is the reason why the housing associations is a

partner in the DAMP project driven by a wish to find a way to disconnect the common sewer system and handle the rainwater local.

#### **4.1.3    *Gaps in existing NBSs in Lodz DS***

The gaps in existing NBSs in Lodz's DS are analysed in the table 9 (Appendix 6.3). None of NBS focused on rainwater retention was applied at the demo site. The nearest NBS: rainwater gardens, façade gardens, green roofs and green walls are located within the private investment "Synergia", and in the open spaces at the Piotrkowska 217 – the cultural and restaurant centre. There are also NBS applied to improve water quality in the city rivers.

There are also no multifunctional areas, meeting the targets of healthy population and healthy nature. Planning of green infrastructure, currently focuses on woonerfs, is driven by a single-target approach: creating an aesthetic space suitable for recreation. No real role is given to nature, neither not much attention is given to management sustaining regulatory services and self-regulatory potential of nature.

No blue-green hot-spots have been identified with clear protection / management targets towards climate adaptation, sustaining of ecosystem services and biodiversity protection.

There is a clear gap in local regulatory / administrative framework to impose strong obligations on all city investors towards sustaining natural capital at site and set secure low impact development.

There is an urgent need to implement standards not only to NBS design and implementation, but generally to integrated urban water management, what amplifies risks emerging from climate change, and deprives the city of natural capital thus its insurance against future challenges.

There are no established PPP models to involve private sector in NBS implementation across the city, neither good local business models facilitating use of NBS.

Some gaps are being addressed by current actions. Those include development of hydrological-hydraulic model to estimate and model river and storm water flows in integrated river-storm water system across the city, establishing the standards for maintenance of city greenery including its protection in the land development processes, testing the programme of façade gardens, releasing a programme of small grants for rainwater gardens, facilitation of the project on habitats for pollinators. The City progressed also on development of NBS related participatory programmes, tools, promotion, some of them supporting not only communication among stakeholders but also their engagement in the city-nature stewardship. These engagement practices consist of organization of Citizens' Panel on City Greenery, co-designing workshops on streets revitalization, e.g., "Streets of Old Polesie". There is also ongoing participatory development of the City Green Deal that is to stimulate filling the NBS gaps through multi-stakeholder and multi-sectoral collaboration.

#### **4.1.4    *Gaps in existing NBSs in Piraeus DSs***

The existing planting in the Mikrolimano/Akti Dilaveri is mainly ornamental with limited biodiversity concentrated mainly in the trees that provide habitats for insects and birds. Both areas are well visited, with good access through public transport and a constitute a pole of attraction due to the waterfront. Introducing measures to increase awareness of city greenery and to evaluate, protect and maintain existing greenery requires funding and resources that are limited; such initiatives at a public scale would require trained staff and also for hosting events. It would be necessary to develop a particular service.



The development of comfortable seating points, NBS conditioned corridors, and new tree planting cannot be introduced due to the fact that the regeneration of Mikrolimano is currently under construction and cannot implement any alterations that could harm the signed contracts between the Municipality and the construction company. MF pocket parks with MF green spaces designed to affect site microclimate with number of greenery functions are not feasible for Mikrolimano due to space limitations. The development of MF roof garden is also not feasible due to the lack of public buildings and also having in mind technical regulations due to the age of the buildings and the seismic activity in Greece.

The creation or enhancement of urban elements to reduce visitor's depression or introduce components for daily care and enhancement of biodiversity is not feasible due to the lack of existing funding and resources. Furthermore, the development of human / ESS regular interaction points cannot be implemented as the regeneration of Mikrolimano is currently under construction and cannot implement any proposals that would cause design alterations.

Secure passages are already in place along both sites. Visibility within the site is limited due to the high building density however the waterfront allows for undisturbed views into the sea. The integration of comfortable easy materialization and biophilic design is not feasible as the regeneration of Mikrolimano is currently under ongoing construction and cannot implement any proposals that would cause design alterations.

Potential improvement of facilities could be developed for senior people daily exercise walk and creativity. Both vertical and pocket farms are not encouraged due to the air pollution that creates concerns for safe human consumption. There are no kindergartens within the area to mix the elderly with the children.

The development of water amenities and socializing spots is not feasible due to the fact that the regeneration of Mikrolimano is currently under construction and cannot implement any proposals that would cause design alterations. Urban farms are not encouraged due to the air pollution that creates concerns for safe human consumption.

The introduction of permeable areas and recreation areas, as well as interventions to materials used, to combat heat island effects, to provide 80% min shading in the summer afternoons, and to control winter winds are not possible because it is not foreseen within the current project for regeneration of Mikrolimano area. Also, the introduction of engagement facilities and promotion of daily routines with access to demo sites is a time-consuming process that would require a lot of funding and planning permission as well recruiting trained staff or hosting events while human resources are not available. The walking and running length along both sites is sufficient. Furthermore, the introduction of a cycle path is already in place.

Both sites have pathways crossings and traffic lights at key points that are clearly indicated. Interventions to reduce levels of noise and air pollution, moderate air temperature and promote biodiversity with NBS cannot be integrated into the existing regeneration plans of Mikrolimano which are currently under construction.

Versatile public spaces, social-urban hubs and open-air gyms cannot be introduced as the regeneration of Mikrolimano is currently under construction and cannot implement any proposals that would cause design alterations. It might be possible to introduce ND MF "canopy" units for

natural shading at selected areas for socializing, recharging electronics, playing chess, or waiting for buss.

Planning interventions for different gender and people groups that are not already integrated in the existing regeneration plans of Mikrolimano which are currently under construction cannot be implemented. However, it might be possible, if needed, to integrate technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth. The layout and structure of the buildings do create courtyards. Parks are not present in the area neither could be developed due to the purpose and nature of the sites. The site conditions are favorable for enhancing local shops. The sites are well used by the public and popular destinations within the Attica region.

The greenery and water features can not be enhanced further from what has been already designed in the existing regeneration plans of Mikrolimano that is currently under construction; therefore, cannot implement any proposals that would cause design alterations. The production of a citizens participation manual and a planning system where citizens proposals become visible as well as citizen education are not feasible due to limited funding and human resources as it would also require trained staff, hosting events and possibly developing a particular service. There are shelters available and a special service within the Municipality catering for the needs of stray animals. Furthermore, the weather in Greece is too arid for rainwater-based drinkers. It is possible to achieve public marketing of results.

The negative effects on microclimate can be analyzed. The relocation of the air conditioner's exhausts would entail large costs for dwellers and possibly legal issues and planning permissions. The introduction of micro-climate regulating NBS is not feasible as the regeneration of Mikrolimano is currently under construction; therefore, cannot implement any proposals that would cause design alterations; this is also the case for the development of facilities for mental and physical health, positive emotional experience, and sense of place. Additionally, the introduction of resilience measure's improvements than what have not already been included in the regeneration plans of Mikrolimano cannot be implemented. The contribution of NBS's to PH and WB values and associated visitor categories can be defined. It might be possible to increase awareness of city greenery and introduce measures to evaluate and protect-properly maintain existing greenery with the involvement of locals. There is no available space to introduce new tree planting, also the planted shaded areas.

It is possible to introduce to the Ralleion School Complex measures to increase the use of green areas, to maintain existing and new greenery with the potential involvement of pupils, parents, and teachers with limitations though, as acquiring GDPR permission is too difficult. Tree planting is not feasible as there does not seem to be any available space for new tree planting. The planted sheltered areas are located adjacent to a busy road and not accessible during breaks for pupil's safety. Visibility within the site is limited due to the high building density. The scale of the site is too small to accommodate MF pocket park within the school complex. Access to the site is satisfactory and traffic lights are located and clearly indicated at the main junction points of the main road. Due to the nature of the site it is not possible to establish particular interventions such as eco-café, surface waterway, water amenities, socializing spots, family outing zones, facilities for stimulus of senior people daily exercise walk and creativity, human / ESS regular interaction points, sports equipment renting, versatile public spaces, social-urban hubs, open air gyms as well as NB MF "canopy" units for natural shading at selected areas for socializing, recharging electronics, playing chess, or waiting for buss.

A MF roof is an option for Ralleion School although currently the roofs are inaccessible (there is only a window – not a door- in the Headmaster's office). Furthermore, the roofs don't have railings, so they

are not safe for students. The creation or enhancement of urban elements to reduce visitor's depression is not feasible as the planted sheltered areas are located adjacent to a busy road and not accessible during breaks for pupil's safety. However, it is possible to introduce components for daily care and enhancement of biodiversity. The Ralleion School Complex is located inland therefore urban NBS elements and assets that improve access to and contact with surface water bodies, water features, water sounds are inapplicable. The maintenance of the school's open spaces is satisfactory. The introduction of comfortable easy materialization and biophilic design is not feasible as the existing planting is limited and there is an unavailability of open spaces.

There is no kindergarten within the school complex to mix the elderly with the kindergarten children. Both vertical and pocket farms and community farming are not encouraged outdoors due to the air pollution that creates concerns for safe human consumption. It might be possible to introduce permeable areas on the school roofs with green roofs.

The introduction of permeable and recreation areas, as well as interventions to materials used, to combat heat island effects, to provide 80% min shading in the summer afternoons, and to control winter winds are not possible due to the small scale of the Ralleion School Complex and the lack of open spaces. The walking and running length, and development of a cycle path is limited also by the small scale of the Ralleion School Complex and the lack of open spaces. Interventions to reduce levels of noise and air pollution, moderate air temperature and promote biodiversity with NBS cannot be integrated because the small scale of the Ralleion School Complex and the lack of open spaces.

Other interventions such as planning interventions for different gender and people groups, the introduction of technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth are also not feasible due to the nature of the Ralleion School Complex. Parks are not present in the area neither could be developed due to the school function not being a public open space. The environment can be further enhanced with green roofs.

The production of a citizens participation manual and a planning system where citizens proposals become visible as well as citizen education are not feasible due to the school function. The Ralleion School Complex cannot cater for stray animals. There are shelters available and a special service within the Municipality catering for the needs of stray animals. Furthermore, the weather in Greece is too arid for rainwater-based drinkers. It is possible to achieve public marketing of results.

Overall, the school does not have air conditions. Potentially, establishment of green roofs and walls may contribute to energy savings that can be monitored. The negative effects on microclimate can be analyzed. The relocation of the air conditioner's exhausts would entail large costs for dwellers and possibly legal issues and planning permissions. The introduction of air purification or micro-climate regulating NBS is not feasible due to the unavailability of open spaces and the nature of the site. The development of facilities for mental and physical health, positive emotional experience, and sense of place is limited by the small scale and unavailability of open spaces within the school complex. Similarly, the introduction of resilience measure's improvements is limited. The contribution of NBS's to PH and WB values and associated visitor categories can be defined (due to the nature of site - elementary school-) only by measurements from teachers, visitor teachers (Pilot school) and parents until legal issues concerning student's participation are cleared.



## 4.2 FL Cities CS comments on gaps in existing NBSs

The material for this chapter was provided by FL cities, based on analyses of FR cities answers to the question about the gaps in existing NBS planning and modelling technologies in the questionnaire Q2.

### 4.2.1 *FL City of Bogota' – El Reencuentro Case Study*

Although there is an extensive presence of green areas and trees in the study zone no NBS or blue-green hot spots have been implemented. The use of the green meeting points identified is more related to the improvement of social cohesion in the study zone, than to the management sustaining regulatory services and self-regulatory potential of nature.

Meanwhile, the city had some advances in the implementation of NBS but we are in the earliest phases of the process. In fact, the Institution of Urban Development (IDU) of the city had more than 300 ongoing plans for the implementation of SUDs in the city, and there are some pilot cases that have been already constructed in the public space (SUDs train for stormwater management in San Cristobal Park and the use tree pits). But we are still in the process of implementation and monitoring the efficiency of this solutions to construct our own pilot database and learn for the experience to recognize the multifunctionality of this system.

In terms of regulations, although the technical standards to the design of SUDs have been developed (NS-166), there is still a gap in the availability of professionals to ensure the use of suitable design process. This lack of professionals with a high level of expertise in the field is consider also a barrier for of the creation of multidisciplinary groups to ensure the best practices of implementation (e.g., there is a limited knowledge of the maintenance of the structures). Furthermore, there is an absence of cohesion between the regulations and technical guides and the construction license requirements for the development of these solutions.

It is also identified a lack of institutional coordination, and role definition in the planning process for the implementation and operation of NBS, in which the responsibilities of each part are not clearly defined. We do not have clearly defined the role of the public and private investors or the available economic resources for the implementation of this solutions, and how to encourage the stakeholders to consider the use of this types of structures in their own projects by the use of incentives.

There is also a lack of participatory strategies with the citizens to co-create public space and promote the consolidation of natural solutions to solve urban challenges of the city. It is also related with the lack of educational programs in the study zone for governmental institutions, academic institutions and citizens that allowed the communication between stakeholders to promote the NBS implementation.

In conclusion as the BID mentioned<sup>17</sup>, for a real implementation we required solid economic arguments, educational process to the members of the projects that ensure a high skills level, better methodologies of implementation, and the develop financial programs.

<sup>17</sup> Inter-American Development Bank (IDB). *Nature-Based Solutions: Increasing Private Sector Uptake for Climate-Resilience Infrastructure in Latin America and the Caribbean*. December 2019.



#### **4.2.2 FL City Fengxi New City – National Pilot Sponge City**

Disadvantages of sponge city construction in Fengxi New City:

- Goal-oriented sponge city construction in the new area, which focuses on solving future urban water system problems, is difficult to generate immediate sponge effect in the short term (compared with the problem orientation in the old city).
- The infrastructure (pipe network, pumping station, water treatment facilities, etc.) of the new area is relatively weak, and the construction sequence is greatly affected by land transfer and other factors, which will restrict the coordination of the source, process and terminal system of the sponge city in a certain period.
- The urban governance system of the new area is not fully developed, and the streamlined and efficient management mechanism has problems such as excessive concentration of responsibilities and rights and insufficient division of labor to some extent, which affect the professional and refined operation and maintenance management efficiency after the large-scale construction of sponge city.

Although the government of Fengxi New City attach great importance to NBS planning, yet there is lack of professional knowledge in NBS planning and implementation. Also, the operation and maintenance of sponge city and NBS is also difficult. There is lack of good experience and guidance.

#### **4.2.3 FL City of Limassol – Public Garden Case Study**

Future plans of the Limassol Municipality include the enhancement of public health and well-being by introducing the project of a new botanical garden along the green paths and by constructing small artificial islands with plants. Aquatic plants such as water lilies and other aquatic plants will be placed onto the islands and into the water, while wooden bridges will be built that will connect the artificial islands and be accessible to the public so that people will also be given the opportunity to study the aquatic world. Overall, the aim is to increase the green areas in the Limassol Urban Area and consequently promote sports and activities near the neighbourhood so that citizens do not have to drive to other parks or areas of the city for their personal exercise and leisure walking.

Apart from the perennial trees that provide shading and pure oxygen to the visitors, the only NBS that is currently established in the garden is the watering with tertiary treatment water, while the Limassol garden is crossed by an open channel for the rainwater.

There is a gap concerning the clear protection for sustaining the ecosystem services and biodiversity protection and there is a need to integrate urban water management and handle risks that emerge during the change of seasons. It is not so easy to tangle private companies with NBS implementation inside Municipality due to the Treasury of the Republic of Cyprus and the procurement regulations that need to be followed. Also, there is a gap in respect of the lack of expertise between local private companies in terms of NBSs. Limassol Municipality has organized meetings with several stakeholders and municipal councillors for stimulating awareness in the fill of NBS gaps, but at this stage we only have some suggestions that needs "filtering" and processing.



#### **4.2.4 FL City of Palermo – Villa Turrisi Park**

It should be remembered that the Passo di Rigano Canal was one of the water flows that, together with the Papireto and the Kemonia, poured water into the city centre during the flood of 1931, contributing significantly to the flood. Even today, the hydrogeological risk of the area is high, as the canals (diverted into cemented paths) cannot dispose of abundant and constant quantities of rainwater. Re-naturalization of covered waterways (just for the park area) will be eco-designed with contribution of the euPOLIS project's planning methodology. The regional basin authority has affixed to the area a high hydraulic risk (flood risk) pending the evaluation of the hydraulic study done with the university which attributes a lower risk level to the area and therefore the implementation of the intervention to the green way is bound by the decision of this public body.

In the area there are also some illegal buildings that the municipality intends to demolish.

The area of Villa Turrisi park is still to be planned and there are difficulties related to the involvement of the owners of the private lands. In fact, the green area mostly extends over private areas, some of which are agricultural crops, with a prevalence of citrus trees. In the Park there are also public areas such as the areas of the former Palermo-Camporeale railway line, the embankments, and surfaces of the Borsellino and Passo di Rigano Canals and buildings confiscated from the mafia. The Mayor asked the Region and the State, owners of part of the lands, to transfer the management of their land to the Municipality of Palermo to be able to start the design of an urban park initially on publicly owned land.

#### **4.2.5 FL City of Trebinje – Otok Case Study**

There is significant room for enhancement of the environmental/eco value in Trebinje. In this case-study it is possible to implement advanced planning technologies, which will lead to improvement of citizens' health and well-being. Of particular importance is the impact of NBSs on shading and evaporative cooling in the prevailing hot summer months. Implementation of solar collectors on newly designed facilities will be of great importance for the whole city. Solar collectors will convert solar energy into heat. Commercially available flat plate collectors will convert 95 percent of solar radiation into energy. In tubular vacuum collectors, the integrated mirror concentrates sunlight on the absorber. Therefore, complete collectors have achieved greater efficiency even during cloudy days of heat production. After it is converted into heat in the solar collectors, it is transferred via the solar fluid to the hot water tank. The heat exchanger transfers energy to the water in the tank. Now hot water can be used on request, even when the sun is not shining.

With a solar system, you can save and make 70 percent of your energy costs for heating domestic hot water. Systems that combine solar energy, and are used to heat space, can save about 20 to 35 percent of their energy needs annually. An important primary argument worldwide is water recycling, especially due to its growing shortage. In the new urban settlement at the site of the case study it is important to introduce water recycling. Possible forms to reduce water consumption in addition to limiting use is the use of water recycling systems. The same can be achieved by designing and installing dual water supply systems, one of which is supplied with recycled water from a rainwater collection system, by reutilizing grey or black water. In new area it is important to plan green buildings. They are buildings that are designed and built in a way that have minimal environmental impact throughout the entire building life cycle. Green building designs can be applied to any kind of building, including residential homes, schools, commercial buildings, industrial facilities, laboratories, and many others.



Systematical analysis of the existing NBS has enabled cities to identify a number of PH& WB related NBS gaps at all demo sites.

This process has also enabled the FR cities to identify the potential interventions beyond their original planes. Those potential interventions will be discussed in more detail in following WPs.

The gaps analysis process including optimization criteria will continue through the following WP's and the tool for the gap's identification (Appendix 6) will be in constant development.

For FL cities the provided reflection on the gap's identification stimulated the awareness in filling the gaps and plan further steps in planning actions for it.

Through the process of analysis of FR cities demo-sites, FL case-studies and the dialog with cities teams, euPOLIS team has collected the high-quality material for the actual, detailed, site planning work in WP6.



## 5. Lessons learned/ Conclusions

An important feature of the euPOLIS project is the richness of the diverse characteristics of its FR cities' demo-sites (DS) and FL cities case studies (CS). This richness has created opportunities for systemic implementation of the overarching integrated GDPM, which will be easily customized to the local conditions.

The key result of euPOLIS activities specified under the T3.1 has clearly defined that the FR cities demo-sites and FL cities case-studies are very different and complementary.

The systemic gap analysis in the use of existing (standard) NBS planning and modelling technologies are identified in all demo sites. The set of euPOLIS metrics was used through the provisional GDPM template to define clear quantifiable optimization planning criteria relevant to the PH&WB.

Diversity of the size and the scale of demo-sites (small scale in Gladsaxe and Lodz, and bigger scale in Belgrade and Piraeus) will facilitate extrapolation of the euPOLIS results to bigger scale at the level of whole city and to the other cities with similar climate conditions. Potential extrapolation area covers the climatic differences present in the whole Europe, from cold climate Scandinavian region to hot dry Mediterranean one, demonstrating the flexibility BGS/GDPM integrated system.

Additionally, analysis of local micro-climate and environmental conditions has helped to identify needs for supportive/complementary measures to be taken in the euPOLIS project, so that the newly introduced NBS have gear around support in what is needed not only for survival but demonstration of the potentials and benefits.

These analyses enabled us to map existing NBS and initially to evaluate their role in the proposed projects. Further interventions will be made complementary to exiting assets to maximize benefit for PH&WB.

As a part of task activities, the analysis of demo sites and case-studies has demonstrated the values in terms of existing NBS, such as present vegetation, but also great potential for upgrade and added value by BGS/NBS. Through the process of analysis of FR cities demo-sites and the dialog with cities teams, euPOLIS team has collected the high-quality material for the actual, detailed, site planning work in WP6.

Identification of gaps has enabled the FR cities to map the interventions beyond their original plans, which will be discussed in more detail in forthcoming WPs. Systematical analysis of the existing NBS has also enabled to identify a number of PH&WB related NBS gaps at all demo sites. This process permitted the FR cities to recognize the potential interventions beyond their original planes. Those potential interventions will be discussed in more detail in following WPs.

The gaps analysis process including optimization criteria will be continued through the forthcoming WP's and the tool for the gap's identification (Appendix 6) will be in constant development. This will be utilized to prepare ground for FR and FL cities for the future planning of euPOLIS NBS and further developing their action plans for the new interventions for filling the gaps.

Although individual models have been used to evaluate separate aspects and processes, the gap analyses also has revealed the lack of existing integrating modelling tools. This is potential for integrating the separate models into interactive/integrated modelling tools.

This deliverable will enable smooth and seamless transition to tasks T3.2 and T3.3.



The analysis made in FR cities will enable FL cities to have a clear overview on the future planning of BGS interventions in both the existing CSs and future locations in their cities with potential for extrapolation to the other cities as well.



## 6. Appendixes

### 6.1 Belgrade DSs Gaps Analysis

Table 7. Belgrade DSs gaps in existing NBSs – identification tool

	STATUS OF BELGRADE DEMO-SITES (INCLUDING RUNNING AND MAINTENANCE ITEMS)	Not existing or poor (X)	Could be planned/implemented (X)	Not applicable due to:
1	Stress reduction - (Introduce: Location beauty, comfortable resting points, presence of biodiversity)			
1.1	Introduce measures to increase the use of green areas - systematically increase awareness of city greenery - strong recreation areas promotion on all media and stimulate the number of pedestrian day trips to green areas + green areas sustainable usage education to be introduced at all levels and public domains (short media information at top hours as well as information panels at site itself)	X	X	
1.2	Introduce measures to evaluate and protect-properly maintain existing greenery + involve locals	X	X	
1.3	Make sure that new trees planted should meet the following conditions: right tree, at the right place, with specific function (1. Shadow - pedestrian, cycling, 2. Shadow - heat island, 3. Shadow - buildings, 4. Evaporative cooling, 5. Air purification, 6. Evapo transpiration, 7. Socialization, 8. Animal corridors, 9. Winter wind barrier 10. Reduced emission of negative compounds such as BVOC)	X	X	
1.4	Planning to emphasise location beauty, comfortable resting points, presence of biodiversity, water noise + consider visual and functional attractions as well as recreation working and cultural events + EQUILIBRIUM with land for construction	X	X	
1.5	MF pocket parks with MF green spaces designed to affect site microclimate with number of greenery functions including evaporatively cooled and live vegetation shaded public spaces for UHI impact reduction - park trees should be designed/selected for particular functions: shading in summer, wind barrier in winter, socializing areas, animal crossing, adiabatic cooling, reduced negative impact on PH (allergens and BVOC), etc	X	X	
1.6	If possible, influence the creation of transport links for easy public to existing and new green areas			To Be Advised (TBA)



### D3.1 Report on the local demonstration case studies analysis

1.7	Extend NBS interventions towards surrounding buildings	X		
1.8	Create NBS-conditioned corridors for continuous quality access to the other parts of the city and introduce ecological corridor connected with neighbouring green spots/areas		X	
1.9	Seasonal eco café (demonstrating sustainable, nature-friendly mode of operation, cooling and resource recycling)			TBA
1.10	Surface waterway with freshwater aquatic biotope (attractive flora and fauna elements) complete, with integrated constructed wetland and number of bio filters of different types for storm water treatment (water quality improvement)	X	X	
1.11	MF roof garden, VF, experimental area, alternative space for public art installations -	X	X	
1.12	NBS for pluvial floods elimination and surface runoff and water quality management with NB solutions. Storm water control and evaporation enhancing NB systems	X	X	
<b>2</b>	<b>Depression reduction - (Introduce: Elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity)</b>			
2.1	Create / enhance urban elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity	X	X	
2.2	Care for nature - demonstration and contact with nature - introduce components for daily care and enhancement of biodiversity.	X	X	
2.3	Develop human / ESS regular interaction points - Urban NBS elements and assets that improve access to and contact with surface water bodies, water features, water sounds, as well as all types of greenery	X	X	
2.4	In all regenerated areas create space for increased exposure of visitors to arts and crafts	X		TBA
2.5	Make sure maintenance creates spotless environment at all times	X		TBA
<b>3</b>	<b>Anxiety levels reduction - (Introduce: Security – passages, visibility, comfortable materialization + biophilic design)</b>			
3.1	Security – passages - provide overall easy access and walking security	X	X	
3.2	Visibility - relatively acceptable length of visible space + clear undisturbed visibility in direction of pedestrian and cycling movements + clear visibility to surrounding attractive points	X	X	
3.3	Comfortable easy materialization - comfortable and mild colour material - IND.U24	X		TBA
3.4	Biophilic design: analyse applicability of 14 directives (will be addressed in detail in WP6)	X		TBA
3.5	Create family outing zones	X	X	



### D3.1 Report on the local demonstration case studies analysis

3.6	In all regenerated areas create space for increased exposure of visitors to arts and crafts			TBA
3.7	Mental health improvement by eliminating floods or flood potential as well as water streams pollution	X	X	
4	<b>Enhanced cognitive performance - (memory, judgment, language, intuition and the ability to learn) - (number of senior citizens increases, innovative, related planning required to make them more functional)</b>			
4.1	Counter neurological decline typically seen among the elderly - create stimulus for senior people daily exercise walk	X	X	
4.2	Create urban options for new experience and creativity (particularly for senior people): create facilities for walking competition, urban farming, competition in solving mental games, .....	X	X	
4.3	Vertical farms and pocket farms irrigated with rainwater harvested from surrounding buildings. Farms with proper education to expand through the neighbourhood	X	X	
4.4	Seniors regular mixing with kindergarten kids (kindergarten NBS facilities at location) - lecturing to very young from own specific subjects	X		TBA
4.5	Create urban challenges for senior people with this in mind: when you are inside your comfort zone you may be outside of the enhancement zone - experience should be unfamiliar and mentally challenging	X		TBA
4.6	Introduce participatory planning on all-natural items - introduce mental challenge + new experience	X	X	
5	<b>Enhanced psychological health and well-being - (contentment, satisfaction with all elements of life, self-actualization) &amp; spiritual benefits of interacting with nature</b>			
5.1	Creation of water amenities and greenery multifunctional corridors systematically distributed through the demo site	X	X	
5.2	Creation of all gender categories socializing (and entertainment) spots within corridors (mapping of existing & enhancement)	X	X	
5.3	Introduce community urban farming contributing to overall more sustainable food system	X	X	
6	<b>Adequate walking distance and quality of surfaces and environment</b>			
6.1	Green permeable areas introduced (Surfaces converted into permeable areas, wherever possible), and existing grey areas replaced or retrofitted	X	X	



### D3.1 Report on the local demonstration case studies analysis

6.2	Recreation areas with adequate special coverage	X	X	
6.3	Engagement facilities – to incentivise active time in the park	X	X	TBA
6.4	Urbanism to promote daily routine by walking - (on streets - pleasant and protected streets) with access to demo site		X	TBA
6.5	Schools: - outdoor sports in NBS supported environment for more frequent, to be radically improved		X	TBA
6.6	Schools - promote and monitor impacts of NBS and students sports at other recreational facilities		X	TBA
6.7	Introduce and promote regular physical health assessment of neighbourhood and visitors (starting with absence of diseases to fitness level)	X		TBA
6.8	Provide sufficient walking length - reasonable for recreational walking		X	
6.9	Walking pathway materialization - semi soft advanced technologies material		X	TBA
6.10	Heat islands eliminated - Albedo effect optimal + pathways in shade min 80% in the afternoon in summer		X	TBA
6.11	Summer shading - to cover 80% of public space in afternoon in summer	X	X	
6.12	Winter wind control - adequate number of green windbreaker trees in the winter wind direction	X	X	
6.13	Introduction of recreation areas whenever possible at the location	X	X	
<b>7</b>	<b>Adequate running distance and quality of surfaces and environment</b>			
7.1	Running length - reasonable for recreational running with NBS quality enhancement	X	X	
7.2	Running pathway materialization - semi soft advanced technologies material with NBS quality enhancement	X	X	TBA
7.3	Measures for heat islands radical reduction -(criterions pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer)	X	X	
7.4	Winter wind control in areas / corridors popular for recreational activities during cold weather season- adequate number of windbreaker trees in the winter wind direction	X	X	
7.5	Trees selected and positioned for evaporative cooling	X	X	
7.6	Summer shading - to cover 80% of public space in afternoon in summer	X	X	
7.7	Winter wind control - adequate number of green windbreaker trees in the winter wind direction to reduce wind chill effect	X	X	



### D3.1 Report on the local demonstration case studies analysis

7.8	Quality maintenance on the open-air demo sites during winter periods /snow and ice removal, maintaining easy access, funds provided for maintenance)		X	TBA
<b>8</b>	<b>Adequate cycling distance and quality of surfaces and environment</b>			
8.1	Introduce cycling length - reasonable for recreational cycling	X	X	
8.2	Pathway materialization - semi soft advanced technologies material		X	TBA
8.3	Introduce measures for heat islands radical reduction - pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer	X	X	
8.4	Winter wind control - adequate number of windbreaker trees in the winter wind direction	X	X	
8.5	summer shading - to cover 80% of public space in afternoon in summer	X	X	
<b>9</b>	<b>Safety of users crossing cycling / rollers routes - (Introduce: No direct crossing between fast lanes + warning signs for pedestrians + no "dead corners")</b>			
9.1	All pathways crossings safety should be clearly reflected - potential accidents eliminated by design solutions or site installed visible instructions		X	TBA
9.2	Easy availability of sports equipment renting in NBS supporting environment		X	TBA
<b>10</b>	<b>NCD incidence number reduction (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
10.1	Levels of noise - analyse potential for NBS for protection from traffic noise	X		
10.3	Moderate air temperature, as item 1.1.3	X	X	
10.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level	X	X	
<b>11</b>	<b>CD incidence number reduction (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
11.1	Levels of noise - analyse potential for NBS for protection from traffic noise	X		
11.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?	X	X	



### D3.1 Report on the local demonstration case studies analysis

11.3	Moderate air temperature, as item 1.1.3	X	X	
11.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level	X	X	
12	<b>Increased use of public spaces - (Introduce: Increased and comfortable public places - enlarge existing or introduce new)</b>			
12.1	Planning to include missing types of public spaces + more versatile public spaces, night use safety access and facilities		X	
12.2	Social-Urban Hub created as BGS demo/Edu-centre and community activator in the domain of culture and environmental regeneration		X	
12.3	NB MF "canopy" units for natural shading of 30m2 (irrigated vertical climbing vegetation) for socializing, recharging electronics, playing chess, or waiting for buss		X	
12.4	Open air gym with clear usage instructions			Applicable for Linear Park
13	<b>Higher ethnic and gender diversity - (Introduce: Introduce missing facilities for different gender and people groups –utilize BGS "gender planning criteria) (Gender related planning matrix used)</b>			
13.1	Planning with NBS toll "gender planning criteria" with accent on gender groups that are not attending and specific NBS and related facilities to invite them (in WP4, WP6 analyse how to increase number of people belonging to non-attending gender groups)		X	
13.2	Planning to adopt appropriate distribution of public, communal / semi-public, and private spaces		X	
13.3	Ensuring high-quality usage of public spaces during different seasons		X	
13.4	Graduated and differentiated areas for movement (slow, fast, small, large); options and orientation for walkways day and night use depending on the intensity of movement, direction, and scale of spaces		X	TBA
13.5	Include active transportation with delineating bicycle traffic from pedestrian and automobile traffic, creating pathways for skateboards, rollerblades, and other transportation, and separating pedestrian pathways from traffic ), while ensure barrier-free design.		X	
13.6	Planning should exclude any physical barriers not suitable for older people + ensure walkways have a smooth surface + pedestrian pathways should be naturally shaded in summer		X	TBA



### D3.1 Report on the local demonstration case studies analysis

13.7	The design to incorporate public open places, squares, and public sites to correspond to neighbourhood size and characteristics (age, religion...)		X	
13.8	Various levels of effective spatial buffers structure the area, creating a sequence of spaces with different qualities. Light and shade denote quiet and active zones, change, and differentiated spaces		X	
13.9	If there is one, the common courtyard helps to define the neighbourhood, and creates a safe and nurturing place for children and youth		X	
13.10	Places that include technology, play, and social interaction are an important part of Child and Youth Friendly communities, especially in meeting their social, physical, and emotional health needs. - Create technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth		X	
13.11	Consider discernible social centres, such as plazas, squares, or green spaces with transportation located nearby.		X	TBA
13.12	Create conditions to support local shops or convenience store	X	X	TBA
13.13	Both sunny and shaded areas are incorporated in the public spaces and are easily accessible	X	X	
13.14	The areas of active play to be included - Introduce arrangement of special-use areas for specific groups: e.g., playgrounds for small children within visual and voice range of the apartments + water toys, water playground to attract younger generations		X	TBA
13.15	Make picnic and seating areas available		X	TBA
13.16	Parks include designated play areas for age appropriateness, while also incorporating a space conducive to family gatherings	X	X	
13.17	Park should demonstrate good visibility, clear orientation and pathways, efficient lighting, well maintained public toilets and spaces that foster frequent use	X	X	
13.18	Entries to the park should coincide with bus stops and crosswalks		X	TBA
13.19	Provide sheltered areas for older people	X		TBA
13.20	Major park signs should be lit for night visibility		X	
13.21	The design should address the fact that girls preferring to play in quiet corners		X	
13.22	Create youth hangout zone at the perimeter of the park		X	
13.23	Create few small private areas where couples or small groups can sit		X	



### D3.1 Report on the local demonstration case studies analysis

13.24	Provide one or two green axes through whole area and position sport facilities on or along them		X	
13.25	To make it more usable for girls, divide large areas into smaller areas to avoid large area being dominated by the one particular group - provide open spaces that can be (safely) used by girls		X	TBA
13.26	Park paths should be well lit		X	
13.27	To make the park more appealing to girls create what amounted to gender-segregated spaces, installing volleyball and badminton courts for the girls, and dividing open areas into more private spaces with landscaping.		X	TBA
13.28	Girls meeting areas should be located along to pathways to discourage onlookers - to motivate girls to stay active and use these public spaces		X	
13.29	Youth centres, are important meeting-points and places of communication	X	X	TBA
13.30	Create places of undisturbed retreat that also allow youngsters to be noisy and exuberant			TBA
13.31	Well-maintained and safe green spaces, with adequate shelter, toilet facilities and seating that can be easily accessed.		X	
13.32	A need for small, quieter, contained green spaces in the fringe areas of the city rather than the large busy parks used by children		X	
14	<b>Strong participatory process (target&gt;200) - (Introduce: Introduce systemic, comprehensive collaborative planning process)</b>			
14.1	Introduce compulsory participatory planning in all cases here below		X	TBA
14.2	With NBS and related interventions create conditions for more intensive site use. Define new, group activities, mostly NBS based (local farming - food, flowers aromatic plants + other joint social activities ???, any cultural activities (exchange of different culture manifestation), any joint business, actions to increase biodiversity, ..), for previously non-active citizens, follow their level of acceptance		X	
15	<b>Other liveability targets relevant to PH&amp;WB</b> (DEVELOP: liveability indicators describing different aspects of WB and PH)		X	
16	<b>Improve overall usage stability of the location</b>			
16.1	Access to location: above item xx		X	
16.2	Visibility at the location: above item yy		X	



D3.1 Report on the local demonstration case studies analysis

<b>17</b>	<b>Enhance environment</b>			
17.1	Enhance greenery to xxm3/m2 ?? (already covered in the item ?)		X	
17.2	Enhance / introduce water amenities - xxm2/m2 ??		X	
<b>18</b>	<b>Provide adequate infrastructure for water amenities</b>			
18.1	introduce watering points - xx per expected number of visitors		X	
18.2	introduce toilets - xx per expected number of visitors		X	TBA
<b>19</b>	<b>Create local conditions conducive to citizens participation process</b>			
19.1	Produce citizens participation manual		X	
19.2	Agree with cities on participation logistic practically applicable		X	
19.3	Educate citizens on: 1.BGS, 2.their roles in the participation process		X	
<b>20</b>	<b>Enhance emotional attachment - (Apply planning system where citizens proposals become visible +?)</b>			
20.1	Secure quiet, relaxing spaces within the demonstration site - IND.SE19		X	
20.2	Apply (negotiate with city management) planning system where citizens proposals become visible		X	TBA
<b>21</b>	<b>Introduce / enhance feeling of responsibility and ownership - (Introduce: Citizens regular inclusion into whole planning and implementation process +?)</b>			
21.1	Include citizens regular participation into whole development implementation process		X	
21.2	Elements to increase biodiversity including rainwater-based drinkers and shelters for animals		X	TBA
<b>22</b>	<b>Increased sense of pride - (Introduce: Public announcement of results from planning process stressing citizens direct impact with their proposed solutions +?)</b>			
22.1	Public marketing of results achieved, stressing citizens direct impact (proposed solutions)		X	
<b>23</b>	<b>Higher trust in local community members - (Introduce: Level and quality of communication in defining site requirements +?)</b>			
<b>24</b>	<b>New forms of neighbourly exchange - neighbourhood engagement and cooperation - (Introduce:</b> - Level and quality of communication on site planning - joint work on urban farms - cultural events, +?)			



### D3.1 Report on the local demonstration case studies analysis

24.1	Level of communication on site planning		X	
24.2	Joint work on urban farms		X	
25	<b>Emergence of local leaders and social entrepreneurs - (Introduce: .....)</b>			
26	<b>Increased feeling of community efficacy - (Introduce: - results from joint activities: - planning, - farming, cultural events + ?) (The results from joint activities: planning, farming, ....)</b>			
27	<b>Microclimate improvement - (Introduce: Comprehensive and noticeably better-quality microclimate compared to surroundings)</b>			
27.1	Analysis of negative effects on microclimate: Materialization, artificial sources of heat, lack of natural protection from radiation		X	
27.2	Introduce terrain coverage by specifically designed greenery - Trees, water, greenery,		X	
27.3	Systemic increase of microclimate related greenery as per euPOLIS pocket park solution or similar - greenery m <sup>2</sup> / person to exceed present status significantly		X	
27.4	Narrow streets to be equipped with small and medium pots with greenery at the ground level and at the facade (windows) level	X		
27.5	Air conditioners exhausts to be directed upwards with small aesthetically acceptable barriers - or units to be removed to the roof level if possible	X		
27.6	School air quality control - NBS's at the school air intake for the artificial ventilation system	X		
27.8	Air quality at streets and public spaces - design and construct extensive NBS barriers between pollution sources and recipients		X	
28	<b>Energy saving in immediate neighbourhood - (Introduce: Demonstration site urban components affecting energy consumption in the neighbouring buildings)</b>		X	
29	<b>Heat Island reduction - (Introduce: Demonstration site urban components affecting directly and indirectly Heat Island intensity at the site and at the neighbouring buildings)</b>			
29.1	Solutions that mitigate the effect of HI effect sources (measured or simulated) - introduction of interventions designed to reduce / eliminate HI effects - Trees, water, greenery...		X	



### D3.1 Report on the local demonstration case studies analysis

<b>30</b>	<b>ESS Provisioning functions - provision of clean air, food, raw materials. (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>		X	
30.1	Analyse possibility to introduce air purification regulating NBS at all critical site locations as well as joining streets, covering walking and resting points			
30.2	Analyse introduction of system for the utilization of biomass for energy		X	
<b>31</b>	<b>ESS Regulating functions - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
31.1	Microclimate, water purification, soil quality,		X	
31.2	Analyse possibility to introduce micro-climate regulating NBS at all critical site locations as well as joining streets, covering walking and resting points. Particular attention on evaporative cooling corridors with right greenery utilizing natural forces, as well as winter wind barriers		X	
31.3	Introduce "cleaning-up" and populating near shore underwater environment with marine aquatic BG concept.	X		
<b>32</b>	<b>Socio-Cultural ESS - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
32.1	Create facilities for mental and physical health, positive emotional experience and sense of place,..		X	
32.2	Introduce euPOLIS "pocket parks" complete as described in the project proposal, at suitable locations - as socializing and cultural exchange points		X	
<b>33</b>	<b>Ecological environment status / effects - (Introduce: Ecology quality conducive to enhanced PH&amp;WB and site resilience)</b>			
<b>34</b>	<b>Site components / functions with climate resilience effects - (Introduce: Additional site resilience to cope with extreme weather conditions)</b>			
34.1	Define Site components with this function status - Get vulnerability issues from cities		X	
34.2	Introduce Additional resilience measures Improvements: .....		X	
<b>35</b>	<b>Demonstration Site related new business initiatives</b>			
35.1	Create public spaces with microclimate conditions conducive to a small business (positive aesthetic and climatic conditions)		X	



### D3.1 Report on the local demonstration case studies analysis

35.2	Investigate possible implementation - urban farms, food coops, social entrepreneurship, tourist initiatives,		X	
35.3	Site maintenance		X	TBA
35.4	Site tourism		X	TBA
35.5	Food Processing - investigate potential for small manufacturing	X		
35.6	Distribution - recovery and distribution of surplus food from markets		X	TBA
35.7	Sale - communal units exchange based on excess / shortage between them	X		
35.8	Create NBS attractions to bring more visitors: 1. more attractive to be, 2. something to do, 3. enjoy food in beautiful surroundings, ....		X	
35.9	Create multifunctional NBS spatial connections between different areas. Interaction between them might instigate new activities and new business - IND.SE8		X	
<b>36</b>	<b>Number of neighbourhood businesses that master and adopt new BGS paradigm and tools - (Introduce: - Site overall quality contributing to neighbourhood Companies - neighbourhood Companies utilizing BGS as own business drivers – or NBS financing</b>			
36.1	Propose NBS environments, spaces, public areas, that create conditions to attract visitors and subsequently new business,		X	
36.2	Neighbourhood survey to identify Companies utilizing BGS as own business drivers – or NBS financing		X	
36.3	Define all components treated by BGS which contribute to the increased neighbourhood value		X	
<b>37</b>	<b>Define and check applicability of components treated by BGS which contribute to the increased neighbourhood value</b>			
37.1	NBS's conducive to aesthetic values		X	
37.2	NBS's conducive to PH&WB values		X	
37.3	Visitors categories		X	
<b>38</b>	<b>Number of other cities or corporations involved</b>			
38.1	Define with project management euPOLIS other cities involvement plan?		X	
<b>39</b>	<b>Number of people involved in participatory processes (<i>Count from all events</i>)</b>			
<b>40</b>	<b>Size of audience of project-related meetings, conference panels (<i>Count from all events</i>)</b>			



### D3.1 Report on the local demonstration case studies analysis

41	<b>Number of website visits and downloads of prepared guides and reports. (Count from all events)</b>			
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## 6.2 Gladsaxe DSs Gaps Analysis

Table 8. Gladsaxe DS gaps in existing NBSS – identification tool

	STATUS OF GLADSAXE DEMO-SITE (INCLUDING RUNNING AND MAINTENANCE ITEMS)	Not existing or poor (X)	Could be planned/ implemented (X)	Not applicable due to:
1	Stress reduction - (Introduce: Location beauty, comfortable resting points, presence of biodiversity)			
1.1	Introduce measures to increase the use of green areas - systematically increase awareness of city greenery - strong recreation areas promotion on all media and stimulate the number of pedestrian day trips to green areas + green areas sustainable usage education to be introduced at all levels and public domains (short media information at top hours as well as information panels at site itself)	X	<p style="text-align: center;">X</p> <p>With the construction of facilities that can treat rainwater local by forced evaporation the site will change offering a variety of green spaces and a much greater biodiversity. By creating outdoor activities and through events help the residents to embrace the new facilities. We expect to introduce possible new traditions to obtain more social interaction between the residents.</p>	
1.2	Introduce measures to evaluate and protect- properly maintain existing greenery + involve locals	X	<p style="text-align: center;">X</p> <p>In GLX we hope by introducing vegetable gardens and by giving the residents an area to take care of, that we will see people who are willing to be involved as well in maintenance.</p>	
1.3	Make sure that new trees planted should meet the following conditions: right tree, at the right place, with specific function (1. Shadow – pedestrian, cycling 2. Shadow – heat island, 3. Shadow – buildings, 4. Evaporative cooling, 5. Air purification, 6. Evapo transpiration, 7. Socialization, 8. Animal corridors, 9. Winter wind barrier 10. Reduced emission of negative compounds such as BVOC)	X	<p style="text-align: center;">X</p> <p>We will create a forest biotope making the forested area of the plot into an area offering recreational value, a chance to interact with the characteristic fauna of the forest and work with the trees as an important tool handle rainwater local by evaporation. The trees can help us to clean the rainwater and to direct wind to create a nice environment and to force evaporation.</p>	
1.4	Planning to emphasise location beauty, comfortable resting points, presence of biodiversity, water noise + consider visual and functional attractions as well	X	<p style="text-align: center;">X</p> <p>The noise of running water is both a tool to mental health and increased evaporation. The sound can be used to minimize since</p>	



### D3.1 Report on the local demonstration case studies analysis

	as recreation working and cultural events + EQUILIBRIUM with land for construction		studies show, that the sound of running water can break noise problems since the sound of water seems to drown out stressful noise.	
1.5	MF pocket parks with MF green spaces designed to affect site microclimate with number of greenery functions including evaporatively cooled and live vegetation shaded public spaces for UHI impact reduction - park trees should be designed/selected for particular functions: shading in summer, wind barrier in winter, socializing areas, animal crossing, adiabatic cooling, reduced negative impact on PH (allergens and BVOC)	X	<p style="text-align: center;">X</p> <p>Green recreational areas or pocket parks will follow as an included space when planning with evaporation.</p>	
1.6	If possible, influence the creation of transport links for easy public to existing and new green areas			<p style="text-align: center;">X</p> <p>It is a privately owned area so it is mostly the residents that will benefit from the NBS. Public transport from the plot is already very well.</p>
1.7	Extend NBS interventions towards surrounding buildings	X	<p style="text-align: center;">X</p> <p>The residents will get introduced to NBS solutions through work with small scale kitchen gardens – a resident can have his or her own garden or they can organize small communities. We plan to design this action to be an inspiration for the other social housing associations in the neighbourhood and hope among the residents to find ambassadors to take initiative to generate new gardens at other sites maybe already the next season. The gardens will be bound together with the concept of managing rainwater local.</p>	
1.8	Create NBS-conditioned corridors for continuous quality access to the other parts of the city and introduce ecological corridor connected with neighbouring green spots/areas	X	<p style="text-align: center;">X</p> <p>We expect to create a strong example on how added value can be obtained by using NBS solutions to connect water handling with social and biological interactions.</p> <p>We will introduce the idea to the administration of the social housing association to create Green corridors to combine the surrounding departments of social housing that are all a part of the same housing association.</p>	
1.9	Seasonal eco café (demonstrating sustainable, nature-friendly mode of operation, cooling and resource recycling)	X	<p style="text-align: center;">X</p> <p>This can be a side effect when finding the right project ambassadors among the residents. In our first interaction initiative we will introduce a wagon offering coffee and a place to sit to talk with the neighbours. Due to local legislation this will be an initiative for the</p>	



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			residents only. Whether this can create a local repetitive event will be based on volunteer entrepreneurship.	
1.10	Surface waterway with freshwater aquatic biotope (attractive flora and fauna elements) complete, with integrated constructed wetland and number of bio filters of different types for storm water treatment (water quality improvement)	X	X  This will be implemented in corporation with the DAMP project as an element of both recreative and evaporation potential.	
1.11	MF roof garden, VF, experimental area, alternative space for public art installations -	X	X  A creative environment will be constructed at the site physical close to the caretakers existing workshop and garage. This will be the epicentre of daily activities for 20 days. We will create this temporary space and experimental area but will inspire the residents to take over the initiative and adapt the area to be a continuing initiative.	
1.12	NBS for pluvial floods elimination and surface runoff and water quality management with NB solutions. Storm water control and evaporation enhancing NB systems	X	X  In order to be able to use the rainwater stored in the area as a part of the evaporation technique, it will be a core issue to implement ways to obtain a high water quality.	
2	<b>Depression reduction - (Introduce: Elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity)</b>			
2.1	Create / enhance urban elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity	X	X  This will be a collaboration with the DAMP project how to get the most out of evaporating nature-based elements.	
2.2	Care for nature - demonstration and contact with nature - introduce components for daily care and enhancement of biodiversity.	X	X  We will introduce co-responsibility to the residents as a potential to keep maintenance costs down. It will be an initiative growing from bottom up. We will use vegetable gardens as a communication tool to find and activate potential ambassadors who has the surplus and the will to be a part of the daily caretaking and enhancement of biodiversity.	
2.3	Develop human / ESS regular interaction points - Urban NBS elements and assets that improve access to and contact with surface water bodies, water features, water sounds, as well as all types of greenery	X	X  This will be implemented in collaboration with the DAMP project.	



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2.4	In all regenerated areas create space for increased exposure of visitors to arts and crafts	X	X Attempts will be made to make the site and the results of the cooperated technical, social and biological efforts visible for interested professionals. As well we will work on creating a result that can be used for educational use in the local school or kindergarten.	X This will be difficult to apply due to the plot is private.
2.5	Make sure maintenance creates spotless environment at all times	X	X It is an important aim for the project to work on how to create more biodiversity and a more facilitated environment without increasing maintenance cost. This will be pursued both by making biological sustainable environments, changing the expectation to how a spotless environment is expected to look like and by creating joint ownership and a feeling of responsibility to the space.	
3	<b>Anxiety levels reduction - (Introduce: Security – passages, visibility, comfortable materialization + biophilic design)</b>			
3.1	Security – passages - provide overall easy access and walking security	X	X Designing an urban space with more biology and diversity of spaces will have to be followed up with elements that will provide the feeling of security. Working with the DAMP project we know that there are a big scepticism if spaces offers places to hide and we have obtained a knowledge of the local conditions that can become important to the euPOLIS initiatives.	
3.2	Visibility - relatively acceptable length of visible space + clear undisturbed visibility in direction of pedestrian and cycling movements + clear visibility to surrounding attractive points		X Pileparken offers so much visibility that all intimacy is gone making the space predictable and anonymous. The long straight pedestrian lanes promote moped and bicycle speeding creating a hazard for the pedestrians. The project will work on creating a better balance between visibility and obstructed visibility.	
3.3	Comfortable easy materialization - comfortable and mild colour material - IND.U24	X	X Please describe what this cover.	
3.4	Biophilic design: analyse applicability of 14 directives (will be addressed in detail in WP6)		X Please elaborate.	
3.5	Create family outing zones		X It is an aim to create spaces not only for families but different spaces for different ages, groups and needs by creating a varied natural landscape	



### D3.1 Report on the local demonstration case studies analysis

3.6	In all regenerated areas create space for increased exposure of visitors to arts and crafts	X		X Not relevant in demo site in GLX as it is privately owned area.
3.7	Mental health improvement by eliminating floods or flood potential as well as water streams pollution	X	X This will be implemented in collaboration with the DAMP project.	
4	<b>Enhanced cognitive performance - (memory, judgment, language, intuition and the ability to learn) - (number of senior citizens increases, innovative, related planning required to make them more functional)</b>			
4.1	Counter neurological decline typically seen among the elderly - create stimulus for senior people daily exercise walk	X	X Could be developed but should also be anchored in the local home / health care.	
4.2	Create urban options for new experience and creativity (particularly for senior people): create facilities for walking competition, urban farming, competition in solving mental games	X	X Could be developed but should also be anchored in the local home / health care and primarily be a wish that grow from the bottom and up.	
4.3	Vertical farms and pocket farms irrigated with rainwater harvested from surrounding buildings. Farms with proper education to expand through the neighbourhood	X	This will be an obvious collaboration with the DAMP project.	
4.4	Seniors regular mixing with kindergarten kids (kindergarten NBS facilities at location) - lecturing to very young from own specific subjects	X	This will be an obvious collaboration with the DAMP project.	
4.5	Create urban challenges for senior people with this in mind: when you are inside your comfort zone you may be outside of the enhancement zone - experience should be unfamiliar and mentally challenging	X	X We will construct pathways through nature-based environments offering physical challenges and experiences in the encounter with nature and biology.	
4.6	Introduce participatory planning on all-natural items - introduce mental challenge + new experience		X Participatory planning will be the core of all interventions. The site will be planned in collaboration and dialogue with the residents and opportunities to create ownership and participation will be explored in varies ways.	



### D3.1 Report on the local demonstration case studies analysis

<b>5</b>	<b>Enhanced psychological health and well-being - (contentment, satisfaction with all elements of life, self-actualization) &amp; spiritual benefits of interacting with nature</b>			
5.1	Creation of water amenities and greenery multifunctional corridors systematically distributed through the demo site	X	This will be an obvious collaboration with the DAMP project.	
5.2	Creation of all gender categories socializing (and entertainment) spots within corridors (mapping of existing & enhancement)	X	To be further explained. Seems to have a lot of overlap to other initiatives.	
5.3	Introduce community urban farming contributing to overall more sustainable food system	X	Should be an initiative growing from bottom up. But using vegetable gardens as a communication tool potential ambassador will turn up if any.	
<b>6</b>	<b>Adequate walking distance and quality of surfaces and environment</b>			
6.1	Green permeable areas introduced (Surfaces converted into permeable areas, wherever possible), and existing grey areas replaced or retrofitted		X  All surfaces connected to the DAMP evaporation system will be permeable.	X  Due to high groundwater level the municipality of Gladsaxe do not give permission to local infiltration. This is one of the reasons that it is being tested to use evaporation as an alternative way to handle the rainwater local.
6.2	Recreation areas with adequate special coverage	X	X	
6.3	Engagement facilities – to incentivise active time in the park		We see the exposure of water as an engagement facility. In collaboration with the DAMP project we will look into ways of using the water recreational: for children's play, as a visual and auditive tool to mental healing, to create irrigation for kitchen gardens, to create a more natural balanced micro climate, to create rich environment for animals and plants, to create spaces to stay.	
6.4	Urbanism to promote daily routine by walking - (on streets - pleasant and protected streets) with access to demo site		X  It is relevant to work with a route that combines the initiatives on the site – both giving the residents a route for daily routine walking but as well to generate traffic of people moving in the area and potentially talk to each other.	
6.5	Schools: - outdoor sports in NBS supported environment for more frequent, to be radically improved	X	X	



### D3.1 Report on the local demonstration case studies analysis

				Please elaborate
6.6	Schools - promote and monitor impacts of NBS and students' sports at other recreational facilities			
6.7	Introduce and promote regular physical health assessment of neighbourhood and visitors (starting with absence of diseases to fitness level)	X The residents board has been introduced to the purpose of the project.	X The project will have a special focus on health through social behaviour. Through 2021 there will be a close dialogue with the residents in order to introduce the project and the potential new social habits that will be introduced in the project. Through this dialogue the residents will be introduced to the assessment that will be carried out during the project period and the residents will be informed about the ideas and thoughts behind the project.	
6.8	Provide sufficient walking length - reasonable for recreational walking		X The pathways in at the site will be extended in order to activate and make the nature-based solutions and planned biotopes accessible for residents in all ages.	
6.9	Walking pathway materialization - semi soft advanced technologies material			
6.10	Heat islands eliminated - Albedo effect optimal + pathways in shade min 80% in the afternoon in summer		X The evaporation environment constructed through the DAMP project is expected to have an impact on the Heat Island effect. Ex. to obtain higher evaporation it will be tested to spray water on sun heated pavements. It will be measured how these techniques, the presence of water at the surface and the extended use of plants will affect the temperature and the microclimate.	
6.11	Summer shading - to cover 80% of public space in afternoon in summer		X To be assessed if this needs that much shade, maybe not so relevant for Pileparken	
6.12	Winter wind control - adequate number of green windbreaker trees in the winter wind direction.	X	X	
6.13	Introduction of recreation areas whenever possible at the location		X	
7	<b>Adequate running distance and quality of surfaces and environment</b>			
7.1	Running length - reasonable for recreational running with NBS quality enhancement	X		The site is too small area for running, but will be good for small walks around the building blocks and the different kind of biotopes



### D3.1 Report on the local demonstration case studies analysis

7.2	Running pathway materialization - semi soft advanced technologies material with NBS quality enhancement	X		X
7.3	Measures for heat islands radical reduction – (criterions pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer)	X	X It is an aim to measure the change in local temperature due to enriched biodiversity.	
7.4	Winter wind control in areas / corridors popular for recreational activities during cold weather season-adequate number of windbreaker trees in the winter wind direction	X	X The site has long east-west facing spaces parallel with the building blocks. These corridors will be divided by tree planting and by working with curved pathways and shrub planting.	
7.5	Trees selected and positioned for evaporative cooling	X	X It is planned in DAMP phase 1 to monitor tree evaporation. This would be interesting to extend to other types of trees.	
7.6	Summer shading - to cover 80% of public space in afternoon in summer	X		X It is not an aim in danish climate to cover as much as possible. In spring and autumn and some cool summers sun exposed area is seen as a quality. The variation of space and quality is more important in danish context.
7.7	Winter wind control - adequate number of green windbreaker trees in the winter wind direction to reduce wind chill effect	X	X Breaking up the long corridors will break the wind – see 7.4	
7.8	Quality maintenance on the open-air demo sites during winter periods /snow and ice removal, maintaining easy access, funds provided for maintenance)	X	X Snow clearing is a part of the care takers job in Pileparken. But all design needs to meet the geometry of the machines. A close dialogue with the caretaker in the design process is essential. Ice and icy roads are in Denmark removed by spreading salt. Since the salt is a problem to the natural environment new techniques need to be introduced in the daily winter maintenance.	
8	<b>Adequate cycling distance and quality of surfaces and environment</b>			
8.1	Introduce cycling length - reasonable for recreational cycling	X		The site is too small for cycling but since cycling is a preferred transportation in Copenhagen and suburbs, the area is design with bicycle parking and ramps to enter basement facilities with bikes.
8.2	Pathway materialization - semi soft advanced technologies material		Please elaborate	



### D3.1 Report on the local demonstration case studies analysis

8.3	Introduce measures for heat islands radical reduction - pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer		In the danish project focus is to obtain higher evaporation to handle all rainwater local. In summer water stored from rainy seasons can be sprayed on sun heated pavements. This will both help to handle the water and to cool the surface on hot days.	
8.4	Winter wind control - adequate number of windbreaker trees in the winter wind direction		See 7.4	
8.5	Summer shading - to cover 80% of public space in afternoon in summer			It is not an aim in danish climate to cover as much as possible. In spring and autumn and some cool summers sun exposed area is seen as a quality. The variation of space and quality is more important in danish context.
9	<b>Safety of users crossing cycling / rollers routes - (Introduce: No direct crossing between fast lanes + warning signs for pedestrians + no "dead corners")</b>			
9.1	All pathways' crossings safety should be clearly reflected - potential accidents eliminated by design solutions or site installed visible instructions	X		X If we talk within Pileparken 6, then not relevant here
9.2	Easy availability of sports equipment renting in NBS supporting environment	X	Equipment could be stored with the caretaker.	
10	<b>NCD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
10.1	Levels of noise - analyse potential for NBS for protection from traffic noise	X		Noise is not a problem at the site. But using sound of water is an interesting way to handle traffic noise. A British research study shows that people hear the sound of water before other sounds.
10.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?			When it comes to traffic and air pollution this is not a significant issue at the site.
10.3	Moderate air temperature, as item 1.1.3		Moderation of temperature goes hand in hand with treating of surface water by evaporation.	
10.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level		Please elaborate	



### D3.1 Report on the local demonstration case studies analysis

<b>11</b>	<b>CD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
11.1	Levels of noise - analyse potential for NBS for protection from traffic noise		See 10.1	
11.2	low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?			Not any known
11.3	Moderate air temperature, as item 1.1.3		See above	
11.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level		X	
<b>12</b>	<b>Increased use of public spaces - (Introduce: Increased and comfortable public places - enlarge existing or introduce new)</b>			
12.1	Planning to include missing types of public spaces + more versatile public spaces, night use safety access and facilities		Relevant if the wording is "common space" because it is privately owned area and therefore not "public"	
12.2	Social-Urban Hub created as BGS demo/Edu-centre and community activator in the domain of culture and environmental regeneration		Relevant if the wording is "common space" because it is privately owned area and therefore not "public"	
12.3	NB MF "canopy" units for natural shading of 30m2 (irrigated vertical climbing vegetation) for socializing, recharging electronics, playing chess, or waiting for buss		Relevant if the wording is "common space" because it is privately owned area and therefore not "public"	
12.4	Open air gym with clear usage instructions		Relevant if the wording is "common space" because it is privately owned area and therefore not "public"	
<b>13</b>	<b>Higher ethnic and gender diversity - (Introduce: Introduce missing facilities for different gender and people groups –utilize BGS "gender planning criteria) (Gender related planning matrix used)</b>			
13.1	Planning with NBS tool "gender planning criteria" with accent on gender groups that are not attending and specific NBS and related facilities to invite them (in WP4, WP6 analyse how to increase number of people belonging to non-attending gender groups)		It will be a central aim in Pileparken to include ethnic diversity.	



### D3.1 Report on the local demonstration case studies analysis

13.2	Planning to adopt appropriate distribution of public, communal / semi-public, and private spaces	X	The site is private but has a daily flow of people using the plot as a short cut.	
13.3	Ensuring high-quality usage of public spaces during different seasons	X	X	
13.4	Graduated and differentiated areas for movement (slow, fast, small, large); options and orientation for walkways day and night use depending on the intensity of movement, direction, and scale of spaces	X	It is a wish to slow down bicycles and moped driving to secure the pedestrians walking in the front of the house to the parking lane. The existing site has very straight lines and no obstacles. This is a wish from the residents to change this.	
13.5	Include active transportation with delineating bicycle traffic from pedestrian and automobile traffic, creating pathways for skateboards, rollerblades, and other transportation, and separating pedestrian pathways from traffic), while ensure barrier-free design.	X		The size of the plot is not applicable for an urban traffic planning study beside mentioned in 13.4
13.6	Planning should exclude any physical barriers not suitable for older people + ensure walkways have a smooth surface + pedestrian pathways should be naturally shaded in summer	Existing – and will be a part of the future planning due to danish regulation		
13.7	The design to incorporate public open places, squares, and public sites to correspond to neighbourhood size and characteristics (age, religion...)		The space has to be designed to activate the outdoor space but take into account that there is no barrier between the apartment space and the common space right outside peoples windows.	
13.8	Various levels of effective spatial buffers structure the area, creating a sequence of spaces with different qualities. Light and shade denote quiet and active zones, change, and differentiated spaces	X	see 13.7	
13.9	If there is one, the common courtyard helps to define the neighbourhood, and creates a safe and nurturing place for children and youth	X	By activating the open space around the apartment blocks will be creating space with a variation of scale.	



### D3.1 Report on the local demonstration case studies analysis

13.10	Places that include technology, play, and social interaction are an important part of Child and Youth Friendly communities, especially in meeting their social, physical, and emotional health needs. Create technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth		We aim to emphasize the connection between technology, social inclusion and health by connecting the physical space to information accessible via smart phones. This could as well inspire to physical action and play.	
13.11	Consider discernible social centres, such as plazas, squares, or green spaces with transportation located nearby.			X
13.12	Create conditions to support local shops or convenience store			Residential area without any local shops besides pizzeria truck – not really a need for that
13.13	Both sunny and shaded areas are incorporated in the public spaces and are easily accessible		Relevant if wording is “common” space and not “public”	
13.14	the areas of active play to be included - Introduce arrangement of special-use areas for specific groups: e.g., playgrounds for small children within visual and voice range of the apartments + water toys, water playground to attract younger generations	X	X	
13.15	Make picnic and seating areas available		Already existing but can be improved especially in connection to planned use of different biotopes that will offer different types of stay.	
13.16	Parks include designated play areas for age appropriateness, while also incorporating a space conducive to family gatherings		The variation of green spaces will be programmed having different kind of focus groups. But it is important that all spaces open up to many groups in order to facilitate that people meet their neighbours.	
13.17	Park should demonstrate good visibility, clear orientation and pathways, efficient lighting, well maintained public toilets and spaces that foster frequent use	X	All this is a part of actions above.	
13.18	Entries to the park should coincide with bus stops and crosswalks	X		The site offers good access to public transport and it is not a wish to expose the site public.
13.19	Provide sheltered areas for older people		If it is a local wish – bottom up.	
13.20	Major park signs should be lit for night visibility			Light is important for safety and orientation, but it is a private property and light is not important for directing people, since this is their own garden.



### D3.1 Report on the local demonstration case studies analysis

13.21	The design should address the fact that girls preferring to play in quiet corners			Is this not a discriminating statement in itself? But there should be room for both physical and less physical children.
13.22	Create youth hangout zone at the perimeter of the park		We aim to work on creating a landscape with a football field that will be both a water storage and a hangout for the local young people.	
13.23	Create few small private areas where couples or small groups can sit	X	X	
13.24	Provide one or two green axes through whole area and position sport facilities on or along them	X	X	
13.25	To make it more usable for girls, divide large areas into smaller areas to avoid large area being dominated by the one particular group - provide open spaces that can be (safely) used by girls		Please see 13.21	
13.26	Park paths should be well lit		X	
13.27	To make the park more appealing to girls create what amounted to gender-segregated spaces, installing volleyball and badminton courts for the girls, and dividing open areas into more private spaces with landscaping.		see 13.22	
13.28	Girls meeting areas should be located along to pathways to discourage onlookers - to motivate girls to stay active and use these public spaces		?	
13.29	Youth centres, are important meeting-points and places of communication	X	see 13.22	
13.30	Create places of undisturbed retreat that also allow youngsters to be noisy and exuberant	X	The appartement buildings are facing north and south and have no windows in the gable. The outdoor space at the end of the buildings offers spaces not disturbing the private space in the buildings. We will work with this zoning but as well be aware that it will be important to make visual contact between the apartments and where you can meet people and spur to people to get out of their apartments to meet their neighbours.	X We will meet resistance introducing noise and a lively urban environment since the open space of the site is generally very close to people's private spaces – apartments and balconies.
13.31	Well-maintained and safe green spaces, with adequate shelter, toilet facilities and seating that can be easily accessed.		Staff is working on the site and have an office and a workshop. It will be important to include the caretaker to make a project that will be impossible to meet the maintenance level within an accessible budget frame.	



### D3.1 Report on the local demonstration case studies analysis

13.32	A need for small, quieter, contained green spaces in the fringe areas of the city rather than the large busy parks used by children	X	X	
14	<b>Strong participatory process (target&gt;200) - (Introduce: Introduce systemic, comprehensive collaborative planning process)</b>			
14.1	Introduce compulsory participatory planning in all cases here below		This is unavoidable since the resident board has the final word on all activities planned.	
14.2	With NBS and related interventions create conditions for more intensive site use. Define new, group activities, mostly NBS based (local farming - food, flowers aromatic plants + other joint social activities ???, any cultural activities (exchange of different culture manifestation), any joint business, actions to increase biodiversity, ..), for previously non-active citizens, follow their level of acceptance	X	X	
15	<b>Other liveability targets relevant to PH&amp;WB</b> (DEVELOP: liveability indicators describing different aspects of WB and PH)			
16	<b>Improve overall usage stability of the location</b>			
16.1	Access to location: above item xx			Residential area
16.2	Visibility at the location: above item yy			Residential area
17	<b>Enhance environment (already covered?)</b>			
17.1	Enhance greenery to xxm3/m2 (already covered in the item ?)		Measures will come when planning start	
17.2	Enhance / introduce water amenities - xxm2/m2 ??		Measures will come when planning start	
18	<b>Provide adequate infrastructure for water amenities</b>			
18.1	Introduce watering points - xx per expected number of visitors			X
18.2	Introduce toilets - xx per expected number of visitors			Beside people's own apartments the property offers common toilets for the residents in the basement. The residents do not see a reason to have a public bathroom since they are not interested in making the site into a public park.



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<b>19</b>	<b>Create local conditions conducive to citizens participation process</b>			
19.1	Produce citizens participation manual		Planning in progress	
19.2	Agree with cities on participation logistic practically applicable		Planning in progress	
19.3	Educate citizens on: 1.BGS, 2. Their roles in the participation process		Planning in progress	
<b>20</b>	<b>Enhance emotional attachment - (Apply planning system where citizens proposals become visible +?)</b>			
20.1	Secure quiet, relaxing spaces within the demonstration site - IND.SE19	X	This is included in the plan of involving residents	
20.2	Apply (negotiate with city management) planning system where citizens proposals become visible	X	This is included in the plan of involving residents	
<b>21</b>	<b>introduce / enhance feeling of responsibility and ownership - (Introduce: Citizens regular inclusion into whole planning and implementation process + ?)</b>			
21.1	Include citizens regular participation into whole development implementation process	X	This is included in the plan of involving residents	
21.2	Elements to increase biodiversity including rainwater-based drinkers and shelters for animals	X	This is included in the plan of involving residents	
<b>22</b>	<b>Increased sense of pride - (Introduce: Public announcement of results from planning process stressing citizens direct impact with their proposed solutions + ?)</b>			
22.1	Public marketing of results achieved, stressing citizens direct impact (proposed solutions)		?	
<b>23</b>	<b>Higher trust in local community members - (Introduce: Level and quality of communication in defining site requirements + ?)</b>	X	<p>In GLX we want to see if the presence of a social worker and a contact person, Nicolas over a longer period of time. We aim to build a trust between him and the local community and based on this trust to make it possible to reach groups that was not reached before.</p> <p>We aim to mediate changes for these people by growing initiative from down and up. By introducing simple activities that can embrace a lot of different people we hope to meet the people who</p>	



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			<p>has the ability and energy to involve themselves and become ambassadors to the project.</p> <p>We will provide them with assistance and network to establish a platform from where they can attract neighbours and build a sustainable, inclusive social community.</p>	
24	<b>New forms of neighbourly exchange - neighbourhood engagement and cooperation - (Introduce:</b> - Level and quality of communication on site planning - joint work on urban farms - cultural events, + ?)			
24.1	Level of communication on site planning	X	<p>Communication has to be built on recognition. What we communicate must be relevant and present for the recipient. If we communicate too early nobody can see the relevance and nobody will hear what we say and we lose their awareness. If we communicate too late people will feel that they have nothing to say, and we lose their awareness. We hope to build a communication on trust, inspiration and action.</p>	
24.2	Joint work on urban farms	X	<p>We are introducing building a common vegetable garden as a tool to communication. Our interest is not the garden but the confident space that we build together with the residents. How the garden will develop the first year and the following years has to be built on the local initiative. We can only mediate people to act and offer them tools when they ask for it. If this will lead to a joint urban farm is not an aim but it might be an outcome.</p>	
25	<b>Emergence of local leaders and social entrepreneurs</b>		See above	
26	<b>Increased feeling of community efficacy - (Introduce:</b> - results from joint activities: - planning, - farming, - cultural events, + ?) <i>(The results from joint activities: planning, farming, ....)</i>		<p>The cultural event is a way to express and substantiate the community. To gather around a common goal and to build up a local network. We will use the kitchen garden as a reason to create the cultural event.</p>	



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<b>27</b>	<b>Microclimate improvement - (Introduce: Comprehensive and noticeably better-quality microclimate compared to surroundings)</b>			
27.1	Analysis of negative effects on microclimate: Materialization, artificial sources of heat, lack of natural protection from radiation		This is what the DAMP project is all about. Our aim is to create an additional tool to handle water local but the result will be solutions based on natural principals.	
27.2	Introduce terrain coverage by specifically designed greenery - Trees, water, greenery,		We hope in the collaboration between DAMP and euPOLIS to find a symbiose between a technical need to find alternative ways to handle rainwater to meet climate change with the need to make our cities a better base for a healthy and active life.	
27.3	Systemic increase of microclimate related greenery as per euPOLIS pocket park solution or similar - greenery m2 / person to exceed present status significantly		This will be an obvious collaboration with the DAMP project.	
27.4	Narrow streets to be equipped with small and medium pots with greenery at the ground level and at the facade (windows) level			There are no narrow streets in Pileparken
27.5	Air conditioners exhausts to be directed upwards with small aesthetically acceptable barriers - or units to be removed to the roof level if possible			Airconditioning is not an issue in Danish climate and in a fairly open urban space.
27.6	School air quality control - NBS's at the school air intake for the artificial ventilation system			See above
27.8	Air quality at streets and public spaces - design and construct extensive NBS barriers between pollution sources and recipients			See above
<b>28</b>	<b>Energy saving in immediate neighbourhood - (Introduce: Demonstration site urban components affecting energy consumption in the neighbouring buildings)</b>			
<b>29</b>	<b>Heat Island reduction - (Introduce: Demonstration site urban components affecting directly and indirectly Heat Island intensity at the site and at the neighbouring buildings)</b>			
29.1	Solutions that mitigate the effect of HI effect sources (measured or simulated) - introduction of interventions designed to reduce / eliminate HI effects - Trees, water, greenery.	X	X Evaporation moves heat energy from the terrain surface and is a relevant tool to minimize UHI effect. At the site in GLX we aim to	



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			identify the local change of temperature when increasing biodiversity.	
<b>30</b>	<b>ESS Provisioning functions - provision of clean air, food, raw materials. (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
30.1	Analyse possibility to introduce air purification regulating NBS at all critical site locations as well as joining streets, covering walking and resting points		X	Air purification is not an aim on the site since we are not in a dense urban context.
30.2	Analyse introduction of system for the utilization of biomass for energy			We do not expect the site in GLX to be big enough for a local energy production based on biomass. However, we are in the DAMP project looking at possibilities to extract heat from the water in order to produce energy for the plant to be self-supplying with energy necessary for water circulation and forced evaporation.
<b>31</b>	<b>ESS Regulating functions - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
31.1	microclimate, water purification, soil quality,	X	Water purification is a key to unfold the recreative potentiality of having water stored and circulated on site. We are looking into different nature-based techniques to improve water quality	
31.2	Analyse possibility to introduce micro-climate regulating NBS at all critical site locations as well as joining streets, covering walking and resting points. Particular attention on evaporative cooling corridors with right greenery utilizing natural forces, as well as winter wind barriers	X		Not important / relevant at the GLX site.
31.3	Introduce "cleaning-up" and populating near shore underwater environment with marine aquatic BG concept.	X		No marine aquatic environment in GLX
<b>32</b>	<b>Socio-Cultural ESS - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
32.1	Create facilities for mental and physical health, positive emotional experience, and sense of place	X	Water will be present in different condition creating sounds and refractions – water mirror, rippling water etc. Circulation of water is a criterion for creating an environment to force evaporation offering values to be explored.	



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32.2	Introduce euPOLIS "pocket parks" complete as described in the project proposal, at suitable locations - as socializing and cultural exchange points	X	Developing scalable typologies in GLX must be developed together with techniques to obtain evaporation.	
33	<b>Ecological environment status / effects - (Introduce: Ecology quality conducive to enhanced PH&amp;WB and site resilience)</b> overall ecological status to be defined			
34	<b>Site components / functions with climate resilience effects - (Introduce: Additional site resilience to cope with extreme weather conditions)</b>			
34.1	Define Site components with this function status - Get vulnerability issues from cities		This will be an obvious collaboration with the DAMP project since developing of typologies are essential for scaling up.	
34.2	Introduce Additional resilience measures Improvements		Water quality improvement, energy extraction potential, energy storage (ex. Storing water in high altitude will store the potential energy), evaporation factor, UHI reduction factor, water saturation capacity ....	
35	<b>Demonstration Site related new business initiatives</b>			
35.1	Create public spaces with microclimate conditions conducive to a small business (positive aesthetic and climatic conditions)			The site in GLX is not appropriate for potential business development since this will not contradict the local plan legislation framework.
35.2	Investigate possible implementation - urban farms, food coops, social entrepreneurship, tourist initiatives,		See 35.1 – residents might be able to do roadside sale or sale of e.g., Vegetable to neighbours.	
35.3	Site maintenance		Both for keeping maintenance cost down but as well to develop better local awareness and co-ownership it is a good idea to introduce ways to make the residents contribute to maintenance.	
35.4	Site tourism	X	A private residential property is not potential for developing tourist business. Nevertheless, the development of physical results from joint euPOLIS-DAMP NBS planning will create a potential destination for people with professional approach or as a demonstration site to show local school children about NBS solutions and approach to climate change and climate adaption. It is a possible potential to find ways to communicate the multifunctionality of the future site presented by a hub manned by the residents.	



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35.5	Food Processing - investigate potential for small manufacturing			See 35.1
35.6	Distribution - recovery and distribution of surplus food from markets			See 35.1
35.7	Sale - communal units exchange based on excess / shortage between them		See 35.2	See 35.1
35.8	Create NBS attractions to bring more visitors: 1. more attractive to be, 2. something to do, 3. enjoy food in beautiful surroundings, ....	X	A positive consequence of creating a more varied, more social and secure environment will be to reduce eviction from the area.	It is not an aim in GLX to attract more visitors
35.9	Create multifunctional NBS spatial connections between different areas. Interaction between them might instigate new activities and new business - IND.SE8	X	There is a focus in the neighbourhood to achieve better social contact between the different social housing associations.	
36	<b>Number of neighbourhood businesses that master and adopt new BGS paradigm and tools - (Introduce: - Site overall quality contributing to neighbourhood Companies - neighbourhood Companies utilizing BGS as own business drivers – or NBS financing</b>			
36.1	Propose NBS environments, spaces, public areas, that create conditions to attract visitors and subsequently new business,	X		The site in GLX is not appropriate for potential business development since this will not contradict the local plan legislation framework.
36.2	Neighbourhood survey to identify Companies utilizing BGS as own business drivers – or NBS financing	X		The site in GLX is not appropriate for potential business development since this will not contradict the local plan legislation framework.
36.3	Define all components treated by BGS which contribute to the increased neighbourhood value	X	Recreative functions (planning of a football field as a combined water storage and recreative space), attractions based on increased biodiversity e.g., Aquatic biotopes, butterflies, birds etc.	
37	<b>Define and check applicability of components treated by BGS which contribute to the increased neighbourhood value</b>			
37.1	NBS's conducive to aesthetic values	X	Nature based biotopes like lakes, meadow and forest introduced in a monotonous and little inspiring neighbourhood.	
37.2	NBS's conducive to PH&WB values	X	A landscape based on natural biotopes with incorporated activities, mental relaxation and actions to expand social network moving residents from being excluded to be included.	



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37.3	Visitors' categories		Based on obtained ownership to the outdoor space, activity and climate action we hope to generate a pride of the site and a desire to open up and share values with the neighbours and the neighbourhood.	
38	<b>Number of other cities or corporations involved</b>			
38.1	Define with project management euPOLIS other cities involvement plan?		<p>The GLX team are developing a plan of action together with the residents based on creating a temporary urban garden. The garden is a tool to communicate with residents we do not normally reach.</p> <p>The plan is developed with the resident board, the caretaker and members of the social housing administration.</p> <p>The plan is based on creating contact and opening for involvement as we have actual activities to offer.</p>	
39	<b>Number of people involved in participatory processes (<i>Count from all events</i>)</b>			
40	<b>Size of audience of project-related meetings, conference panels (<i>Count from all events</i>)</b>			
41	<b>Number of website visits and downloads of prepared guides and reports. (<i>Count from all events</i>)</b>			



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#### 6.3 Lodz DSs Gaps Analysis

Table 9. Lodz DS gaps in existing NBSs – identification tool

	STATUS OF LODZ DEMO-SITE (INCLUDING RUNNING AND MAINTENANCE ITEMS)	Not existing or poor (X)	Could be planned / implem. (X)	Not applicable due to:
1	Stress reduction - (Introduce: Location beauty, comfortable resting points, presence of biodiversity)			
1.1	Introduce measures to increase the use of green areas - systematically increase awareness of city greenery - strong recreation areas promotion on all media and stimulate the number of pedestrian day trips to green areas + green areas sustainable usage education to be introduced at all levels and public domains (short media information at top hours as well as information panels at site itself)			In Łódź we have city project Green Łódź (Green Łódź), promoted on social media, local media and the office website - as part of the project various free events and activities aimed at the residents of our city are organized in the parks/green areas throughout the year. The offer of spending free time in the greenery of the city is adapted for all age groups. Recreation, cultural and sporting events and activities in the city's parks and green spaces. So, the information can be included in regular city promotion activities.
1.2	Introduce measures to evaluate and protect-properly maintain existing greenery + involve locals	X	X	Could be difficult to apply due to low citizen responsiveness. Formal greenery is covered by the newly applied standards of maintenance and does not involve citizens for formal reasons. Informal greenery (60% of the greenery) is not maintained, and people are discouraged to care for it. For the demo we could possibly introduce a unique programme for the locals, being conscious that in 2-3 years it will spontaneously cease to exist.
1.3	Make sure that new trees planted should meet the following conditions: right tree, at the right place, with specific function (1. Shadow - pedestrian, cycling, 2. Shadow - heat island, 3.Shadow - buildings, 4.evaporative cooling, 5.air purification, 6.evapo transpiration, 7.socialization, 8.animal corridors, 9.winter wind barrier 10. reduced emission of negative compounds such as BVOC)			Team comment: No X There are no X – Does that mean that these planning criteria are already included into original planning and therefore they are not regarded as "Gaps in NBS"?
1.4	Planning to emphasise location beauty, comfortable resting points, presence of biodiversity, water noise + consider visual and			No X Same comment as 1.3



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	functional attractions as well as recreation working and cultural events + EQUILIBRIUM with land for construction			
1.5	MF pocket parks with MF green spaces designed to affect site microclimate with number of greenery functions including evaporatively cooled and live vegetation shaded public spaces for UHI impact reduction - park trees should be designed/selected for particular functions: shading in summer, wind barrier in winter, socializing areas, animal crossing, adiabatic cooling, reduced negative impact on PH (allergens and BVOC) .... etc	X		There are some pocket parks in Lodz – but its condition/design is rather poor especially when we consider ecological functions, also the leisure space itself is not perceived positively by the residents. We have special woonerf design mainly for recreation with green elements (trees), however blue solutions (use of rainwater) are not taken into account during implementation. The new design is already considered in the demo.
1.6	If possible, influence the creation of transport links for easy public to existing and new green areas			In larger scale it is already considered in case of expo horticultural. Demo is already well linked via public transport.
1.7	Extend NBS interventions towards surrounding buildings	X	X	
1.8	Create NBS-conditioned corridors for continuous quality access to the other parts of the city and introduce ecological corridor connected with neighbouring green spots/areas	X		The master plan already exists built around the blue-green network, ignored in the city management and planning since 2009, despite numerous citizens' campaigns. euPOLIS demo will promote BGS.
1.9	Seasonal eco café (demonstrating sustainable, nature-friendly mode of operation, cooling and resource recycling)	X	X	The “bike-café” already operates in the city, can be invited to the demo.
1.10	Surface waterway with freshwater aquatic biotope (attractive flora and fauna elements) complete, with integrated constructed wetland and number of bio filters of different types for storm water treatment (water quality improvement)	X		Slowly advancing blue-green network of river corridors, not applicable in euPOLIS site. Small water container / pond is already planned in the demo.
1.11	MF roof garden, VF, experimental area, alternative space for public art installations -	X		Not applicable to the site. Green art installation sites exist in the city.
1.12	NBS for pluvial floods elimination and surface runoff and water quality management with NB solutions. Storm water control and evaporation enhancing NB systems	X		Already ongoing projects of façade gardens, and rain gardens, however dpt. in charge of infrastructure reluctant to broader NBS application. Such NBS are planned for euPOLIS and ATENAS demos.



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<b>2</b>	<b>Depression reduction - (Introduce: Elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity)</b>			
2.1	Create / enhance urban elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity	X		No focus on in-city biodiversity as for now, no enabling environment. Planned for euPOLIS demo.
2.2	Care for nature - demonstration and contact with nature - introduce components for daily care and enhancement of biodiversity.	X		Planned as a part of euPOLIS demo related to kindergarten. As for the city see 1.2.
2.3	Develop human / ESS regular interaction points - Urban NBS elements and assets that improve access to and contact with surface water bodies, water features, water sounds, as well as all types of greenery		X	Already ongoing projects in slightly wrong direction: graduation towers and street fountains; no much support from citizens. Already considered for the demo and theoretically by the City for other locations (still focus on techno-gardens).
2.4	In all regenerated areas create space for increased exposure of visitors to arts and crafts			See 1.11
2.5	Make sure maintenance always creates spotless environment	X		Maintenance costs must be reduced. The focus of the demo put on self-regulatory potential of the site.
<b>3</b>	<b>Anxiety levels reduction - (Introduce: Security – passages, visibility, comfortable materialization + biophilic design)</b>			
3.1	Security – passages - provide overall easy access and walking security			Formal greenery is overloaded with passages which reduce its resilience. Current efforts must be put to reverse the process.
3.2	Visibility - relatively acceptable length of visible space + clear undisturbed visibility in direction of pedestrian and cycling movements + clear visibility to surrounding attractive points			Harmful to the city nature, currently actions should reverse the process of opening views and allow creation of closed enclaves better regulating microclimate and serving habitats to nature.
3.3	Comfortable easy materialization - comfortable and mild colour material - IND.U24			Regulated by local plans that specify the materials and colours allowed in places. euPOLIS should propose new, softer, more comfortable materials
3.4	Biophilic design: analyse applicability of 14 directives (will be addressed in detail in WP6)			To be decided upon receiving details.
3.5	Create family outing zones	X		Current city development counteracts such spaces, initially secured by the Blue-green network. The process accelerates in wrong direction.
3.6	In all regenerated areas create space for increased exposure of visitors to arts and crafts	X	X	It depends on art and crafts providers.



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3.7	Mental health improvement by eliminating floods or flood potential as well as water streams pollution	X		Still no clear and consequent city policy, requires integrated water management across sectors. Adding x to "could be planned" will not change the fact that current city policy hampers any efforts, city departments seem to act pretty independently and out of European standards when refers to e.g., street revitalization
4	<b>Enhanced cognitive performance - (memory, judgment, language, intuition, and the ability to learn) - (number of senior citizens increases, innovative, related planning required to make them more functional)</b>			
4.1	Counter neurological decline typically seen among the elderly - create stimulus for senior people daily exercise walk	X		Not considered by current policy- focus on families and kids, although current focus on woonerfs partially meets the expectations. Still Łódź city centre with one of the highest air pollutions. In Europe is not foreseen as good place for daily workouts. Foreseen in the demo.
4.2	Create urban options for new experience and creativity (particularly for senior people): create facilities for walking competition, urban farming, competition in solving mental games.	X	TBA	No dedicated policies neither actions. Urban farming has already been raised by citizens and is to be considered by the City.
4.3	Vertical farms and pocket farms irrigated with rainwater harvested from surrounding buildings. Farms with proper education to expand through the neighbourhood	X		Planned for the demo. Reluctance in the city due to air pollution.
4.4	Seniors regular mixing with kindergarten kids (kindergarten NBS facilities at location) - lecturing to very young from own specific subjects	X	TBA	No focus on seniors in the city policies /plans. ATENAS project is trying to act in this direction (COVID impacted)
4.5	Create urban challenges for senior people with this in mind: when you are inside your comfort zone you may be outside of the enhancement zone - experience should be unfamiliar and mentally challenging	X	TBA	No focus on seniors in the city policies / plans. Focus of the demo.
4.6	Introduce participatory planning on all-natural items - introduce mental challenge + new experience	X	X	No animators and animation in the city, therefore meeting the target is not realistic within 3-4 years. One short project will not compensate for 50 years negligence, especially that there is no specialized people. We should revisit this item as very important in euPOLIS.
5	<b>Enhanced psychological health and well-being - (contentment, satisfaction with all elements of life, self-actualization) &amp; spiritual benefits of interacting with nature</b>			



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5.1	Creation of water amenities and greenery multifunctional corridors systematically distributed through the demo site	X		Already planned in demo
5.2	Creation of all gender categories socializing (and entertainment) spots within corridors (mapping of existing & enhancement)	X	TBA	
5.3	Introduce community urban farming contributing to overall more sustainable food system	X	TBA	Reluctance to urban farming, no spaces available, despite allotment gardens being quite numerous in Lodz and still foreseen by developers and some city departments as waste of the ground. Strong arguments consider air pollution and its consequences to food quality.
6	<b>Adequate walking distance and quality of surfaces and environment</b>			
6.1	Green permeable areas introduced (Surfaces converted into permeable areas, wherever possible), and existing grey areas replaced or retrofitted	X	X	Unlikely due to focus on high profit development, grey replaced by grey, and green replace by grey. In demo the focus is to decrease the grey part to min.
6.2	Recreation areas with adequate special coverage	X	X	Almost no new parks funded in last decades, official reason=lack of funding
6.3	Engagement facilities – to incentivise active time in the park			Open air gym on place.
6.4	Urbanism to promote daily routine by walking (on streets - pleasant and protected streets) with access to demo site		X	In fact, ongoing greening of streets, unfortunately with simultaneous tree cutting for numerous investments around and consequent extermination of the accessible green ring.
6.5	Schools: - outdoor sports in NBS supported environment for more frequent, to be radically improved	x		Planned for the demo in collaboration with kindergarten. The centre of the city is not perceived as safe place for pupils. Anyhow majority of schools have own playing grounds and the City acquired project for 180 rainwater gardens at schools.
6.6	Schools - promote and monitor impacts of NBS and students' sports at other recreational facilities	x	X	Possible with dedicated school programmes.
6.7	Introduce and promote regular physical health assessment of neighbourhood and visitors (starting with absence of diseases to fitness level)	X		No facilities, time consuming (to be consult medical team). The demo is too small to demonstrate any impact on neighbourhood. It could be possible with big whole-city programme monitoring activities in big green areas.
6.8	Provide sufficient walking length - reasonable for recreational walking	x		No suitable spaces in the city centre, demo's length is 283m. Blue-Green Network is an upscaling option.
6.9	Walking pathway materialization - semi soft advanced technologies material	x	TBA	



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6.10	Heat islands eliminated - Albedo effect optimal + pathways in shade min 80% in the afternoon in summer	x		Already considered in demo-site. Not possible in the city scale under current regulations / approaches - the only criterion for the investments is profitability per m <sup>2</sup> , this eliminates all chances for creation a sufficient green area to minimize UHI, the same applies to rebuilding of streets, even if tree planting is considered no water management is included (specific policy of Dpt. City Investments and Road and Transport Authority) which results in over 65% tree mortality rate.
6.11	Summer shading - to cover 80% of public space in afternoon in summer	x		Contradicting policy of Dpt. Architecture and Urbanization forcing XIX –century view of the city. EuPOLIS should suggest this innovative approach to be seriously considered and introduced into planning criteria
6.12	Winter wind control - adequate number of green windbreaker trees in the winter wind direction	x		Not possible under current regulations / approaches - Polish law abolished whole protection of city ventilation corridors, city agricultural lands (obligatory de-landing), local law is not strong enough (and there is no will) to protect informal greenery for any climate change adaptation actions
6.13	Introduction of recreation areas whenever possible at the location			Already planned. Also, open air gyms are the most common investment under citizens' budget and are located literally wherever possible.
<b>7</b>	<b>Adequate running distance and quality of surfaces and environment</b>			
7.1	Running length - reasonable for recreational running with NBS quality enhancement			See 6.8
7.2	Running pathway materialization - semi soft advanced technologies material with NBS quality enhancement	x		See 6.8, the new materials are foreseen in demo
7.3	Measures for heat islands radical reduction – (criterions pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer)	x		Already planned for the demo. In the city scale. See also 6.10 and 6.11.
7.4	Winter wind control in areas / corridors popular for recreational activities during cold weather season- adequate number of windbreaker trees in the winter wind direction	x	x	No attention. Greenery maintenance is reduced to cleaning due to lack of funding, there is no long-term planning and no holistic view. In general trees are perceived as a problem not as a solution whenever issue of wind is brought.
7.5	Trees selected and positioned for evaporative cooling	x	X	Planned for demo, unachievable for the city due to current policy. The euPOLIS point is to demonstrate advantages of this approach – “seeing is believing” – small pilot model that can be replicated throughout the city.
7.6	Summer shading - to cover 80% of public space in afternoon in summer	x		
7.7	Winter wind control - adequate number of green windbreaker trees in the winter wind direction to reduce wind chill effect	x	X	See 7.4, 7.5
7.8	Quality maintenance on the open-air demo sites during winter periods /snow and ice			Not necessarily desired. The ideal maintenance should consider white city approach with no snow removal or only local cleaning with local snow storage.



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	removal, maintaining easy access, funds provided for maintenance)			
<b>8</b>	<b>Adequate cycling distance and quality of surfaces and environment</b>			
8.1	Introduce cycling length - reasonable for recreational cycling	X		In demo no space available, in the city the available areas are shrinking due to densification of buildings and acceptance for fencing of the new investments.
8.2	Pathway materialization - semi soft advanced technologies material	X	x	Doubts related to new technologies
8.3	Introduce measures for heat islands radical reduction - pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer	X		Considered in demo
8.4	Winter wind control - adequate number of windbreaker trees in the winter wind direction	X		Considered in demo
8.5	Summer shading - to cover 80% of public space in afternoon in summer	X		Considered in demo
<b>9</b>	<b>Safety of users crossing cycling / rollers routes - (Introduce: No direct crossing between fast lanes + warning signs for pedestrians + no "dead corners")</b>			
9.1	All pathways' crossings safety should be clearly reflected - potential accidents eliminated by design solutions or site installed visible instructions			
9.2	Easy availability of sports equipment renting in NBS supporting environment	x		No space available, however there is a city bike available nearby, and in general the city bike stands are located at green areas allowing for easy transportation.
<b>10</b>	<b>NCD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
10.1	Levels of noise - analyse potential for NBS for protection from traffic noise	X		Considered in demo
10.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?	X		Considered in demo
10.3	Moderate air temperature, as item 1.1.3	x		Considered in demo



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10.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level	x		Considered in demo
11	<b>CD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
11.1	Levels of noise - analyse potential for NBS for protection from traffic noise	x		Considered in demo
11.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?	x		Considered in demo
11.3	Moderate air temperature, as item 1.1.3	x		Considered in demo
11.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level	x		Considered in demo
12	<b>Increased use of public spaces - (Introduce: Increased and comfortable public places - enlarge existing or introduce new)</b>			
12.1	Planning to include missing types of public spaces + more versatile public spaces, night use safety access and facilities	x		Considered in demo
12.2	Social-Urban Hub created as BGS demo/Edu-centre and community activator in the domain of culture and environmental regeneration	x		The role played by the University of Lodz. Hub facility possible on site.
12.3	NB MF "canopy" units for natural shading of 30m2 (irrigated vertical climbing vegetation) for socializing, recharging electronics, playing chess, or waiting for buss	x		There are suitable spaces for this aim which are already arranged for people, not many of them
12.4	Open air gym with clear usage instructions			Exists at demo and all the parks
13	<b>Higher ethnic and gender diversity - (Introduce: Introduce missing facilities for different gender and people groups –utilize BGS "gender planning criteria) (Gender related planning matrix used)</b>			



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13.1	Planning with NBS toll “gender planning criteria” with accent on gender groups that are not attending and specific NBS and related facilities to invite them (in WP4, WP6 analyse how to increase number of people belonging to non-attending gender groups)	X	X	
13.2	Planning to adopt appropriate distribution of public, communal / semi-public, and private spaces	X		Rather unachievable considering the structure of the ownership in the area
13.3	Ensuring high-quality usage of public spaces during different seasons			
13.4	Graduated and differentiated areas for movement (slow, fast, small, large); options and orientation for walkways day and night use depending on the intensity of movement, direction, and scale of spaces	X		No adequate space available
13.5	Include active transportation with delineating bicycle traffic from pedestrian and automobile traffic, creating pathways for skateboards, rollerblades, and other transportation, and separating pedestrian pathways from traffic), while ensure barrier-free design.			In case of narrow green spaces this is exactly what we want to avoid, too space consuming and such approach already degraded several parks
13.6	planning should exclude any physical barriers not suitable for older people + ensure walkways have a smooth surface + pedestrian pathways should be naturally shaded in summer	X	X	
13.7	The design to incorporate public open places, squares, and public sites to correspond to neighbourhood size and characteristics (age, religion...)	X	X	
13.8	Various levels of effective spatial buffers structure the area, creating a sequence of spaces with different qualities. Light and shade denote quiet and active zones, change, and differentiated spaces	X	X	



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13.9	If there is one, the common courtyard helps to define the neighbourhood, and creates a safe and nurturing place for children and youth	X	X	
13.10	Places that include technology, play, and social interaction are an important part of Child and Youth Friendly communities, especially in meeting their social, physical, and emotional health needs. - Create technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth	X		Rather not achievable in demo due to lack of space, however there is a number of spaces dedicated to children and a few to young people. We want to bring older people to focus. Open air Wi-Fi has been already criticized in literature as having adverse health Impact.
13.11	Consider discernible social centres, such as plazas, squares, or green spaces with transportation located nearby.			Slowly being considered in city revitalization plans
13.12	Create conditions to support local shops or convenience store			
13.13	Both sunny and shaded areas are incorporated in the public spaces and are easily accessible		X	
13.14	The areas of active play to be included - Introduce arrangement of special-use areas for specific groups: e.g., playgrounds for small children within visual and voice range of the apartments + water toys, water playground to attract younger generations			Explicit request from local investor to remove playground from visual and voice range of apartments
13.15	Make picnic and seating areas available	X	X	
13.16	Parks include designated play areas for age appropriateness, while also incorporating a space conducive to family gatherings			Some parks do include although this is rather controversial approach as being exclusive with respect to age and societal groups
13.17	Park should demonstrate good visibility, clear orientation and pathways, efficient lighting, well maintained public toilets and spaces that foster frequent use	X		Current approach favours light pollution and limited differentiation of vegetation, toilets are not considered.
13.18	Entries to the park should coincide with bus stops and crosswalks			
13.19	Provide sheltered areas for older people	X	X	
13.20	Major park signs should be lit for night visibility	X		No signs in parks
13.21	The design should address the fact that girls preferring to play in quiet corners	X		No space available



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13.22	Create youth hangout zone at the perimeter of the park	X		No space available
13.23	Create few small private areas where couples or small groups can sit	X		Considered in demo. Not considered in parks which are historical monuments and must not be changed, informal greenery could be an option, but it is ignored as a solution
13.24	Provide one or two green axes through whole area and position sport facilities on or along them			
13.25	To make it more usable for girls, divide large areas into smaller areas to avoid large area being dominated by the one particular group - provide open spaces that can be (safely) used by girls			
13.26	Park paths should be well lit			On contrary, light pollution is a main problem of city parks (still to be discussed).
13.27	To make the park more appealing to girls create what amounted to gender-segregated spaces, installing volleyball and badminton courts for the girls, and dividing open areas into more private spaces with landscaping.			
13.28	Girls meeting areas should be located along to pathways to discourage onlookers - to motivate girls to stay active and use these public spaces		X	
13.29	Youth centres, are important meeting-points and places of communication	X		No dedicated facilities
13.30	Create places of undisturbed retreat that also allow youngsters to be noisy and exuberant	X		No space available
13.31	Well-maintained and safe green spaces, with adequate shelter, toilet facilities and seating that can be easily accessed.			See 13.17
13.32	A need for small, quieter, contained green spaces in the fringe areas of the city rather than the large busy parks used by children	X		Demo site is Linear area, so it can be difficult to put every solutions at this place. We will have to make choices how support presence of girls at linear parks. (the selection to be made, based on expected profile of visitors)
14	<b>Strong participatory process (target&gt;200) - (Introduce: Introduce systemic, comprehensive collaborative planning process)</b>			
14.1	Introduce compulsory participatory planning in all cases here below		X	



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14.2	With NBS and related interventions create conditions for more intensive site use. Define new, group activities, mostly NBS based (local farming - food, flowers aromatic plants + other joint social activities ???, any cultural activities (exchange of different culture manifestation), any joint business, actions to increase biodiversity, ...), for previously non-active citizens, follow their level of acceptance	X		See parts 1-11
15	<b>Other liveability targets relevant to PH&amp;WB</b> (DEVELOP: liveability indicators describing different aspects of PH&WB)			
16	<b>Improve overall usage stability of the location</b>			
16.1	Access to location: above item xx			
16.2	Visibility at the location: above item yy			
17	<b>Enhance environment (already covered?)</b>			
17.1	Enhance greenery to xxm3/m2 (already covered in the item ?)			
17.2	Enhance / introduce water amenities - xxm2/m2 ??	X	X	Planned in demo
18	<b>Provide adequate infrastructure for water amenities</b>			
18.1	Introduce watering points - xx per expected number of visitors	X	X	
18.2	Introduce toilets - xx per expected number of visitors			No space, maintenance costs
19	<b>Create local conditions conducive to citizens participation process</b>			
19.1	Produce citizens participation manual			Existing
19.2	Agree with cities on participation logistic practically applicable			
19.3	Educate citizens on: 1.BGS, 2. their roles in the participation process		X	



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<b>20</b>	<b>Enhance emotional attachment - (Apply planning system where citizens proposals become visible +?)</b>			
20.1	Secure quiet, relaxing spaces within the demonstration site - IND.SE19			<p>Many points contradict each other, considering limited space in demo related to its location, we cannot provide everything to everyone, quiet space at the same time as noisy spaces for youngsters, shaded and open space, toilets, gyms, gardens, climbing walls.</p> <p>Considering current push for parks being techno-gardens: lots of pavements, grill places (concrete), gym spaces, open spaces, playing grounds, effort must be made to reverse this degradation towards natural, self-sustaining spaces with limited light and controlled access. This Gaps Assessment list contains theoretically possible interventions at any site.</p>
20.2	Apply (negotiate with city management) planning system where citizens proposals become visible	X		System exist, trust doesn't.
<b>21</b>	<b>Introduce / enhance feeling of responsibility and ownership (Introduce: Citizens regular inclusion into whole planning and implementation process + ?)</b>			
21.1	Include citizens regular participation into whole development implementation process			Planned
21.2	Elements to increase biodiversity including rainwater-based drinkers and shelters for animals	X		Planned
<b>22</b>	<b>Increased sense of pride - (Introduce: Public announcement of results from planning process stressing citizens direct impact with their proposed solutions + ?)</b>			
22.1	Public marketing of results achieved, stressing citizens direct impact (proposed solutions)	X		Planned
<b>23</b>	<b>Higher trust in local community members - (Introduce: Level and quality of communication in defining site requirements)</b>			
<b>24</b>	<b>New forms of neighbourly exchange - neighbourhood engagement and cooperation - (Introduce: - Level and quality of communication on site planning - joint work on urban farms - cultural events, + ?)</b>			



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24.1	Level of communication on site planning			
24.2	Joint work on urban farms	X		No urban farms
25	<b>Emergence of local leaders and social entrepreneurs</b>			
26	Increased feeling of community efficacy - <b>(Introduce:</b> - results from joint activities: - planning, - farming, - cultural events, + ?) <b>(The results from joint activities: planning, farming, ....)</b>			
27	Microclimate improvement - <b>(Introduce: Comprehensive and noticeably better-quality microclimate compared to surroundings)</b>			
27.1	Analysis of negative effects on microclimate: Materialization, artificial sources of heat, lack of natural protection from radiation	X		Planned
27.2	Introduce terrain coverage by specifically designed greenery - Trees, water, greenery,	X		Planned
27.3	Systemic increase of microclimate related greenery as per euPOLIS pocket park solution or similar - greenery m <sup>2</sup> / person to exceed present status significantly	X		Planned
27.4	Narrow streets to be equipped with small and medium pots with greenery at the ground level and at the facade (windows) level			Already implemented in the city without simultaneous water provision
27.5	Air conditioners exhausts to be directed upwards with small aesthetically acceptable barriers - or units to be removed to the roof level if possible			No legislation
27.6	School air quality control - NBS's at the school air intake for the artificial ventilation system	X		This might be important for the kindergarten.
27.8	Air quality at streets and public spaces - design and construct extensive NBS barriers between pollution sources and recipients	X		Green infrastructure is implemented without water component



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28	<b>Energy saving in immediate neighbourhood - (Introduce: Demonstration site urban components affecting energy consumption in the neighbouring buildings)</b>	X		
29	<b>Heat Island reduction - (Introduce: Demonstration site urban components affecting directly and indirectly Heat Island intensity at the site and at the neighbouring buildings)</b>			
29.1	Solutions that mitigate the effect of HI effect sources (measured or simulated) - introduction of interventions designed to reduce / eliminate HI effects - Trees, water, greenery.			X
30	<b>ESS Provisioning functions - provision of clean air, food, raw materials,... (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
30.1	Analyse possibility to introduce air purification regulating NBS at all critical site locations as well as joining streets, covering walking and resting points	X		Planned
30.2	Analyse introduction of system for the utilization of biomass for energy	X		No legal and operational mechanisms in the city
31	<b>ESS Regulating functions - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
31.1	Microclimate, water purification, soil quality,	X		Planned
31.2	Analyse possibility to introduce micro-climate regulating NBS at all critical site locations as well as joining streets, covering walking and resting points. Particular attention on evaporative cooling corridors with right greenery utilizing natural forces, as well as winter wind barriers	X		Planned
31.3	Introduce "cleaning-up" and populating near shore underwater environment with marine aquatic BG concept.			



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<b>32</b>	<b>Socio-Cultural ESS (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
32.1	Create facilities for mental and physical health, positive emotional experience and sense of place	X		Planned
32.2	Introduce euPOLIS "pocket parks" complete as described in the project proposal, at suitable locations - as socializing and cultural exchange points	X		Not planned within euPOLIS but under other programmes in the city
<b>33</b>	<b>Ecological environment status / effects (Introduce: Ecology quality conducive to enhanced PH&amp;WB and site resilience)</b>			
<b>34</b>	<b>Site components / functions with climate resilience effects - (Introduce: Additional site resilience to cope with extreme weather conditions)</b>	X		
34.1	Define Site components with this function status - Get vulnerability issues from cities			
34.2	Introduce Additional resilience measures Improvements			
<b>35</b>	<b>Demonstration Site related new business initiatives</b>			Not really suitable site for business
35.1	create public spaces with microclimate conditions conducive to a small business (positive aesthetic and climatic conditions)			See previous sections
35.2	investigate possible implementation - urban farms, food coops, social entrepreneurship, tourist initiatives,			See previous sections
35.3	Site maintenance			
35.4	Site tourism			
35.5	Food Processing - investigate potential for small manufacturing	X		No potential
35.6	Distribution - recovery and distribution of surplus food from markets			Investigated by food banks



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35.7	Sale - communal units exchange based on excess / shortage between them	X		No will in the city
35.8	Create NBS attractions to bring more visitors: 1. more attractive to be, 2. something to do, 3. enjoy food in beautiful surroundings, ....			Not suitable place
35.9	Create multifunctional NBS spatial connections between different areas. Interaction between them might instigate new activities and new business - IND.SE8			Blue-Green Network
36	<b>Number of neighbourhood businesses that master and adopt new BGS paradigm and tools - (Introduce: - Site overall quality contributing to neighbourhood Companies - neighbourhood Companies utilizing BGS as own business drivers – or NBS financing</b>			
36.1	Propose NBS environments, spaces, public areas, that create conditions to attract visitors and subsequently new business,			
36.2	neighbourhood survey to identify Companies utilizing BGS as own business drivers – or NBS financing			Already in place
36.3	Define all components treated by BGS which contribute to the increased neighbourhood value			
37	<b>Define and check applicability of components treated by BGS which contribute to the increased neighbourhood value</b>			
37.1	NBS's conducive to aesthetic values			
37.2	NBS's conducive to PH&WB values			
37.3	Visitors' categories			
38	<b>Number of other cities or corporations involved</b>			
38.1	Define with project management euPOLIS other cities involvement plan?			
39	<b>Number of people involved in participatory processes (Count from all events)</b>			



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40	Size of audience of project-related meetings, conference panels ( <i>Count from all events</i> )			
41	Number of website visits and downloads of prepared guides and reports. ( <i>Count from all events</i> )			

#### 6.4 Piraeus DSs Gaps Analysis

Table 10. Piraeus DS gaps in existing NBSS, Mikrolimano, Akti-Dilevari – identification tool

STATUS OF PIRAEUS DEMO-SITES 1&2 MIKROLIMANO/AKTI DILAVERI (INCLUDING RUNNING AND MAINTENANCE ITEMS)		Not existing or poor (X)	Could be planned/implemented (X)	Not applicable due to:
1	Stress reduction - (Introduce: Location beauty, comfortable resting points, presence of biodiversity)			
1.1	Introduce measures to increase the use of green areas - systematically increase awareness of city greenery - strong recreation areas promotion on all media and stimulate the number of pedestrian day trips to green areas + green areas sustainable usage education to be introduced at all levels and public domains (short media information at top hours as well as information panels at site itself)	X		Funding and Resources are limited. At a public scale it would require trained staff or hosting events.
1.2	Introduce measures to evaluate and protect+properly maintain existing greenery + involve locals	X		Funding and Resources are limited. At a public scale it would require trained staff or hosting events. It would be necessary to develop a particular service.
1.3	Make sure that new trees planted should meet the following conditions: right tree, at the right place, with specific function (1. Shadow - pedestrian, cycling 2. Shadow - heat island 3. Shadow - buildings 4. Evaporative cooling 5. Air purification 6. Evapo transpiration 7. Socialization 8. Animal corridors, 9. Winter wind barrier 10. Reduced emission of negative compounds such as BVOC).		X	The renovation of Mikrolimano is currently under construction and expected to be delivered by Q4 of 2021, thus there cannot be any major design alterations in this point. This can only be applied in Akti Dilaveri, as suggestions from euPOLIS team to the planners.
1.4	Planning to emphasise location beauty, comfortable resting points, presence of biodiversity, water noise + consider visual and functional attractions as well as recreation working and cultural events + EQULIBRIUM with land for construction		X	The renovation of Mikrolimano is currently under construction and expected to be delivered by Q4 of 2021, thus there cannot be any major design alterations in this point. This can only be applied in Akti Dilaveri, as suggestions from euPOLIS team to the planners.



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1.5	MF pocket parks with MF green spaces designed to affect site microclimate with number of greenery functions including evaporatively cooled and live vegetation shaded public spaces for UHI impact reduction - park trees should be designed/selected for particular functions: shading in summer, wind barrier in winter, socializing areas, animal crossing, adiabatic cooling, reduced negative impact on PH (allergens and BVOC)		X	The scale of intervention of euPOLIS on both sites is small so only by suggesting methodologies to the planners of Akti Dilaveri renovation. For Mikrolimano the previous comment still applies.
1.6	If possible, influence the creation of transport links for easy public to existing and new green areas			The current sites have satisfactory access.
1.7	Extend NBS interventions towards surrounding buildings	X		For Mikrolimano the previous comment still applies.
1.8	Create NBS-conditioned corridors for continuous quality access to the other parts of the city and introduce ecological corridor connected with neighbouring green spots/areas		X	The scale of intervention of euPOLIS on both sites is small so only by suggesting methodologies to the planners of Akti Dilaveri renovation. For Mikrolimano the previous comment still applies.
1.9	Seasonal eco café (demonstrating sustainable, nature-friendly mode of operation, cooling and resource recycling)		X	
1.10	Surface waterway with freshwater aquatic biotope (attractive flora and fauna elements) complete, with integrated constructed wetland and number of bio filters of different types for storm water treatment (water quality improvement)			The scale of the sites is small and there are no natural resources available.
1.11	MF roof garden, VF, experimental area, alternative space for public art installations	X		Lack of public building
1.12	NBS for pluvial floods elimination and surface runoff and water quality management with NB solutions. Storm water control and evaporation enhancing NB systems	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
2	<b>Depression reduction - (Introduce: Elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity)</b>			
2.1	Create / enhance urban elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity	X		Funding and Resources are limited. At a public scale it would require trained staff or hosting events. It would be necessary to develop a particular service.
2.2	Care for nature - demonstration and contact with nature - introduce components for daily care and enhancement of biodiversity.	X		Funding and Resources are limited. At a public scale it would require trained staff or hosting events. It would be necessary to develop a particular service.
2.3	Develop human / ESS regular interaction points - Urban NBS elements and assets that improve access to and contact with surface water bodies, water features, water sounds, as well as all types of greenery	X		Mikrolimano's renovations covers this aspect in a sense as the promenade now will be accessible to people.



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2.4	In all regenerated areas create space for increased exposure of visitors to arts and crafts	X	X	
2.5	Make sure maintenance creates spotless environment at all times			Already in place.
3	Anxiety levels reduction - (Introduce: Security – passages, visibility, comfortable materialization + biophilic design)			
3.1	Security – passages - provide overall easy access and walking security			Already in place.
3.2	Visibility - relatively acceptable length of visible space + clear undisturbed visibility in direction of pedestrian and cycling movements + clear visibility to surrounding attractive points			High building density.
3.3	Comfortable easy materialization - comfortable and mild colour material - IND.U24	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
3.4	Biophilic design: analyse applicability of 14 directives (will be addressed in detail in WP6)	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
3.5	Create family outing zones		X	Renovated Mikrolimano promenade will have a seaside accessible space for families to walk and/or cycle. Place restrictions don't allow for picnic and/or playground areas. In Akti Dilaveri this could be applicable.
3.6	In all regenerated areas create space for increased exposure of visitors to arts and crafts		X	Space in Mikrolimano is restricted for such actions, in Akti Dilaveri a summer theatre is already in place.
3.7	Mental health improvement by eliminating PLUVIAL floods or flood potential as well as water streams pollution		X	If the new design of Akti Dilaveri contains releasing surface floods directly into the canal, usage of biofilters will be suggested to the planners.
4	Enhanced cognitive performance - (memory, judgment, language, intuition and the ability to learn) - (number of senior citizens increases, innovative, related planning required to make them more functional)			
4.1	Counter neurological decline typically seen among the elderly - create stimulus for senior people daily exercise walk	X	X	
4.2	Create urban options for new experience and creativity (particularly for senior people): create facilities for walking competition, urban farming, competition in solving mental games	X	X	
4.3	Vertical farms and pocket farms irrigated with rainwater harvested from surrounding buildings. Farms with proper education to expand through the neighbourhood	X		Air pollution creates concerns for safe consumption.
4.4	Seniors regular mixing with kindergarten kids (kindergarten NBS facilities at location) - lecturing to very young from own specific subjects	X		Kindergarten not included in sites



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4.5	Create urban challenges for senior people with this in mind: when you are inside your comfort zone you may be outside of the enhancement zone - experience should be unfamiliar and mentally challenging	X		Contact is with locals who are familiar with the sites.
4.6	Introduce participatory planning on all-natural items - introduce mental challenge + new experience		X	As commented before, major alterations could harm the signed contracts. In Akti Dilaveri such actions can be suggested to the planners.
5	<b>Enhanced psychological health and well-being - (contentment, satisfaction with all elements of life, self-actualization) &amp; spiritual benefits of interacting with nature</b>			
5.1	Creation of water amenities and greenery multifunctional corridors systematically distributed through the demo site	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
5.2	Creation of all gender categories socializing (and entertainment) spots within corridors (mapping of existing & enhancement)	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
5.3	Introduce community urban farming contributing to overall more sustainable food system	X		Air pollution creates concerns for safe consumption.
6	<b>Adequate walking distance and quality of surfaces and environment</b>			
6.1	Green permeable areas introduced (Surfaces converted into permeable areas, wherever possible), and existing grey areas replaced or retrofitted	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
6.2	Recreation areas with adequate special coverage			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
6.3	Engagement facilities – to incentivise active time in the park	X	X	Funding and Resources are limited. At a public scale it would require trained staff or hosting events. It would be necessary to develop a particular service.
6.4	Urbanism to promote daily routine by walking - (on streets - pleasant and protected streets) with access to demo site			Time consuming process that would require a lot of funding and planning permission.
6.5	Schools: - outdoor sports in NBS supported environment for more frequent, to be radically improved	X		There are no schools in both sites to support such actions.
6.6	Schools - promote and monitor impacts of NBS and students' sports at other recreational facilities			Such actions have been already discussed with the stakeholders of Area 3 which is actually a school.
6.7	Introduce and promote regular physical health assessment of neighbourhood and visitors (starting with absence of diseases to fitness level)		X	
6.8	Provide sufficient walking length - reasonable for recreational walking			Already in place
6.9	Walking pathway materialization - semi soft advanced technologies material	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.



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6.10	Heat islands eliminated - Albedo effect optimal + pathways in shade min 80% in the afternoon in summer	X		
6.11	Summer shading - to cover 80% of public space in afternoon in summer	X		
6.12	Winter wind control - adequate number of green windbreaker trees in the winter wind direction	X		
6.13	Introduction of recreation areas whenever possible at the location		X	
<b>7</b>	<b>Adequate running distance and quality of surfaces and environment</b>			
7.1	Running length - reasonable for recreational running with NBS quality enhancement	X		Already in place
7.2	Running pathway materialization - semi soft advanced technologies material with NBS quality enhancement	X		
7.3	Measures for heat islands radical reduction – (criterions pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer)	X		
7.4	Winter wind control in areas / corridors popular for recreational activities during cold weather season- adequate number of windbreaker trees in the winter wind direction	X		As stated before, in Mikrolimano alterations that can harm the signed contract are not possible. Change of the materials applied for instance is definitely considered such an alteration.
7.5	Trees selected and positioned for evaporative cooling		X	
7.6	Summer shading - to cover 80% of public space in afternoon in summer	X		
7.7	Winter wind control - adequate number of green windbreaker trees in the winter wind direction to reduce wind chill effect	X		
7.8	Quality maintenance on the open-air demo sites during winter periods /snow and ice removal, maintaining easy access, funds provided for maintenance)	X		
<b>8</b>	<b>Adequate cycling distance and quality of surfaces and environment</b>			
8.1	Introduce cycling length - reasonable for recreational cycling	X		Already in place
8.2	Pathway materialization - semi soft advanced technologies material	X		
8.3	Introduce measures for heat islands radical reduction - pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
8.4	Winter wind control - adequate number of windbreaker trees in the winter wind direction	X		



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8.5	Summer shading - to cover 80% of public space in afternoon in summer	X		
9	<b>Safety of users crossing cycling / rollers routes - (Introduce: No direct crossing between fast lanes + warning signs for pedestrians + no "dead corners")</b>			
9.1	All pathways' crossings safety should be clearly reflected - potential accidents eliminated by design solutions or site installed visible instructions			All pathways' crossings have traffic lights at key points and are clearly indicated.
9.2	Easy availability of sports equipment renting in NBS supporting environment	X		Mikrolimano's space restriction does not permit public sport equipment. This could be applied in the eastern part of Akti Dilaveri which does not belong in the Municipality of Piraeus.
10	<b>NCD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
10.1	Levels of noise - analyse potential for NBS for protection from traffic noise			Mikrolimano's renovation will permit only restricted vehicle access (only for businesses to get supplies). Access to Mikrolimano is through Akti Dilaveri, so traffic there is also going to reduce as it is going to be used only for visitors reaching the parking space.
10.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?			
10.3	Moderate air temperature, as item 1.1.3			
10.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level			
11	<b>CD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
11.1	Levels of noise - analyse potential for NBS for protection from traffic noise			Mikrolimano's renovation will permit only restricted vehicle access (only for businesses to get supplies). Access to Mikrolimano is through Akti Dilaveri, so traffic there is also going to be reduced as it is going to be used only for visitors reaching the parking space.
11.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?			
11.3	Moderate air temperature, as item 1.1.3			
11.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level			
12	<b>Increased use of public spaces - (Introduce: Increased and comfortable public places - enlarge existing or introduce new)</b>			
12.1	Planning to include missing types of public spaces + more versatile public spaces, night use safety access and facilities			Mikrolimano will offer quality public access space. Site space restrictions and targeted aesthetics don't allow any other type of public spaces than the designed



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12.2	Social–Urban Hub created as BGS demo/Edu-centre and community activator in the domain of culture and environmental regeneration	X		ones, In Akti Dilaveri ownership of the eastern part is a restriction. euPOLIS team will advise those planners.
12.3	NB MF “canopy” units for natural shading of 30m2 (irrigated vertical climbing vegetation) for socializing, recharging electronics, playing chess, or waiting for buss	X		
12.4	Open air gym with clear usage instructions	X		Site space restrictions and targeted aesthetics don't allow any other type of public spaces than the designed ones, In Akti Dilaveri, ownership of the eastern part is a restriction. euPOLIS team will advise those planners.
13	<b>Higher ethnic and gender diversity - (Introduce: Introduce missing facilities for different gender and people groups –utilize BGS “gender planning criteria) (Gender related planning matrix used)</b>			
13.1	Planning with NBS toll “gender planning criteria” with accent on gender groups that are not attending and specific NBS and related facilities to invite them (in WP4, WP6 analyse how to increase number of people belonging to non-attending gender groups)			
13.2	Planning to adopt appropriate distribution of public, communal / semi-public, and private spaces	X		
13.3	Ensuring high-quality usage of public spaces during different seasons		X	
13.4	Graduated and differentiated areas for movement (slow, fast, small, large); options and orientation for walkways day and night use depending on the intensity of movement, direction, and scale of spaces	X		
13.5	Include active transportation with delineating bicycle traffic from pedestrian and automobile traffic, creating pathways for skateboards, rollerblades, and other transportation, and separating pedestrian pathways from traffic), while ensure barrier-free design.		X	Mikrolimano and Akti Dilaveri don't seem to suffer from gender inequality access.
13.6	Planning should exclude any physical barriers not suitable for older people + ensure walkways have a smooth surface + pedestrian pathways should be naturally shaded in summer	X		
13.7	The design to incorporate public open places, squares, and public sites to correspond to neighbourhood size and characteristics (age, religion...)		X	
13.8	Various levels of effective spatial buffers structure the area, creating a sequence of spaces with different qualities. Light and shade denote quiet and active zones, change, and differentiated spaces			



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13.9	If there is one, the common courtyard helps to define the neighbourhood, and creates a safe and nurturing place for children and youth			The structure of buildings; there are no courtyards.
13.10	Places that include technology, play, and social interaction are an important part of Child and Youth Friendly communities, especially in meeting their social, physical, and emotional health needs. - Create technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth	X		The target of the renovation of the promenades is to take youth away from technology and bring them close to nature, thus enhance their well-being.
13.11	Consider discernible social centres, such as plazas, squares, or green spaces with transportation located nearby.	X		
13.12	Create conditions to support local shops or convenience store			Already in place
13.13	Both sunny and shaded areas are incorporated in the public spaces and are easily accessible		X	
13.14	The areas of active play to be included - Introduce arrangement of special-use areas for specific groups: e.g., playgrounds for small children within visual and voice range of the apartments + water toys, water playground to attract younger generations	X		Space restrictions don't allow spaces like that in Mikrolimano and in Akti Dilaveri there seem to be just a few housing accommodations.
13.15	Make picnic and seating areas available		X	
13.16	Parks include designated play areas for age appropriateness, while also incorporating a space conducive to family gatherings			Nature of sites (not parks).
13.17	Park should demonstrate good visibility, clear orientation and pathways, efficient lighting, well maintained public toilets and spaces that foster frequent use			
13.18	Entries to the park should coincide with bus stops and crosswalks			
13.19	Provide sheltered areas for older people			
13.20	major park signs should be lit for night visibility			
13.21	The design should address the fact that girls preferring to play in quiet corners	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
13.22	Create youth hangout zone at the perimeter of the park			Nature of sites (not parks).
13.23	Create few small private areas where couples or small groups can sit			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
13.24	Provide one or two green axes through whole area and position sport facilities on or along them		X	



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13.25	To make it more usable for girls, divide large areas into smaller areas to avoid large area being dominated by the one particular group - provide open spaces that can be (safely) used by girls		X	
13.26	Park paths should be well lit			
13.27	To make the park more appealing to girls create what amounted to gender-segregated spaces, installing volleyball and badminton courts for the girls, and dividing open areas into more private spaces with landscaping.			Nature of sites (not parks)
13.28	Girls meeting areas should be located along to pathways to discourage onlookers - to motivate girls to stay active and use these public spaces			
13.29	Youth centres, are important meeting-points and places of communication			
13.30	Create places of undisturbed retreat that also allow youngsters to be noisy and exuberant			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
13.31	Well-maintained and safe green spaces, with adequate shelter, toilet facilities and seating that can be easily accessed.			
13.32	A need for small, quieter, contained green spaces in the fringe areas of the city rather than the large busy parks used by children			
<b>14</b>	<b>Strong participatory process (target&gt;200) - (Introduce: Introduce systemic, comprehensive collaborative planning process)</b>			
14.1	Introduce compulsory participatory planning in all cases here below	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
14.2	With NBS and related interventions create conditions for more intensive site use. Define new, group activities, mostly NBS based (local farming - food, flowers aromatic plants + other joint social activities, any cultural activities (exchange of different culture manifestation), any joint business, actions to increase biodiversity), for previously non-active citizens, follow their level of acceptance			Are well used
<b>15</b>	<b>Other livability targets relevant to PH&amp;WB</b> (DEVELOP: liveability indicators describing different aspects of WB and PH)			
<b>16</b>	<b>Improve overall usage stability of the location</b>			Are well used
16.1	Access to location: above item xx			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.



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16.2	Visibility at the location: above item yy			High building density
<b>17</b>	<b>Enhance environment (already covered?)</b>			
17.1	Enhance greenery to xxm3/m2 (already covered in the item ?)			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
17.2	Enhance / introduce water amenities - xxm2/m2			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
<b>18</b>	<b>Provide adequate infrastructure for water amenities</b>			
18.1	Introduce watering points - xx per expected number of visitors			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
18.2	Introduce toilets - xx per expected number of visitors			
<b>19</b>	<b>Create local conditions conducive to citizens participation process</b>			
19.1	Produce citizens participation manual	X		
19.2	Agree with cities on participation logistic practically applicable	X		Even at this stage (and having in mind Covid restrictions) when filling the questionnaires citizens are getting info on BGS.
19.3	Educate citizens on: 1.BGS, 2.their roles in the participation process	X		
<b>20</b>	<b>Enhance emotional attachment - (Apply planning system where citizens proposals become visible +?)</b>			
20.1	Secure quiet, relaxing spaces within the demonstration site - IND.SE19			The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
20.2	Apply (negotiate with city management) planning system where citizens proposals become visible	X		Municipality of Piraeus already has an app that citizens are encouraged to report various types of problems. This could be extended to accept proposals from citizens.
<b>21</b>	<b>Introduce / enhance feeling of responsibility and ownership - (Introduce: Citizens regular inclusion into whole planning and implementation process + ?)</b>			
21.1	Include citizens regular participation into whole development implementation process	X		It takes time to educate and train citizens on how to participate in actions like these, having in mind the general good and not only the benefit of their neighbourhood. If euPOLIS succeeds, municipality of Piraeus will have proof that this system can work.
21.2	Elements to increase biodiversity including rainwater-based drinkers and shelters for animals	X		There are shelters available and a special service within the Municipality catering for the needs of stray animals. Furthermore, the weather in Greece is too arid for rainwater-based drinkers.
<b>22</b>	<b>Increased sense of pride - (Introduce: Public announcement of results from planning process stressing citizens direct impact with their proposed solutions +?)</b>			
22.1	Public marketing of results achieved, stressing citizens direct impact (proposed solutions)	X		



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23	Higher trust in local community members - (Introduce: Level and quality of communication in defining site requirements + ?)			
24	New forms of neighbourly exchange - neighbourhood engagement and cooperation - (Introduce: - Level and quality of communication on site planning - joint work on urban farms - cultural events, + ?)			
24.1	Level of communication on site planning	X		The regeneration of Mikrolimano is currently under construction; there cannot be any design alterations.
24.2	Joint work on urban farms	X		Air pollution raises concern on safe consumption.
25	Emergence of local leaders and social entrepreneurs - (Introduce: ....)			
26	Increased feeling of community efficacy - (Introduce: - results from joint activities: - planning, - farming, - cultural events, + ?) <i>(The results from joint activities: planning, farming, ....)</i>			
27	Microclimate improvement - (Introduce: Comprehensive and noticeably better-quality microclimate compared to surroundings)			
27.1	Analysis of negative effects on microclimate: Materialization, artificial sources of heat, lack of natural protection from radiation		X	
27.2	Introduce terrain coverage by specifically designed greenery - Trees, water, greenery,		X	
27.3	Systemic increase of microclimate related greenery as per euPOLIS pocket park solution or similar - greenery m <sup>2</sup> / person to exceed present status significantly		X	As explained before, the renovation of Mikrolimano is currently under construction and expected to complete by Q4 of 2021 so there cannot be any major design alterations by euPOLIS. This could be suggested to apply in Akti Dilaveri.
27.4	Narrow streets to be equipped with small and medium pots with greenery at the ground level and at the facade (windows) level		X	
27.5	Air conditioners exhausts to be directed upwards with small aesthetically acceptable barriers - or units to be removed to the roof level if possible	X		This entails large costs for dwellers and possibly legal issues and planning permissions.
27.6	School air quality control - NBS's at the school air intake for the artificial ventilation system	X		There are no schools.
27.8	Air quality at streets and public spaces - design and construct extensive NBS barriers between pollution sources and recipients	X		Extensive design is not an option for Mikrolimano as stated before.



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28	<b>Energy saving in immediate neighbourhood - (Introduce: Demonstration site urban components affecting energy consumption in the neighbouring buildings)</b>			The euPOLIS implementations in Mikrolimano can be seen as examples by the owners of nearby businesses of how to upgrade their systems. The proposed interventions don't seem suitable for houses for various reasons.
29	<b>Heat Island reduction - (Introduce: Demonstration site urban components affecting directly and indirectly Heat Island intensity at the site and at the neighbouring buildings)</b>			
29.1	Solutions that mitigate the effect of HI effect sources (measured or simulated) - introduction of interventions designed to reduce / eliminate HI effects - Trees, water, greenery, ...		X	Can only be suggested in Akti Dilaveri.
30	<b>ESS Provisioning functions - provision of clean air, food, raw materials. - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
30.1	Analyse possibility to introduce air purification regulating NBS at all critical site locations as well as joining streets, covering walking and resting points		X	Could be only in Akti Dilaveri
30.2	Analyse introduction of system for the utilization of biomass for energy	X		
31	<b>ESS Regulating functions - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
31.1	Microclimate, water purification, soil quality			Could only be discussed for Akti Dilaveri.
31.2	Analyse possibility to introduce micro-climate regulating NBS at all critical site locations as well as joining streets, covering walking and resting points. Particular attention on evaporative cooling corridors with right greenery utilizing natural forces, as well as winter wind barriers		X	
31.3	Introduce "cleaning-up" and populating near shore underwater environment with marine aquatic BG concept.		X	Could definitely be applied in Akti Dilaveri
32	<b>Socio-Cultural ESS - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
32.1	Create facilities for mental and physical health, positive emotional experience and sense of place, ...		X	Could only be discussed for Akti Dilaveri.
32.2	Introduce euPOLIS "pocket parks" complete as described in the project proposal, at suitable locations - as socializing and cultural exchange points		X	



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33	<b>Ecological environment status / effects - (Introduce: Ecology quality conducive to enhanced PH&amp;WB and site resilience)</b> overall ecological status to be defined			
34	<b>Site components / functions with climate resilience effects - (Introduce: Additional site resilience to cope with extreme weather conditions)</b>			
34.1	Define Site components with this function status - Get vulnerability issues from cities			Piraeus doesn't suffer from extreme weather conditions. Greece is blessed with a Mediterranean climate, which is considered a mild one.
34.2	Introduce Additional resilience measures Improvements: .....			
35	<b>Demonstration Site related new business initiatives</b>			
35.1	Create public spaces with microclimate conditions conducive to a small business (positive aesthetic and climatic conditions)		X	Could be applied at both sites.
35.2	Investigate possible implementation - urban farms, food coops, social entrepreneurship, tourist initiatives,	X		Air pollution raises concerns for safe consumption.
35.3	Site maintenance	X		Mikolimano is already covered with restaurants, coffee shops and bars and due to its position, it's unexpected for this character to change.
35.4	Site tourism		X	
35.5	Food Processing - investigate potential for small manufacturing			
35.6	Distribution - recovery and distribution of surplus food from markets			
35.7	Sale - communal units exchange based on excess / shortage between them			
35.8	Create NBS attractions to bring more visitors: 1. more attractive to be, 2. something to do, 3. enjoy food in beautiful surroundings, ....			
35.9	Create multifunctional NBS spatial connections between different areas. Interaction between them might instigate new activities and new business - IND.SE8			
36	<b>Number of neighbourhood businesses that master and adopt new BGS paradigm and tools - (Introduce: - Site overall quality contributing to neighbourhood Companies - neighbourhood Companies utilizing BGS as own business drivers – or NBS financing</b>			
36.1	Propose NBS environments, spaces, public areas, that create conditions to attract visitors and subsequently new business,		X	Could be applied in both sites.
36.2	Neighbourhood survey to identify Companies utilizing BGS as own business drivers – or NBS financing		X	



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36.3	Define all components treated by BGS which contribute to the increased neighbourhood value	X		
37	<b>Define and check applicability of components treated by BGS which contribute to the increased neighbourhood value</b>			
37.1	NBS's conducive to aesthetic values		X	
37.2	NBS's conducive to PH&WB values		X	
37.3	Visitors' categories		X	
38	<b>Number of other cities or corporations involved</b>			
38.1	Define with project management euPOLIS other cities involvement plan			
39	<b>Number of people involved in participatory processes (<i>Count from all events</i>)</b>		123	
40	<b>Size of audience of project-related meetings, conference panels. (<i>Count from all events</i>)</b>			
41	<b>Number of website visits and downloads of prepared guides and reports. (<i>Count from all events</i>)</b>			

Table 11. Piraeus DS gaps in existing NBSSs, Ralleion School complex – identification tool

STATUS OF PIRAEUS DEMO-SITE (Rallion School) (INCLUDING RUNNING AND MAINTENANCE ITEMS)		Not existing or poor (X)	Could be planned/implemented (X)	Not applicable due to:
1	Stress reduction - (Introduce: Location beauty, comfortable resting points, presence of biodiversity)			
1.1	Introduce measures to increase the use of green areas - systematically increase awareness of city greenery - strong recreation areas promotion on all media and stimulate the number of pedestrian day trips to green areas + green areas sustainable usage education to be introduced at all levels and public domains (short media information at top hours as well as information panels at site itself)	X	X	
1.2	Introduce measures to evaluate and protect-properly maintain existing greenery + involve locals	X	X	



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1.3	Make sure that new trees planted should meet the following conditions: right tree, at the right place, with specific function (1. Shadow - pedestrian, cycling 2. Shadow - heat island 3. Shadow - buildings 4. Evaporative cooling 5. Air purification, 6. Evapo transpiration 7. Socialization 8. Animal corridors 9. Winter wind barrier 10. Reduced emission of negative compounds such as BVOC)		X	
1.4	Planning to emphasise location beauty, comfortable resting points, presence of biodiversity, water noise + consider visual and functional attractions as well as recreation working and cultural events + EQUILIBRIUM with land for construction		X	The planted sheltered areas are located adjacent to a busy road and not accessible during breaks for pupil's safety.
1.5	MF pocket parks with MF green spaces designed to affect site microclimate with number of greenery functions including evaporatively cooled and live vegetation shaded public spaces for UHI impact reduction - park trees should be designed/selected for particular functions: shading in summer, wind barrier in winter, socializing areas, animal crossing, adiabatic cooling, reduced negative impact on PH (allergens and BVOC) .... etc		X	The scale of the site is too small.
1.6	If possible, influence the creation of transport links for easy public to existing and new green areas	X		The current site has satisfactory access.
1.7	Extend NBS interventions towards surrounding buildings		X	
1.8	Create NBS-conditioned corridors for continuous quality access to the other parts of the city and introduce ecological corridor connected with neighbouring green spots/areas		X	
1.9	Seasonal eco café (demonstrating sustainable, nature-friendly mode of operation, cooling and resource recycling)	X		Area 3 is a school.
1.10	Surface waterway with freshwater aquatic biotope (attractive flora and fauna elements) complete, with integrated constructed wetland and number of bio filters of different types for storm water treatment (water quality improvement)	X		The scale of the site is small and there are no natural resources available.
1.11	MF roof garden, VF, experimental area, alternative space for public art installations		X	Roofs currently are not accessible.
1.12	NBS for pluvial floods elimination and surface runoff and water quality management with NB solutions. Storm water control and evaporation enhancing NB systems		X	
2	Depression reduction - (Introduce: Elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity)			



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2.1	Create / enhance urban elements to take visitors attention and cheer them up, amuse them + Location beauty, comfortable resting point, presence of biodiversity		X	The planted sheltered areas are located adjacent to a busy road and not accessible during breaks for pupil's safety.
2.2	Care for nature - demonstration and contact with nature - introduce components for daily care and enhancement of biodiversity.		X	
2.3	Develop human / ESS regular interaction points - Urban NBS elements and assets that improve access to and contact with surface water bodies, water features, water sounds, as well as all types of greenery	X		Is located inland.
2.4	In all regenerated areas create space for increased exposure of visitors to arts and crafts		X	
2.5	Make sure maintenance creates spotless environment at all times		X	Already in place.
<b>3</b>	<b>Anxiety levels reduction - (Introduce: Security – passages, visibility, comfortable materialization + biophilic design)</b>			
3.1	Security – passages - provide overall easy access and walking security	X		Already in place.
3.2	Visibility - relatively acceptable length of visible space + clear undisturbed visibility in direction of pedestrian and cycling movements + clear visibility to surrounding attractive points	X		High building density.
3.3	Comfortable easy materialization - comfortable and mild colour material - IND.U24	X		
3.4	Biophilic design: analyse applicability of 14 directives (will be addressed in detail in WP6)		X	Limited by existing planting and unavailability of open spaces.
3.5	Create family outing zones	X		Nature of site (not a public space).
3.6	In all regenerated areas create space for increased exposure of visitors to arts and crafts		X	
3.7	Mental health improvement by eliminating floods or flood potential as well as water streams pollution	X		Natural water resources not present.
<b>4</b>	<b>Enhanced cognitive performance - (memory, judgment, language, intuition and the ability to learn) - (number of senior citizens increases, innovative, related planning required to make them more functional)</b>			
4.1	Counter neurological decline typically seen among the elderly - create stimulus for senior people daily exercise walk			
4.2	Create urban options for new experience and creativity (particularly for senior people): create facilities for walking competition, urban farming, competition in solving mental games, .....			



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4.3	Vertical farms and pocket farms irrigated with rainwater harvested from surrounding buildings. Farms with proper education to expand through the neighbourhood			Air pollution creates concerns for safe consumption.
4.4	Seniors regular mixing with kindergarten kids (kindergarten NBS facilities at location) - lecturing to very young from own specific subjects			Kindergarten not included in sites
4.5	Create urban challenges for senior people with this in mind: when you are inside your comfort zone you may be outside of the enhancement zone - experience should be unfamiliar and mentally challenging			Nature of site.
4.6	Introduce participatory planning on all-natural items - introduce mental challenge + new experience			Nature of site.
5	<b>Enhanced psychological health and well-being - (contentment, satisfaction with all elements of life, self-actualization) &amp; spiritual benefits of interacting with nature</b>			
5.1	Creation of water amenities and greenery multifunctional corridors systematically distributed through the demo site			Is located inland.
5.2	Creation of all gender categories socializing (and entertainment) spots within corridors (mapping of existing & enhancement)			Nature of site.
5.3	Introduce community urban farming contributing to overall more sustainable food system			Air pollution creates concerns for safe consumption.
6	<b>Adequate walking distance and quality of surfaces and environment</b>			
6.1	Green permeable areas introduced (Surfaces converted into permeable areas, wherever possible), and existing grey areas replaced or retrofitted		X	
6.2	Recreation areas with adequate special coverage			Nature of site.
6.3	Engagement facilities – to incentivise active time in the park			Nature of site.
6.4	Urbanism to promote daily routine by walking - (on streets - pleasant and protected streets) with access to demo site			Nature of site.
6.5	Schools: - outdoor sports in NBS supported environment for more frequent, to be radically improved			Limited space free space available.
6.6	Schools - promote and monitor impacts of NBS and students' sports at other recreational facilities			Acquiring GDPR permission is too difficult.
6.7	Introduce and promote regular physical health assessment of neighbourhood and visitors (starting with absence of diseases to fitness level)			Nature of site.
6.8	Provide sufficient walking length - reasonable for recreational walking			Nature of site.



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6.9	Walking pathway materialization - semi soft advanced technologies material			Nature of site.
6.10	Heat islands eliminated - Albedo effect optimal + pathways in shade min 80% in the afternoon in summer			
6.11	Summer shading - to cover 80% of public space in afternoon in summer			
6.12	Winter wind control - adequate number of green windbreaker trees in the winter wind direction			
6.13	Introduction of recreation areas whenever possible at the location			
<b>7</b>	<b>Adequate running distance and quality of surfaces and environment</b>			
7.1	Running length - reasonable for recreational running with NBS quality enhancement			Already in place
7.2	Running pathway materialization - semi soft advanced technologies material with NBS quality enhancement	X		
7.3	Measures for heat islands radical reduction – (criterions pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer)	X		
7.4	Winter wind control in areas / corridors popular for recreational activities during cold weather season- adequate number of windbreaker trees in the winter wind direction	X		
7.5	Trees selected and positioned for evaporative cooling	X		Nature of site.
7.6	Summer shading - to cover 80% of public space in afternoon in summer	X		
7.7	Winter wind control - adequate number of green windbreaker trees in the winter wind direction to reduce wind chill effect	X		
7.8	Quality maintenance on the open-air demo sites during winter periods /snow and ice removal, maintaining easy access, funds provided for maintenance)	X		
<b>8</b>	<b>Adequate cycling distance and quality of surfaces and environment</b>			
8.1	Introduce cycling length - reasonable for recreational cycling	X		Nature of site.
8.2	Pathway materialization - semi soft advanced technologies material	X		
8.3	Introduce measures for heat islands radical reduction - pathway Albedo effect optimal + pathways in shade min 80% in the afternoon in summer	X		
8.4	Winter wind control - adequate number of windbreaker trees in the winter wind direction	X		
8.5	Summer shading - to cover 80% of public space in afternoon in summer	X		



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<b>9</b>	<b>Safety of users crossing cycling / rollers routes - (Introduce: No direct crossing between fast lanes + warning signs for pedestrians + no "dead corners")</b>			
9.1	All pathways' crossings safety should be clearly reflected - potential accidents eliminated by design solutions or site installed visible instructions	X		All pathways' crossings have traffic lights at key points and are clearly indicated.
9.2	Easy availability of sports equipment renting in NBS supporting environment	X		Nature of site.
<b>10</b>	<b>NCD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
10.1	Levels of noise - analyse potential for NBS for protection from traffic noise		X	Scale of site and limited surface area available for interventions in planted sheltered areas.
10.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?		X	
10.3	Moderate air temperature, as item 1.1.3		X	
10.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level		X	
<b>11</b>	<b>CD incidence number reduction - (Introduce: Acceptable levels of noise and air pollution, moderate air temperatures, exposure to a microflora in physiological range +?)</b>			
11.1	Levels of noise - analyse potential for NBS for protection from traffic noise		X	Scale of site and limited surface area available for interventions in planted sheltered areas.
11.2	Low air pollution - analyse NBS for protection from traffic pollution - any other pollution at the site?		X	
11.3	Moderate air temperature, as item 1.1.3		X	
11.4	Exposure to a micro flora in physiological range - introduce solutions that stimulate and preserve site biodiversity on regular level		X	
<b>12</b>	<b>Increased use of public spaces - (Introduce: Increased and comfortable public places - enlarge existing or introduce new)</b>			
12.1	Planning to include missing types of public spaces + more versatile public spaces, night use safety access and facilities	X		Nature of site.
12.2	Social-Urban Hub created as BGS demo/Edu-centre and community activator in the domain of culture and environmental regeneration	X		
12.3	NB MF "canopy" units for natural shading of 30m2 (irrigated vertical climbing vegetation) for socializing, recharging electronics, playing chess, or waiting for buss	X		



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12.4	Open air gym with clear usage instructions	X		
13	<b>Higher ethnic and gender diversity - (Introduce: Introduce missing facilities for different gender and people groups –utilize BGS “gender planning criteria) (Gender related planning matrix used)</b>			
13.1	Planning with NBS toll “gender planning criteria” with accent on gender groups that are not attending and specific NBS and related facilities to invite them (in WP4, WP6 analyse how to increase number of people belonging to non-attending gender groups)		X	
13.2	Planning to adopt appropriate distribution of public, communal / semi-public, and private spaces	X		
13.3	Ensuring high-quality usage of public spaces during different seasons		X	
13.4	Graduated and differentiated areas for movement (slow, fast, small, large); options and orientation for walkways day and night use depending on the intensity of movement, direction, and scale of spaces	X		
13.5	Include active transportation with delineating bicycle traffic from pedestrian and automobile traffic, creating pathways for skateboards, rollerblades, and other transportation, and separating pedestrian pathways from traffic), while ensure barrier-free design.	X		Nature of site.
13.6	Planning should exclude any physical barriers not suitable for older people + ensure walkways have a smooth surface + pedestrian pathways should be naturally shaded in summer	X		
13.7	The design to incorporate public open places, squares, and public sites to correspond to neighbourhood size and characteristics (age, religion...)			
13.8	Various levels of effective spatial buffers structure the area, creating a sequence of spaces with different qualities. Light and shade denote quiet and active zones, change, and differentiated spaces	X		
13.9	If there is one, the common courtyard helps to define the neighbourhood, and creates a safe and nurturing place for children and youth	X		
13.10	Places that include technology, play, and social interaction are an important part of Child and Youth Friendly communities, especially in meeting their social, physical, and emotional health needs. - Create technological areas for free Bluetooth connectivity, Wi-Fi, etc. that is easily accessible for children and youth	X		Nature of site.
13.11	Consider discernible social centres, such as plazas, squares, or green spaces with transportation located nearby.	X		



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13.12	Create conditions to support local shops or convenience store	X		
13.13	Both sunny and shaded areas are incorporated in the public spaces and are easily accessible	X		
13.14	The areas of active play to be included - Introduce arrangement of special-use areas for specific groups: e.g., playgrounds for small children within visual and voice range of the apartments + water toys, water playground to attract younger generations	X		
13.15	Make picnic and seating areas available		X	
13.16	Parks include designated play areas for age appropriateness, while also incorporating a space conducive to family gatherings	X		
13.17	Park should demonstrate good visibility, clear orientation and pathways, efficient lighting, well maintained public toilets and spaces that foster frequent use	X		Nature of sites (not parks).
13.18	Entries to the park should coincide with bus stops and crosswalks			
13.19	Provide sheltered areas for older people			
13.20	Major park signs should be lit for night visibility			
13.21	The design should address the fact that girls preferring to play in quiet corners			Nature of site.
13.22	Create youth hangout zone at the perimeter of the park			Nature of sites (not parks).
13.23	Create few small private areas where couples or small groups can sit			
13.24	Provide one or two green axes through whole area and position sport facilities on or along them			Nature of site.
13.25	To make it more usable for girls, divide large areas into smaller areas to avoid large area being dominated by the one particular group - provide open spaces that can be (safely) used by girls			
13.26	Park paths should be well lit			
13.27	To make the park more appealing to girls create what amounted to gender-segregated spaces, installing volleyball and badminton courts for the girls, and dividing open areas into more private spaces with landscaping.			Nature of sites (not parks)
13.28	Girls meeting areas should be located along to pathways to discourage onlookers - to motivate girls to stay active and use these public spaces			
13.29	Youth centres, are important meeting-points and places of communication			Nature of site.
13.30	Create places of undisturbed retreat that also allow youngsters to be noisy and exuberant			



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13.31	Well-maintained and safe green spaces, with adequate shelter, toilet facilities and seating that can be easily accessed.			
13.32	A need for small, quieter, contained green spaces in the fringe areas of the city rather than the large busy parks used by children			
<b>14</b>	<b>Strong participatory process (target&gt;200) - (Introduce: Introduce systemic, comprehensive collaborative planning process)</b>			
14.1	Introduce compulsory participatory planning in all cases here below		X	
14.2	With NBS and related interventions create conditions for more intensive site use. Define new, group activities, mostly NBS based (local farming - food, flowers aromatic plants + other joint social activities ???, any cultural activities (exchange of different culture manifestation), any joint business, actions to increase biodiversity, ...), for previously non-active citizens, follow their level of acceptance			Nature of site.
<b>15</b>	<b>Other liveability targets relevant to PH&amp;WB</b> (DEVELOP: liveability indicators describing different aspects of WB and PH)			
<b>16</b>	<b>Improve overall usage stability of the location</b>			Nature of site.
16.1	Access to location: above item xx			Nature of site.
16.2	Visibility at the location: above item yy			High building density
<b>17</b>	<b>Enhance environment (already covered?)</b>			
17.1	Enhance greenery to xxm3/m2 ?? (already covered in the item ?)		X	
17.2	Enhance / introduce water amenities - xxm2/m2 ??			School is located inland.
<b>18</b>	<b>Provide adequate infrastructure for water amenities</b>			
18.1	introduce watering points - xx per expected number of visitors			Nature of site.
18.2	introduce toilets - xx per expected number of visitors			
<b>19</b>	<b>Create local conditions conducive to citizens participation process</b>			
19.1	Produce citizens participation manual			Nature of site.
19.2	Agree with cities on participation logistic practically applicable			
19.3	Educate citizens on: 1.BGS, 2. Their roles in the participation process			
<b>20</b>	<b>Enhance emotional attachment - (Apply planning system where citizens proposals become visible +?)</b>			
20.1	Secure quiet, relaxing spaces within the demonstration site - IND.SE19			Nature of site.



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20.2	Apply (negotiate with city management) planning system where citizens proposals become visible			Nature of site.
21	<b>Introduce/enhance feeling of responsibility and ownership. (Introduce: Citizens regular inclusion into whole planning and implementation process + ?)</b>			
21.1	Include citizens regular participation into whole development implementation process			Nature of site.
21.2	Elements to increase biodiversity including rainwater-based drinkers and shelters for animals			Nature of site.
22	<b>Increased sense of pride - (Introduce: Public announcement of results from planning process stressing citizens direct impact with their proposed solutions + ?)</b>			
22.1	Public marketing of results achieved, stressing citizens direct impact (proposed solutions)		X	
23	<b>Higher trust in local community members - (Introduce: Level and quality of communication in defining site requirements + ?)</b>			
24	<b>New forms of neighbourly exchange - neighbourhood engagement and cooperation - (Introduce:</b> - Level and quality of communication on site planning - joint work on urban farms - cultural events, + ?)			
24.1	Level of communication on site planning			Nature of site.
24.2	Joint work on urban farms			Air pollution raises concern on safe consumption.
25	<b>Emergence of local leaders and social entrepreneurs - (Introduce: ...)</b>			
26	<b>Increased feeling of community efficacy - (Introduce:</b> - results from joint activities: - planning, - farming, - cultural events, + ?) <i>(The results from joint activities: planning, farming)</i>			
27	<b>Microclimate improvement - (Introduce: Comprehensive and noticeably better-quality microclimate compared to surroundings)</b>			
27.1	Analysis of negative effects on microclimate: Materialization, artificial sources of heat, lack of natural protection from radiation		X	



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27.2	Introduce terrain coverage by specifically designed greenery - Trees, water, greenery,			Nature of site.
27.3	Systemic increase of microclimate related greenery as per euPOLIS pocket park solution or similar - greenery m <sup>2</sup> / person to exceed present status significantly			
27.4	Narrow streets to be equipped with small and medium pots with greenery at the ground level and at the facade (windows) level			
27.5	Air conditioners exhausts to be directed upwards with small aesthetically acceptable barriers - or units to be removed to the roof level if possible			Generally, air conditions not present.
27.6	School air quality control - NBS's at the school air intake for the artificial ventilation system			Not installed.
27.8	Air quality at streets and public spaces - design and construct extensive NBS barriers between pollution sources and recipients			Existing planting creates limitations for further interventions.
28	<b>Energy saving in immediate neighbourhood - (Introduce: Demonstration site urban components affecting energy consumption in the neighbouring buildings)</b>		X	Nature of site.
29	<b>Heat Island reduction - (Introduce: Demonstration site urban components affecting directly and indirectly Heat Island intensity at the site and at the neighbouring buildings)</b>			
29.1	Solutions that mitigate the effect of HI effect sources (measured or simulated) - introduction of interventions designed to reduce / eliminate HI effects - Trees, water, greenery, ...			Nature and scale of site.
30	<b>ESS Provisioning functions - provision of clean air, food, raw materials. (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
30.1	Analyse possibility to introduce air purification regulating NBS at all critical site locations as well as joining streets, covering walking and resting points			Nature of site.
30.2	Analyse introduction of system for the utilization of biomass for energy			
31	<b>ESS Regulating functions - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
31.1	Microclimate, water purification, soil quality,			Nature of site.
31.2	Analyse possibility to introduce micro-climate regulating NBS at all critical site locations as well as joining streets, covering walking and resting points. Particular attention on evaporative cooling corridors with right greenery utilizing natural forces, as well as winter wind barriers			



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31.3	Introduce "cleaning-up" and populating near shore underwater environment with marine aquatic BG concept.			Ralleios School is located inland.
32	<b>Socio-Cultural ESS - (Introduce: ESS quality and intensity significantly contributing to PH&amp;WB and site resilience)</b>			
32.1	Create facilities for mental and physical health, positive emotional experience and sense of place.			
32.2	Introduce euPOLIS "pocket parks" complete as described in the project proposal, at suitable locations - as socializing and cultural exchange points			Nature of site.
33	<b>Ecological environment status / effects - (Introduce: Ecology quality conducive to enhanced PH&amp;WB and site resilience)</b> overall ecological status to be defined			
34	<b>Site components / functions with climate resilience effects - (Introduce: Additional site resilience to cope with extreme weather conditions)</b>			
34.1	Define Site components with this function status - Get vulnerability issues from cities			Nature of site.
34.2	Introduce Additional resilience measures Improvements: .....			
35	<b>Demonstration Site related new business initiatives</b>			
35.1	Create public spaces with microclimate conditions conducive to a small business (positive aesthetic and climatic conditions)			Nature of site.
35.2	Investigate possible implementation - urban farms, food coops, social entrepreneurship, tourist initiatives,			Air pollution raises concerns for safe consumption.
35.3	Site maintenance			
35.4	Site tourism			
35.5	Food Processing - investigate potential for small manufacturing			
35.6	Distribution - recovery and distribution of surplus food from markets			
35.7	Sale - communal units exchange based on excess / shortage between them			Nature of site.
35.8	Create NBS attractions to bring more visitors: 1. more attractive to be, 2. something to do, 3. enjoy food in beautiful surroundings, ....			
35.9	Create multifunctional NBS spatial connections between different areas. Interaction between them might instigate new activities and new business - IND.SE8			



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36	<b>Number of neighbourhood businesses that master and adopt new BGS paradigm and tools - (Introduce: - Site overall quality contributing to neighbourhood Companies, neighbourhood Companies utilizing BGS as own business drivers – or NBS financing)</b>			
36.1	Propose NBS environments, spaces, public areas, that create conditions to attract visitors and subsequently new business,			Nature of site.
36.2	neighbourhood survey to identify Companies utilizing BGS as own business drivers – or NBS financing			
36.3	Define all components treated by BGS which contribute to the increased neighbourhood value			
37	<b>Define and check applicability of components treated by BGS which contribute to the increased neighbourhood value</b>			
37.1	NBS's conducive to aesthetic values			Nature of site.
37.2	NBS's conducive to PH&WB values			Nature of site.
37.3	Visitors' categories			
38	<b>Number of other cities or corporations involved</b>			
38.1	Define with project management euPOLIS other cities involvement plan?			
39	<b>Number of people involved in participatory processes (<i>Count from all events</i>)</b>			
40	<b>Size of audience of project-related meetings, conference panels (<i>Count from all events</i>)</b>			
41	<b>Number of website visits and downloads of prepared guides and reports. (<i>Count from all events</i>)</b>			



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