DIPLOMA THESIS

Nguyen The Khoa

2023

HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES
INSTITUTE OF LANDSCAPE ARCHITECTURE, URBAN PLANNING AND GARDEN ART
BUDAPEST

MASTER OF ARTS IN LANDSCAPE ARCHITECTURE AND GARDEN ART

LANDSCAPE DESIGN PLAN FOR HOSSZÚRÉTI PARK BUDAÖRSI KAMARAERDŐ

AUTHOR : NGUYEN THE KHOA

ADVISOR : JUDIT DOMA-TARCSÁNYI

BUDAPEST, *2023*

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I. INTRODUCTION ABOUT "LINEAR PARK"

1. Linear Park Definition and Historical background.

Linear parks are longitudinal areas, both green and grey, including greenways, corridors and urban edges; blue ways, waterfronts and transportation infrastructure frequently in re-used sites. Normally, they have a minimum width of 25 meters, are of priority use for pedestrians and cyclists, with a spatial distribution marked by vegetation. They have an adequate infrastructure, both associated with recreation and resting areas (Faggi and Vidal 2016).

People relate to linear parks not as a uniform space, but rather as a hierarchy of different supplies which provide a range of benefits that enable active and passive recreational experiences. Each linear park may be seen as having more or fewer cultural, ecological, developmental, agricultural, and recreational values. Each park is filled with an array of elements to shape its character, creating individual feelings along with the experiences people have when they use the park (Faggi and Vidal 2017).

Although the idea of a "linear park" became popular in England from 1960, the design of this type of park is possibly older (Olmsted 1880, Emerald Necklace of Boston). Supported by the Beautiful City Movement (1890-1900), parkways and pedestrian walks were used in many cities to create relaxing, restful, and pleasant access points to recreation areas from the local street network. In Latin America, the Colombian Bogotá Park Way is a good example of a linear park that dates back to 1944 (Faggi and Vidal 2016).

Since the 1960s, linear parks have increased in popularity due to their multifunctionality and the decline of industrial-era infrastructure, which posed new design opportunities for linear parks (Kullmann 2011). In the last decade, they received a great deal of attention among city planners due to the scarcity of available space for the creation of larger parks in densely populated areas. They arose as an opportunity to revitalize interstitial edge-spaces in the post-industrial era as a recreational asset that takes advantage of remnant areas along waterways, coastal edges, riparian zones, abandoned railroads (HerránCuartas 2013, Sinha 2014).

Many cities, such as Barcelona, Bogotá, Boston, Buenos Aires, Jerusalem, Medellín, New York, Palmira, Paris, Rosenheim, Stockholm, Toronto, and Uppsala included a number of green corridors in their strategic master plans as rapid and inexpensive ways to create green areas (Faggi and Vidal 2016).

These parks became fashionable alongside higher concerns for space to do outdoor linear activities: walking, running, jogging, cycling, roller skating. These daily, short- term recreation activities are performed in close proximity to people's homes and are frequently motivated by health concerns, such as obesity, diabetes, and heart disease (Faggi and Vidal 2016).

Another reason for the growing popularity of linear parks is their ecological significance. From an environmental perspective, linear parks are seen as biological corridors with potential to harbor urban biodiversity, increasing connectivity among big parks or natural reserves (Faggi and Vidal 2016).

2. Types of Linear Park.

(Spacey 2017, Six Types of Linear Park)

Waterways – Public space alongside canals, streams and rivers. Rivers often have large floodplains that maybe designated as parks that are closed in the event of a flood.

Shorelines – It is common for shorelines and beaches to be considered public land as areas of exceptional beauty. Many shoreline parks resemble promenades and boardwalks.

Railways and Highways – It is historically common for closed railway lines to be designated as parks. In recent decades, it is also popular to close highway or roads in favor of a linear park. This can significant boost property values and improve neighborhoods across a large area.

Elevated Parks – A linear park that is built above the ground with something under it. Currently most of these are repurposed highways. In theory, they can also be constructed over train lines and other long infrastructure.

Connected Parks – Linear parks that are designed to connect large parks with uninterrupted green space.

Historical Features – Linear parks are often built at the site of former firebreaks, defensive walls or trails. Some have an interesting history or feature historical structures such as city walls or old railway tracks.

3. Design Principles.

(Auckland Design Manual 2022, Design Principles for All Parks)

- Treasure - Identify, conserve and protect what is special about the place. Through interpretation, design, art or information, provide ways for people to understand the special features of our parks and appreciate their significance within the wider landscape. Supporting objectives:

- Natural Environment: Identify, protect and enhance prominent views, natural landscape features, indigenous ecosystems and habitats, and areas of ecological or biodiversity value.
- Communities: Work closely with the community to incorporate design elements which reflect a unique sense of place. Tell the stories of the local history and special community connection with the place, where appropriate.
- Heritage: Identify, protect, and conserve the heritage features on site. Use interpretation to allow people to understand, connect and value both the tangible and intangible heritage values associated with the place.

- Connect - Develop parks which are well connected with the surrounding environment both visually and physically. Designs should maximize accessibility and provide safe and legible movement networks that cater for a range of users. Supporting objectives:

- Connect People: Connect people to the park and to each other. Create convenient and safe connections with surrounding cycle, walking and public transport networks which are easy to access and navigate. Make the park accessible for those with mobility and sensory impairments, where practicable.
- Connect the Environment: Identify and understand the surrounding landscape context and wider ecological/water systems, patterns and processes. Enhance the city ecological services through contiguous vegetation cover connections and corridors between parks and these wider networks to make ecosystems more resilient. Protect and enhance viewpoints and significant natural features. Movement networks through the natural environment should respect existing terrain, flora and fauna, heritage and cultural values.

- Connect Places: Connect our parks to one another and to the surrounding neighborhood. Develop greenways that connect our parks, streets and esplanade reserves to create a network of walkways, trails, and cycle ways. Create or improve connections with surrounding transport networks, community and commercial facilities.

- Enjoy - Develop parks which are safe; inviting and which provide a range of activities, uses and experiences for people of all ages and abilities. Provide opportunities for people to improve their health and wellbeing. Supporting objectives:

- Design for Comfort & Safety: Provide a range of amenities such as seating, sufficient shade and drinking fountains. Ensure amenities provided are appropriate for the scale and purpose of the park, and which also cater for a variety of ages and abilities. Design well-signposted, interesting and welcoming entrances which invite people into the park.
- Design for Health, Wellbeing & Fun: Provide fun, creative and stimulating environments for all ages in the community to enjoy. Provide opportunities for social interaction, active and passive physical activity, and places for children and young people to have fun, play and learn. Design to stimulate the senses, harnessing sights, sounds, smells, taste and tactile experiences.
- Design for More Use & a Range of Experiences: Parks should be multifunctional, promote environmental awareness and appeal to a range of users of various ages and abilities all year round. They should cater for diverse users to happily co-exist within the space. Incorporate simple, uncluttered areas which are flexible and adaptable to diverse a range of activities.

- Utilize - Develop parks which optimize environmental and economic benefits and use resources efficiently and resourcefully. All designs should be resilient and sustainable, safeguarding the environment for the future. Supporting objectives:

- Environmental Benefits: Designs should work to intelligently harness the environmental benefits of our parks. Parks should naturally manage stormwater, improve air quality, reduce flood risk and help mitigate the effects of climate change. Designs should also look to restore ecological and hydrological systems to promote healthy; thriving ecosystems.
- Resources Efficiently: Implement energy efficient systems that make the most of limited resources, such as power and water. Building materials and design elements should be appropriate to context, durable, and feature easily replaced parts if damaged.
- Economic Benefits: Identify and develop relationships with neighboring land uses such as churches, schools and commercial activities and work with them to build community awareness using the park design as a catalyst for the improvement of the neighborhood as a whole. Design to create a destination that can contribute to our tourism economy.

4. Case studies.

4.1. Olmsted Linear Park in Atlanta.

Designed by Frederick Law Olmsted. The Olmsted Linear Park was completed in 1905 in Atlanta's Druid Hills. Saved from destruction by a potential highway project in the 1980s, the park runs along Ponce de Leon Avenue and includes 45 acres of green space.

Olmsted designed the linear park as a refuge from the bustle of the city. Recent rehabilitation efforts have included the burying of utility lines and the installation of 2,600 new trees and shrubs. In total,

the park contains five linear pastoral segments (from west to east, they are: Springdale, Virgilee, Oak Grove, Shadyside, Dellwood) and Deepdeneand - 22 acre old-growth forest; and is today considered one of Atlanta's best parks. (Olmsted Linear Park Alliance 2012, Restoration of Linear Park, Atlanta, GA)

Olmsted Linear Park zoning map (Retrieved from website: atlantaolmstedpark.org)

- Common Ground

- Tranquility - Nature is an antidote to the artificiality and stress of urban life. The park is not to draw attention but to subtly encourage visitors to relax and wander through.

- Health - The pandemic has made us all covet the safety of fresh air, but spending time outdoors encourages mental health as well as physical.

- Affordability - It is one great purpose of the Park to supply to the hundreds of thousands of tired workers, who have no opportunity to spend their summers in the country.

- Sustainability - Olmsted's parks mimicked the natural environment, requiring little maintenance, ensuring "the continued ecological health" of the landscape.

4.2. Elizabeth Street - Linear Park.

Elizabeth Street is boldly re-envisioned as a linear park extending from The Strand in the east, to Cameron Street at the centre of the peninsula, and in the future west to the Waikareao estuary, establishing a recreation connection between the two coastal edges, Tauranga, New Zealand. The project is designed by Isthmus associate landscape architect Travis Wooller and team leader of public spaces at the Tauranga City Council Doug Spittle.

Half of the existing generous street width is repurposed to create the linear park. Increasing the cities green space and creating a pedestrian and cycle priority street, while facilitating vehicular movement and parking.

The linear park comprises of a sequence of paved plaza and green spaces along its length. Tree and shrub plantings and grass areas green the street providing shade and amenity for pedestrians. Raingardens along the length manage and improve the quality of stormwater entering the harbour.

Generous footpaths adjacent to retail businesses provide space for outdoor dining and public seating. Play-along-the-way welcomes children into the city centre environment.

Elizabeth Street project perspective (Retrieved from website: tauranga.govt.nz)

Elizabeth Park concept plan (Retrieved from website: tauranga.govt.nz)

Conceptual Approach:

- Express coast to coast landform - raise & recess: A series of raised and recessed lawn, planting, paved areas along the street providing a sequence of urban green and plaza spaces.

- Activate street through use: Provide spaces for urban activities as walking, cycling; shopping, outdoor dining; Play-along-the-way, picnic, rest.

- Express vegetation - inland ridge to coastal edge transect: Express former vegetation structure within street context.

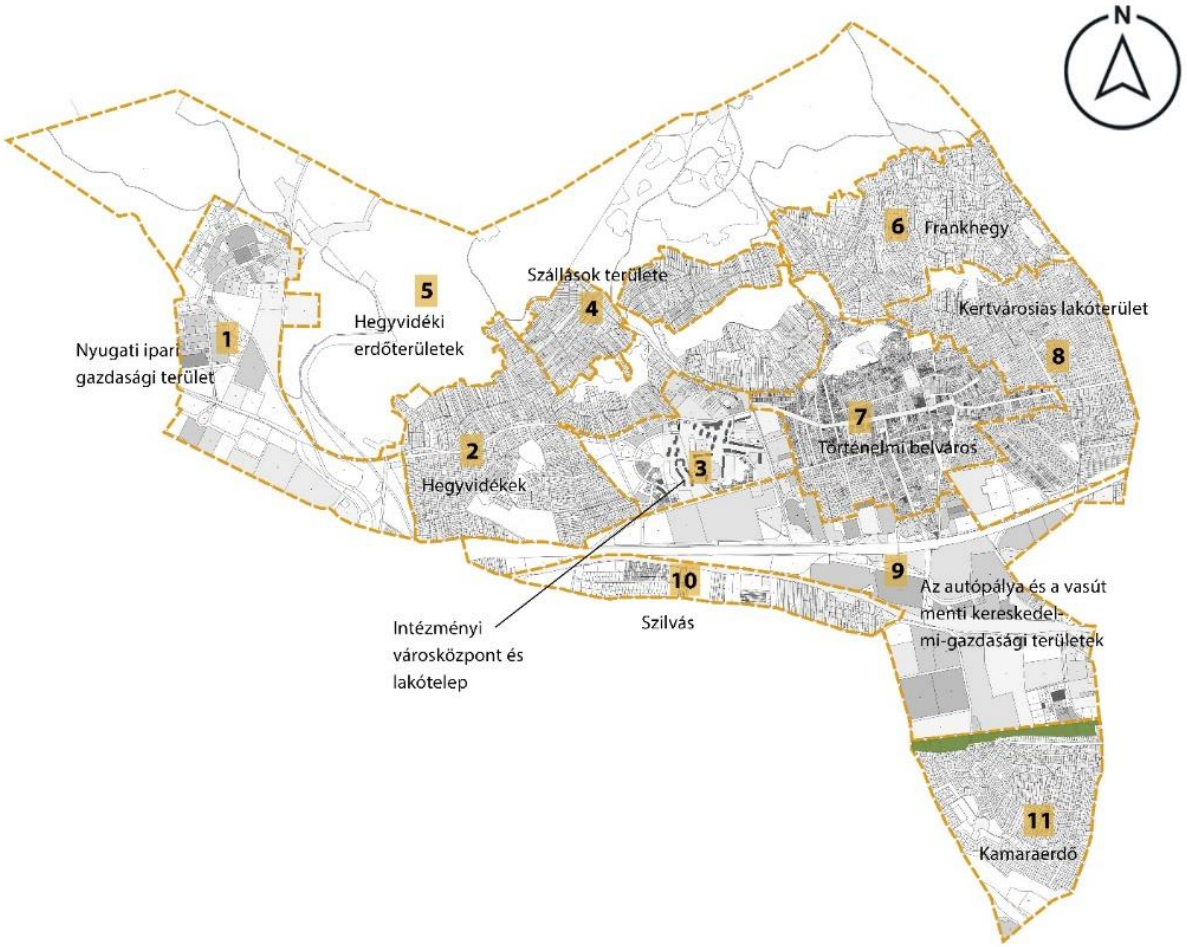
- Green infrastructure: Rain gardens are introduced along the length of the street to treat the carriageway stormwater catchment, which combined with the reduction in hard surface area together contribute to improved water quality. A suite of new street trees - all native species, and suitable for an urban environment, complement the retained existing street trees. Creating a significant volume of vegetation canopy along the street. Providing for shade and improved air quality. Areas of native planting provide another layer of colour, texture and interest. Modulating the street and spaces, and providing an understorey for particular tree species. Stormwater is directed to planting and lawn grass areas to slow and reduce runoff to the piped network, and support the growth of the green infrastructure.

II. SITE SELECTION

1. Introduction about Budaörsi Kamaraerdő park.

Budaörs is a city situated in the southern edge of the Buda Hills and offers a harmonic combination of widely recognized works of contemporary architecture, breath-taking natural surroundings and monuments of historical past. The city's commercial district is adjacent to the joint section of motorways M1 and M7, linking the capital with Vienna and the Lake Balaton, respectively, for this reason, Budaörs can be called the western gate of its immediate neighbor, Budapest.

The largest contiguous forest in Újbuda is the nearly 200-hectare Kamaraerdő, one of the most popular hiking spots in the district and the capital, where people can learn about the natural treasures, plants, and animals of the area on an exciting nature trail. Its center is the easily accessible Nagyré, where the paths converge.



Budaörs Neighborhood map (Retrieved from official website: budaors.hu)

The research site is an existing linear park named Budaörsi Kamaraerdő between Hosszúrét creek and Kolozsvári street.

Area: about 98,500 square meter (1300 meter in length, 55 - 95 meter in width).

Research site location (Author's diagram)

There is an important area, which acts as dividing the space between the complex commercial and residence housing areas. Besides, the park also acts as a link strip connecting green infrastructures in the city (urban parks, nature reserves).

The North borders the commercial centre with mainly warehouses, logistics centre; the South borders the areas of single-family housing; on the West side is the area of Törökbálint, with agricultural land, meadows, shrubs and cemeteries; to the East is Kamaraerdei tanösvény nature trail.

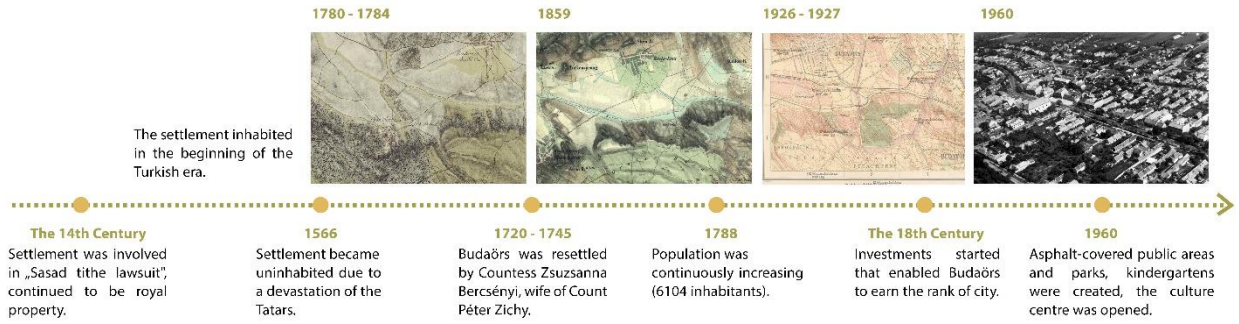
*Budaörsi Kamaraerdő park:

The Board of Representatives 506/2012 (XI.28.) ÖKT supported the implementation of the project: planning the green area of the property numbered 4149/37 with the aim of creating a running track and playground.

In 2013, a new artificial turf sports field was built in the area, a ball-catching net around and cobblestone pavement were built. At the beginning of the design work, the water connection with a drinking fountain and the electrical connection were built.

*Hosszúréti creek: The source of the creek is located in the Torbágy forest, and touching the area of Biatorbágy, Budakeszi, Törökbálint, Budaörs, it collects the waters of the Budaörs and Budakeszi basins and, entering the capital at Kamaraerdő. The path of the creek falls in the Budapest agglomeration, and its built-up area and the gradual shrinking of the vegetation adversely affect the water carrying capacity. In the lower section of the stream, the track of tram 41 running right next to it was also flooded.

2. History about Budaörs.



History timeline (Author's diagram)

(From official website: budaors.hu, History of the Settlement)

The first husbanding and farming groups appeared in this region around 3500 BC. Artifacts from the Bronze Age (1900 BC to 800 BC) were found around Hosszúréti Ditch. Before the Romans came, a Celtic tribe called Eraviscus lived here for nearly one hundred years. During the Roman Age, several villa settlements were created in the region. Building remains were found in Kamaraerdő.

Shortly after the Hungarians' arrival, Budaörs was an inhabited settlement again. Little is known about the history of this vine-producing village in Pilis county in the early middle age.

In the course of the 14th century, the settlement was involved several times in the so-called "Sasad tithe lawsuit". The city continued to be royal property.

The settlement inhabited in the beginning of the Turkish era became uninhabited in 1566 due to a devastation of the Tatars.

The settlement was still inhabited during the Turkish era. It became uninhabited in 1596 when constable Miklós Pálffy from Esztergom deported its population over the course of one night to a place between Esztergom and Érsekújvár.

Budaörs was resettled in 1720 by Countess Zsuzsanna Bercsényi, wife of Count Péter Zichy, who took the settlement back to her name in 1719 and kept it in her possession until her death in 1745. In 1739, the settlement was stricken by plague, killing 259 locals. Subsequently, the landlady settled fifty more Swabian families in the village.

In 1788, 35 peasant families and 114 landless families lived in the settlement, with a total population of 1143. In the course of the 19th century, population was continuously increasing. In 1821 the number was as high as 3775 while in 1900, Budaörs had 6104 inhabitants.

In the beginning of the eighties, investments started that enabled Budaörs to earn the rank of city: asphalt-covered public areas and parks, kindergartens were created, the majority of the housing estate was built and the culture centre was opened at this time.

3. Site analysis.

3.1. Macro scale.

The designed site is located in Kamaraerdő district of Budaörs, which is bordered by the Tétényi plateau in the south, Törökbálin - Pistály in the west, the Szarvasmező industrial estate and the M1-M7 highways separate it from the rest of Budaörs in the north.

3.1.1. Green infrastructure connection in Budaörs.

Green infrastructure in Budaörs comprises different types of vegetated spaces in urban areas, both natural and semi-natural, irrespective of their size, ownership and function. The most typical forms are forests, public parks and gardens, institutional green spaces, playgrounds, sport fields, street trees, nature conservation areas, cemeteries, but also community and private gardens.

One of the most important ecosystem services of urban green spaces is that they provide recreational opportunities for residents, and facilitate social interaction and cohesion.

Budaörs is situated at the southern edge of the Buda Hills, in the basin bearing the name of the settlement. Along the northern side of the basin, in three parallel ridges, there are dolomite hills of peculiar atmosphere: The Budaörsi-kopárok (Kő-hegy, Odvas-hegy, Út-hegy), the Csiki-hegyek and the Törökugrató. These unique natural values belong to the Buda Nature Preservation Area.

The rich fauna of the Budaörs hills is the result of geological changes of several million years. The dolomite debris soil continuously slacking and sliding down are creating “islands” that enabled numerous plants widely spread in former periods with climates totally different from present climate to survive. Sub-Mediterranean and continental species tolerating dryness play an important role in the composition of vegetation.

There is also a form of peculiar formation of the nature in artificially planted pine forests with huge number of Pinus nigra (Nap-hegy, Tűzkő-hegy, Út-hegy, Huszonnégyökröshegy), undergrowth is almost completely missing and fauna is much poorer as well.

On the East, Kamaraerdő is located at an altitude of 126 to 227 meters, with an area of 180 hectares, but it is threatened by built-up areas. The forest consists mainly of oaks and sessile oaks; maple and ash occur in smaller numbers, as well as sedge and hawthorn for the animal world, expect mainly birds.

Budaörsi Kamaraerdő park is planned to become an urban linear park, as a part of green corridor, connecting Kamaraerdő with the urban green spaces (meadow, shrubs, cemetery) in the West. The combination of semi-natural areas and landscapes established through management with important natural assets. Landscapes having old cultural traditions has created a very unique landscape character in this town.

Green infrastructure analysis map (Author's diagram)

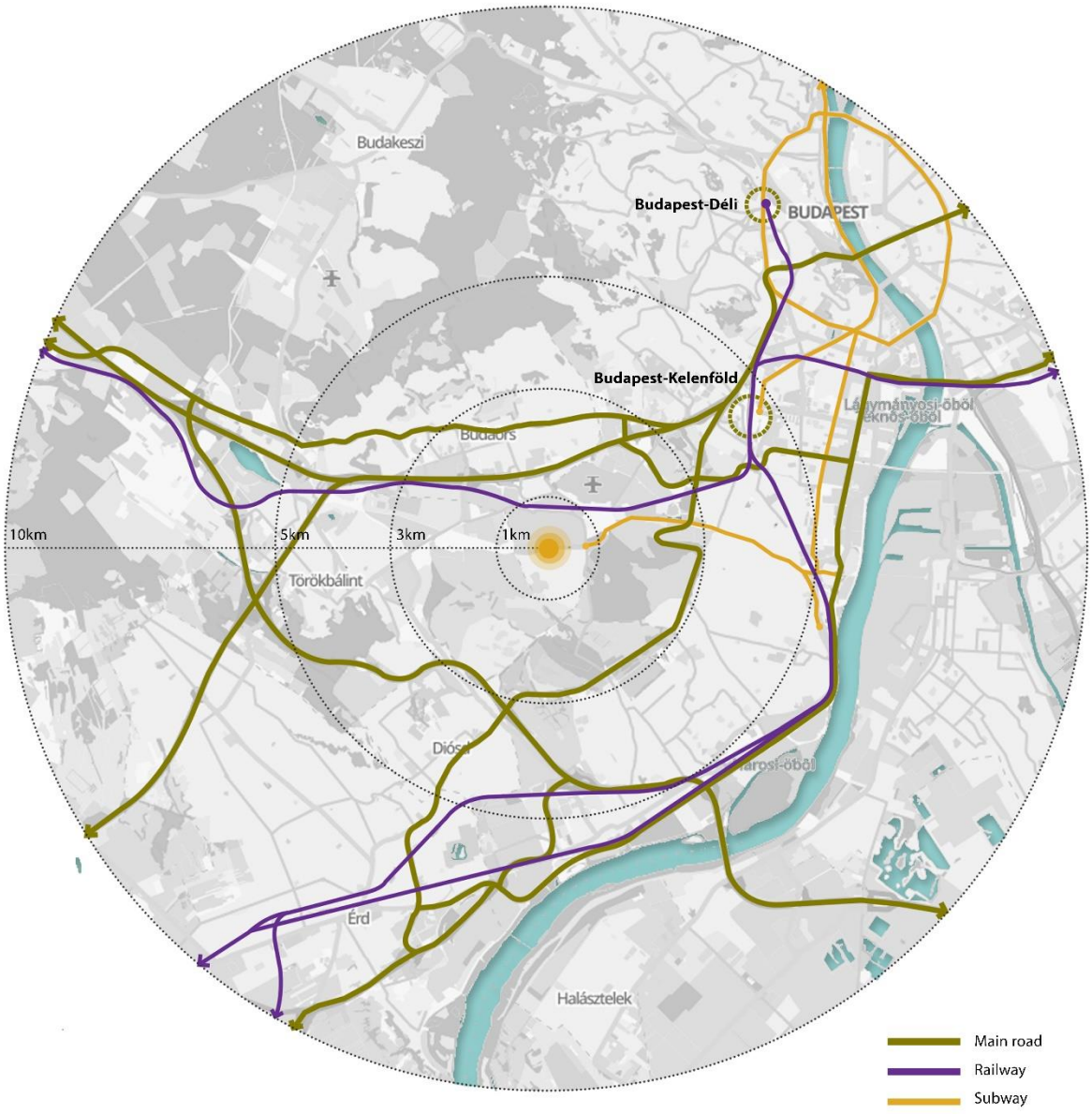
3.1.2. Accessibilities.

The research site is about 10km East of the centre of Budapest, can be easily accessed by urban public transport: train, bus from two main stations (Budapest-Déli and Kelenföld), tramline 41; and motorways M1, M7 for private vehicles.

From the study area, residence can access service areas of Budaörs city within a radius of 1 to 3 kilometers. In addition to the wide range of offerings of shopping centres, the industrial park offers

sites to a number of enterprises. City's strategic direction for the coming period is the increasing settlement of innovative companies and the increase of the proportion of R&D.

The north is a complex of production and business areas for building materials, furniture, logistics... and an important traffic point - Budaörs station. Concentrated along the M1 and M7 highways are commercial centers and educational areas (kindergartens, primary schools, high schools) serving residents.



Accessibilities analysis map (Author's diagram)

Conflicts:

There are few basic urban services (small shops) and kindergartens in the southern residential area, therefore residents have to cross the highways to access major urban services. Besides, small public parks are lack of facilities, as far as not enough to serve users. It is necessary to design urban parks along the route, in harmony with the urban context and existing landscape values, serving multiple uses.

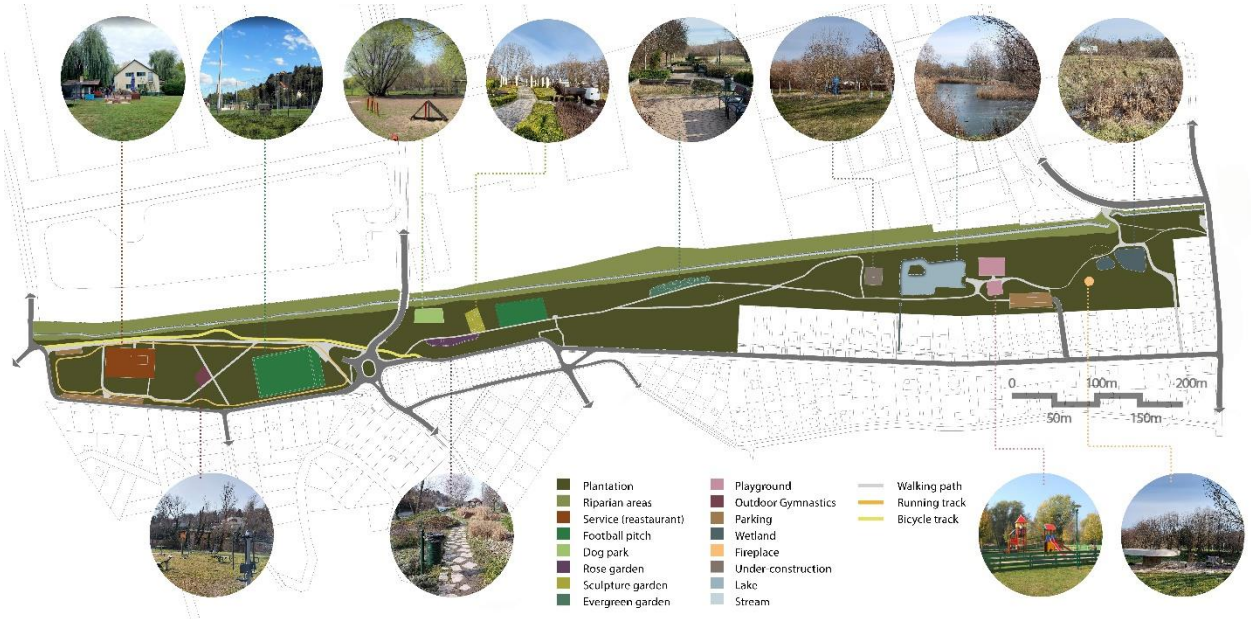
Values:

Hosszúréti creek run through the park, having high historical and visual value, flowing from Törökbálinti-tó to the Danube. Tram line 41 runs along this creek to the Southeast.

The bicycle track - a part of Budapest-Balaton bicycle route not only serves the area's residents but also attracts tourists, running along the linear park, linking Kamaraerdei tanösvény to other featured landscapes.

3.2. Micro scale.

3.2.1. Existing functions.



Existing functions analysis map scale 1:2500 (Author's diagram)

From the West to the East, the catering unit called 'Hacienda' was located on the lot 4007/4 hrsz-ú, the operator of the Hacienda rents the plot from the municipality. The partially asphalted road that stretches along the plot practically only serves the traffic of the Hacienda, and during events they usually park at the end facing Temető street.

In 2013, a new artificial sports field with ball-catching net and cobblestone pavement was built in the area. The size is 44 x 64 meter, covered with artificial grass. The location was designated to the west of the track, in a slightly deeper part. The changing building connected to the track serve the needs of the sports club with a covered storage room for sports equipment and maintenance machines inside.

The role of the fence is primarily property protection. Therefore, the artificial turf field, changing room and the containers will also be inside the fence. Public transport touches the area on its eastern side, at the roundabout: local bus route 288 has a stop here.

The dog park is located right next to Seregély street, which is surrounded by low wire mesh fences, a park is covered by lawn in low maintenance, less utilities for activities.

Rose garden has poor vegetation, low maintenance, unevenly pruned shrubs. There is some equipment inside such as seating, sculpture; concrete columns 2 meters high in the artificial hill;

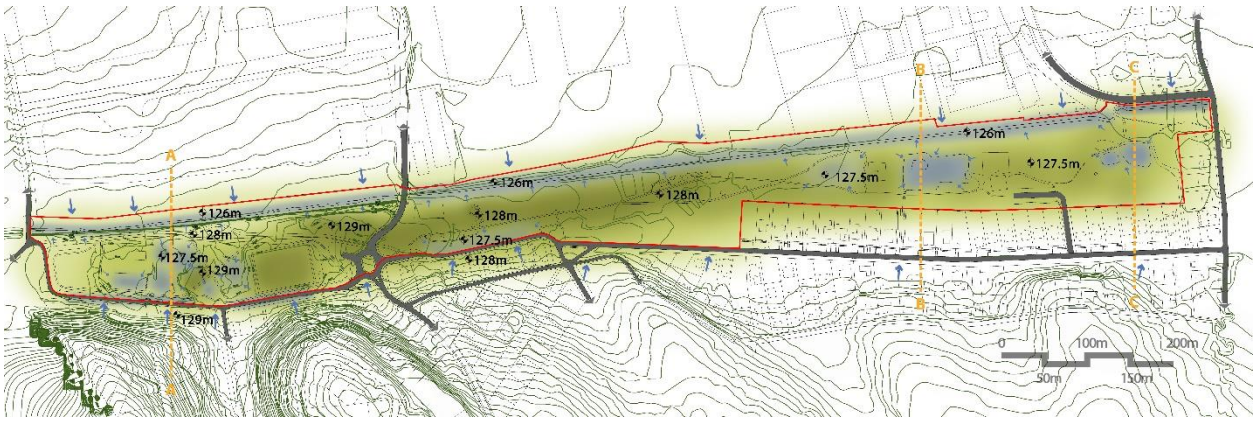
walkways and steps are paved with stone. In general, the rose garden is centrally located, easily accessible from the main entrance and promenade, receiving lots of natural sun light. However, the design is not in harmony with the space and urban context.

The artificial lake is in the east, hidden by the housing block from Kolozsvári street. The flora on the lakeside is quite diverse, with submerged plants, shrubs, and trees; surrounded by spontaneous walking trails. There is potential for development to create a lakeside ecosystem and improve the use of the water surface.

Next to the lake is a children's playground, with basic equipment: slides, swings, sandboxes, and wooden fences surrounding the play area. There are several places suitable for grilling and benches suitable for relaxing in a nicely designed environment.

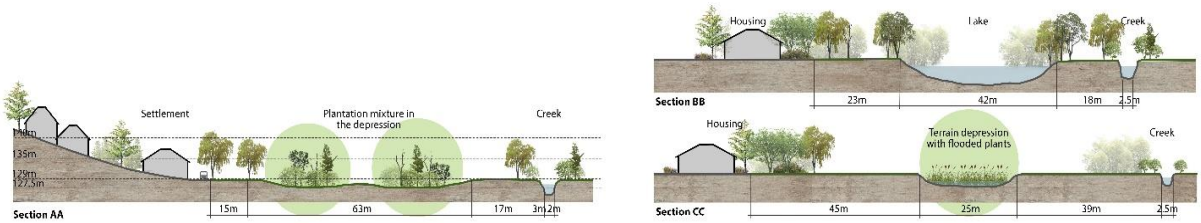
3.2.2. Topography.

The geographical coordinates of Budaörsi Kamaraerdő are 47.450 deg latitude, 18.967 deg longitude, and 120 meter elevation. The topography within 3 kilometers contains very significant variations in elevation, with a maximum elevation change of 938 feet and an average elevation above sea level of 163 meters (source: en-ca.topographic-map.com). Rain falls throughout the year at Budaörs, the month with the most rain at Budaors is June, with an average rainfall of 50 millimeters.



Topography analysis map scale 1:2500 (Author's diagram)

The park is located at the lowest point of the area with average elevation above sea level of 128 meter. Therefore, storm water runoff from the higher elevation is conveyed directly as surface water to the creek and lake without treatment. There are also depressions with mixture vegetation and flooded plantation in the site which acting as a spontaneous storm water system.



Cross sections (Author's diagram)

3.2.3. Plantation.

Plantation analysis map scale 1:2500 (Author's diagram)

Name	Trunk diameter (cm)	Crown diameter (m)	Health condition (1-5)	Number of trees	Measurements/treatments (to be cut, preserved, transplanted)
Robinia pseudoacacia	20 - 50	4 - 16	3 - 5	77	Mostly to be preserved, cut few trees in bad health condition
Salix alba	20 - 80	4 - 20	4 - 5	114	Mostly to be preserved
Prunus sp.	20	5 - 8	5	4	To be preserved
Acer negundo	20	8	5	2	To be preserved
Prunus cerasifera 'Nigra'	20	8	5	1	To be preserved
Populus nigra	30	12	5	3	To be preserved
Populus alba	35 - 50	8 - 12	5	19	To be preserved
Tilia 'Szent István'	10	3	5	124	To be preserved and transplanted
Quercus robur	15	3	5	47	To be preserved and transplanted
Alnus x spaethii	10	3	5	11	To be preserved

Tree survey table (Author's survey)

In the catering Hacienda area and the artificial lake typically contains pioneer tree species, a large number of Salix alba. The tree population consists partly of older individuals, which have started to dry, typically for the species, and there are many dry twigs and branches that are dangerous for people. Most of the stock is made up of seedlings and sprouts, which form larger patches around the mother plants.

The rest of the area is a weedy and grassy, occasionally mowed meadow. Along the park's main pathway is Tilia 'Szent István' planted in lines.

There are also groups of low shrubs, mostly random evergreen species closed to Kolozsvári street. They seem very artificial in this natural environment, this planted vegetation with a lot of evergreen species which plant category is very rare in our native flora and cannot fit into this landscape.

Hosszúréti creek in the north of the park is covered by dense plantation, large groups of trees and shrubs along both sides of the stream: Prunus cerasifera, Populus nigra, Salix alba.

Visual connections: The areas of high artistic and landscape value spread along the park from west to east with relatively long distances: Hosszúréti creek, roundabouts, rose gardens, theme gardens, artificial lakes; users can have good view points to Kamaraerdei tanösvény hill from different position.

There is a path along the stream, which is still an actively used route for pedestrians and cyclists. At the same time, there is an exploratory path in the direction of the park's longitudinal axis, which links the individual functions together.

3.2.4. User flows.

User and Transport flows analysis map scale 1:2500 (Author's diagram)

Residents often use the park for football training, football matches, running. The playground and open grassland attracts many children on weekday afternoons and weekends.

The main entrance is from Seregély street, there is also the route of the local bus service and bus stop. On the edge of the park, along Kolozsvári street, there is sidewalks serving the planned parking lots. For those coming here, the parking spaces is located on the east side connected to the roundabout, and with parallel spaces next to Kolozsvári street.

On the west side, between the Hacienda and Kolozsvári street, the larger grassy, flat area had to be left unbuilt for the purpose of events.

People access the park from the east by bus or tram on Kamaraerdei street. The private transports also can approach the park from Kolozsvári street and parking in Kamaraerdei Játszótér.

The existing asphalt road that bisects the park has been closed to vehicular traffic, but the direction of traffic has not become redundant for pedestrians: those coming from Varjú street can approach the Hacienda and the discovery road in this direction, as well as the individual functions through it.

The running circle (two-way) is built close to the boundaries of the park, around the catering Hacienda and football pitch.

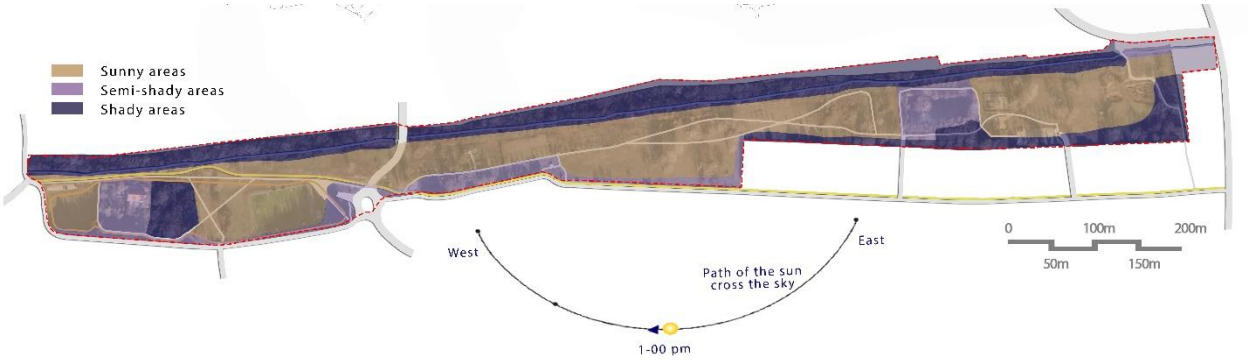
The cycle path: cyclists from Temető street now go along the bank of the stream, then continue their journey through the adjacent public park at the roundabout. An existing pedestrian crossing already leads through the Seregély street branch of the roundabout. The existing pedestrian crossing be converted (painted) so that cyclists can also cross here to the other side. On the other side of Seregély street, proposal to continue the cycle path. On the other side, a cobblestone pavement was built in 2013, which continues from this pedestrian crossing.

3.2.5. Shady and sunny areas.

Climate and average weather year round: At Budaörs, the summers are warm, the winters are very cold and snowy, and it is partly cloudy year round. Over the course of the year, the temperature typically varies from 25°F to 81°F and is rarely below 11°F or above 91°F.

The direction of the park is east-west, the area's terrain is flat, with wide lawns, the trees are planted sparsely, not in groups in the middle of the park, nothing obstructing the sun from midmorning until early evening. So the south side is sunny most of the day (six more hours of direct sun per day), providing a pleasant place for those who want to warm up.

Semi-shady areas are catering Hacienda, artificial lake which covered by shrubs, individual trees. There is also defined as four to six hours of direct sun per day, but most of that should come in the morning hours when the sun's rays are less intense. The plants which prefer part shade enjoy "cool sun", meaning direct sun in the morning or evening and protection from the hot midday sun.



Sunny and Shady areas analysis map scale 1:2500 (Author's diagram)

Hosszúréti creek in the north of the park is covered by dense plantation, large groups of trees along both sides of the stream, so this area is the darkest of all light levels. It is also defined as less than four hours of direct sun per day.

5. SWOT.

Strengths

- The research site is conveniently located in the Budaörs city area, easily accessible by public and private transport from the center of Budapest. Serving residents in the area within a 1-3km walking radius.

- The site is a linear park, which hold an important position in connecting urban green spaces and nature reserves together, creating a continuity of green infrastructure.

- There is Hosszúréti creek with high historical and landscape value, has the advantage of overlooking the hills and diverse vegetation along the stream.

- Existing functions: bicycle route, football field and the catering Hacienda increase activities for diverse users.

- The park is potential place for community life and recreation for local residents.

Weaknesses

- The lack of safety solutions for cyclists and pedestrians (walking paths, bicycle paths…) in the west, there is uncomfortable accessibility in football pitch (traffic flow problems around the roundabout).

- The plant application is poorly fitted to the existing natural environment (existing rose garden, theme garden).

- The need of better landscape architecture design approach for existing functions (water surface, dog park, playground). The unique landscape element has not been taken advantage of in the design (Hosszúréti creek).

- Missing sidewalks, existing path is not wide enough pedestrian walkways.

Opportunities

- Users can easily access other functional areas in the urban area from the park. Develop the linear park with mixed-use and fully functions for diverse users.

- Enhance land use value.

- Improve the connection and design elements (water surface, plantation), apply environmentally friendly constructions and functions.

- Improve infrastructure, parking and main access traffic at roundabouts.

Threats

- Challenges in urban management, rational land use in urban construction and conservation of existing landscape values, natural vegetation inside and outside the study area.

- The challenge of developing landscape design in harmony with the urban context and natural landscape elements.

- Easy accessibility and development could lead to overcrowding and displacement of local residents.

III. CONCEPTUAL APPROACH & DESIGN DEVELOPMENT

1. Strategy and Concept design.

CONCEPT DESIGN:

Applying the linear structure to enhance the linkage between functional areas together, simultaneously integrating ecological landscape design into the park.

A linear structure provides green infrastructure allowing more people from more locations to reap its benefits. In addition, ecological approach creates a wide variety of habitats for native species to thrive, as well as a healthy environment for people and nature to coexist. These eco designs cool urban heat islands and minimize flooding, providing clean water and air for both human and native species.

Concept diagram (Author's diagram)

STRATEGY:

- The linear park with mixed-use development, fully functions for diverse users:

  - Ensure amenities provided are appropriate for the scale and purpose of the park, and which also cater for a variety of ages and abilities.
  - Provide fun, creative and stimulating environments for all ages in the community to enjoy.
  - Design to stimulate the senses, harnessing sights, sounds, smells, taste and tactile experiences.

- Improve the connection and design elements (water surface, plantation):

  - Well connected with the surrounding environment both visually and physically.
  - Create convenient and safe connections with surrounding cycle, walking and public transport networks which are easy to access and navigate.
  - Protect and enhance viewpoints and significant natural features.

- Apply environmentally friendly constructions and functions:

  - Reducing waste and protect the environment, applying a higher value on sustainable and green construction methods.
  - Parks should naturally manage stormwater, improve air quality, reduce flood risk and help mitigate the effects of climate change.

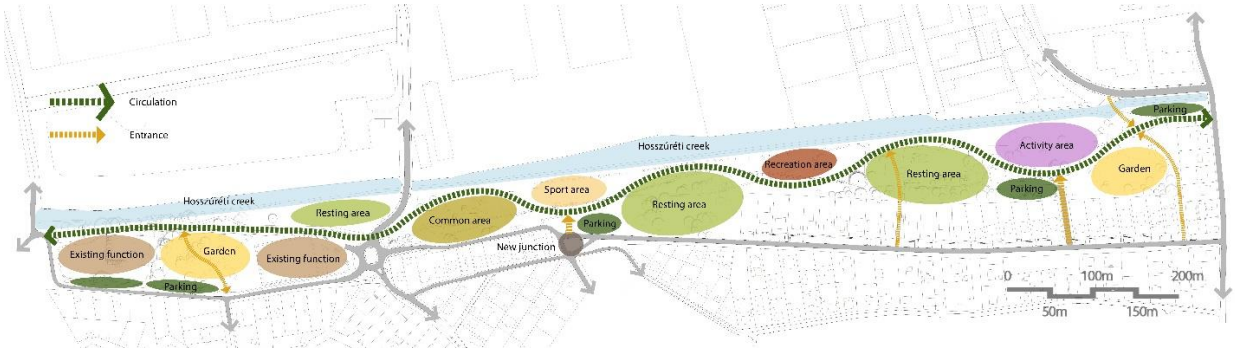
- Raise user safety in landscape architecture design:

  - Develop parks which are safe; inviting and which provide a range of activities, uses and experiences for people of all ages and abilities.

- Design well signposted, interesting and welcoming entrances which invite people into the park.
- Provide opportunities for people to improve their health and wellbeing.

2. Bubble diagram.

The main idea is creating a linear composition of spaces, with the opportunity for a ribbon of play and activation to form a vibrant connection along the length from West to East.



Bubble diagram (Author's diagram)

Inspiration pictures (Author's diagram)

The park circulation system and the entrance space are clearly organized, safe for pedestrians, cyclists and vehicle movement. Through improving continuity for users as well as creating a balance in walkway design, residents of the area can not only easily cross the park to access bus stops, but also are invited to stay and use the recreational function areas.

The natural vegetation and open spaces on the lawn are retained for the area's annual outdoor events (resting area). Recreation area (fire place) increases multi-use, creating outdoor activities between people and nature.

The rain garden system acts as the natural stormwater drainage system of the whole area. Community garden is a complex that supports green education not only for children and students but also for local residents by various workshops, which is learning about plants in rain gardens, wetlands, how to grow and harvest vegetables.

3. Concept plan.

The linear structure of the design is identified by circulation consisting of the main promenade path, bicycle track and running track, which is continuous from west to east. All routes ensure enough width for two way traffic, safe and easy to access from the entrances without interruption.

In the western park area, the linear parking is designed not only for residents but also for users of the football pitch. The small squares near the parking and the football pitch create transition area.

Functional areas are organized and arranged along the main path, they are diverse, harmoniously combining people and nature. People can play in the playground, open space near the lake and creek, as well as experience the workshop in the community garden.

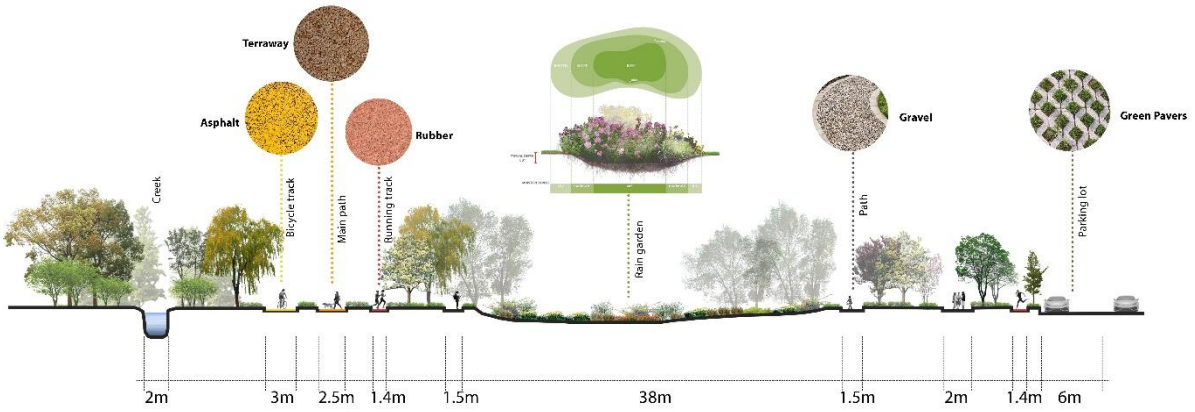
Functional areas: (1) Existing Restaurant, (2) Rain Garden, (3) Outdoor Gymnastic, (4) Existing Football Pitch, (5) Parking Lot, (6) Bus Stop, (7) Dog Park, (8) Sunbathing Area, (9) Creekside Open Space, (10) Football & Hockey Field, (11) New Entrance & Junction, (12) Resting Area, (13) Perennial Bed, (14) Fireplace, (15) Lake, (16) Woody Platform, (17) Playground, (18) Café & Toilet, (19) Rain Garden Workshop, (20) Wetland, (21) Vegetable Garden.

Material selection: Rubber, Terraway, Gravel, Stone Pavers.

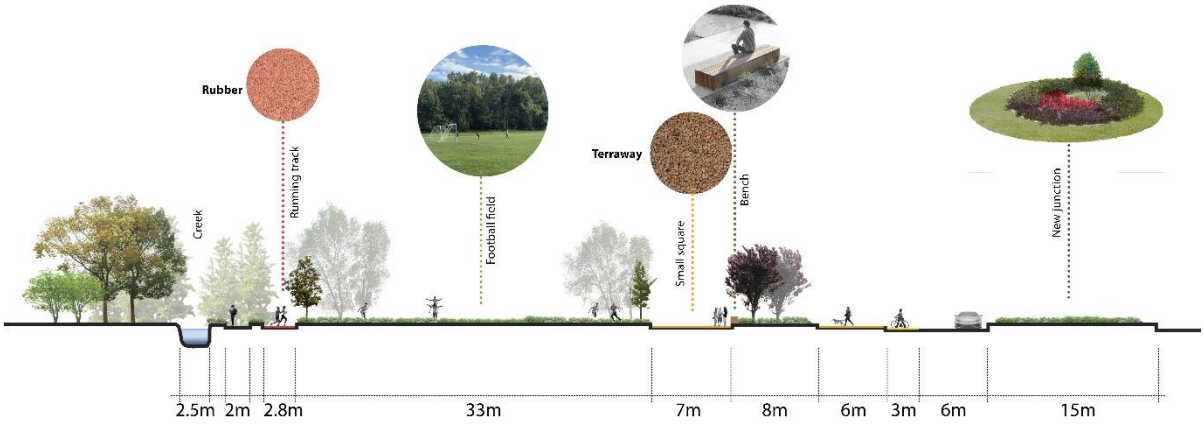
Applying permeable surfaces increase evapotranspiration, filtration and infiltration, and mitigate elevated water temperatures caused by contact with impervious surfaces. Permeable surfaces mitigate and control stormwater runoff by allowing water to pass through into the underlying soils. This kind of natural filtration process is the most effective way of eliminating water contaminants and pollutants.

Applying sustainable furniture: Eco-friendly furniture generates less pollution and waste. Using sustainable furniture helps to tackle climate change and the linear consumption of products we currently have. It is a way to preserve the planet to run out of natural resources as sustainable furniture is usually made with long-lasting, durable materials.

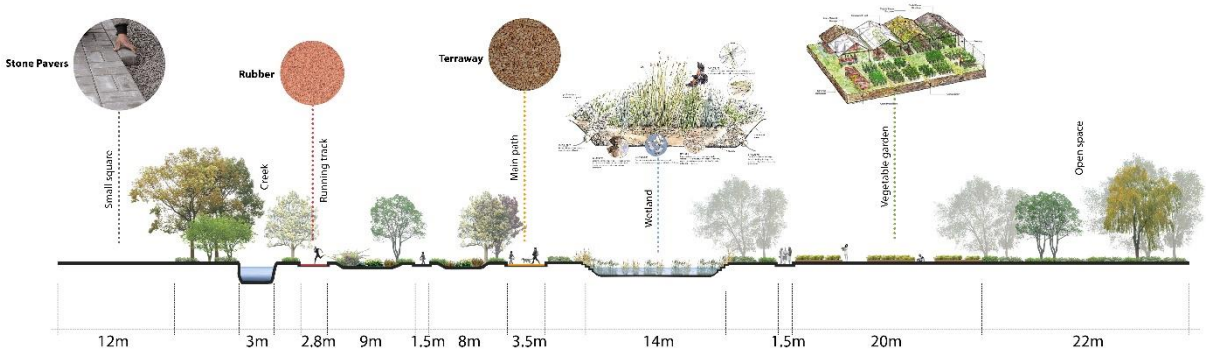
Masterplan scale 1:1000 (Author's diagram)



Cross section AA scale 1:250 (Author's diagram)



Cross section BB scale 1:250 (Author's diagram)



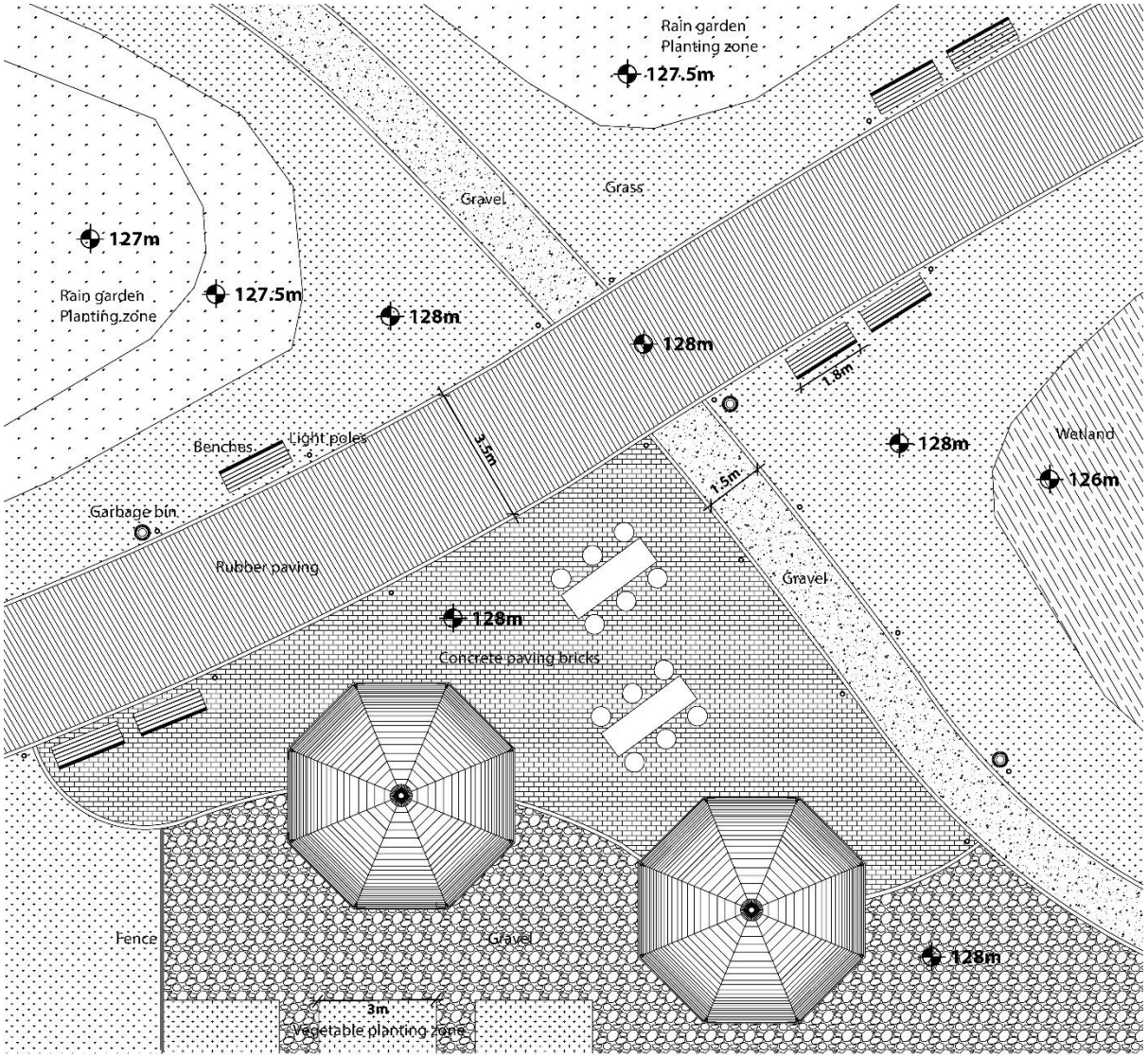
Cross section CC scale 1:250 (Author's diagram)

Perspective from the new entrance (Author's diagram)

Perspective from garden workshop (Author's diagram)

Perspective from the small square with café pavilion (Author's diagram)

4. Design solutions and Plant selections.



Detailed design scale 1:100 (Author's diagram)

4.1. Rain garden design.

(Bennett and Christensen 2016, Rain Garden Design, Construction and Maintenance Manual)

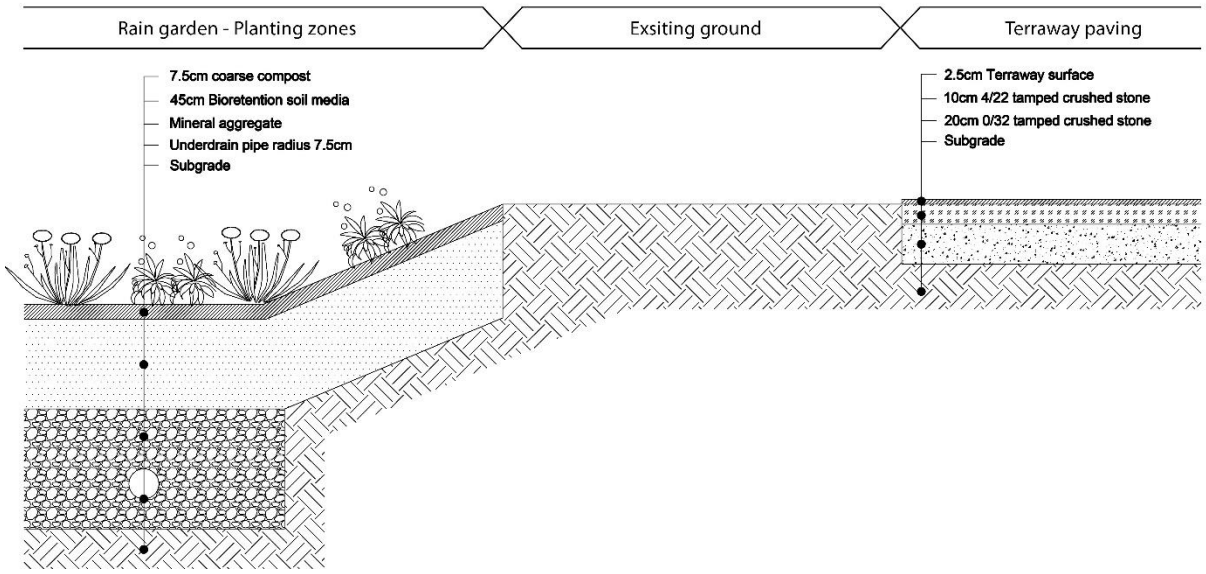
Rain gardens are engineered gardens designed to harness the natural ability of vegetation and soils to treat stormwater and are sometimes called bio-retention devices. Treatment occurs through sedimentation, filtration, adsorption and uptake by vegetation. They can be used to reduce the effects of stormwater volumes, peak flows and contaminant loads on waterways.

Rain gardens work by ponding stormwater in the planted area, which is then filtered through the soil mix and by plant roots. These absorb and filter contaminants before stormwater flows into surrounding ground, pipes, drains and streams, and eventually to the sea.

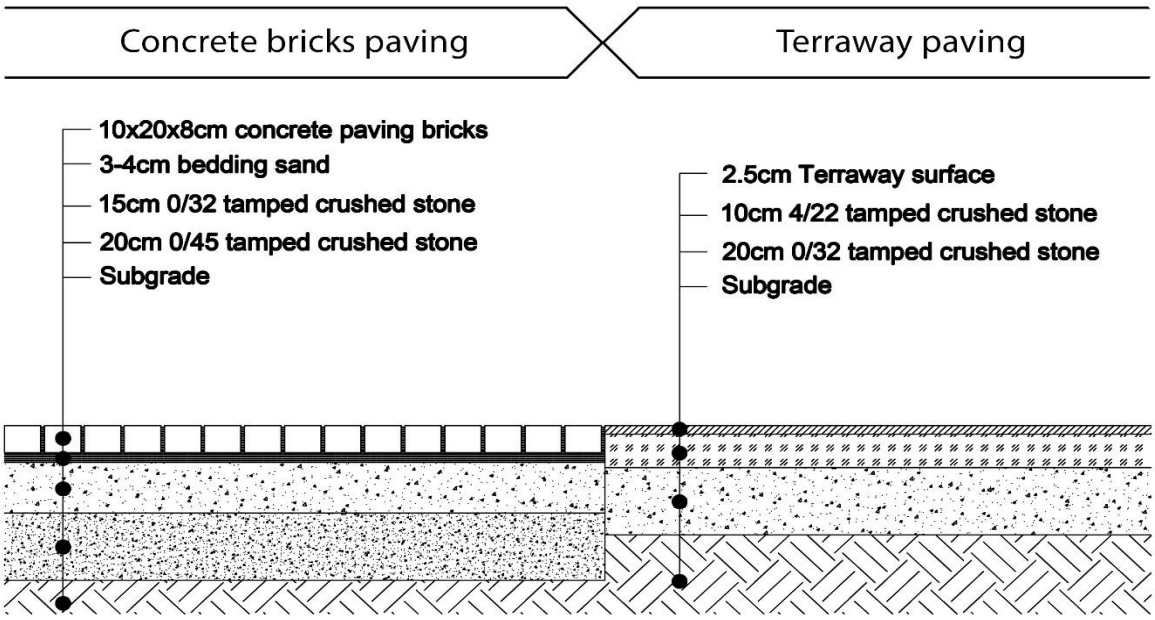
Construction guide:

- Identify services and excavate.
- Form sides and lay liner (if required).

- Install underdrainage.
- Construct overflow drainage.
- Backfill underdrainage system.
- Install transition (sand) layer.
- Install rain garden media mix.
- Complete to finished level.
- Planting.
- Place pebble mulch.
- Review levels.
- Test the rain garden.
- Completion and tidy up.



Technical section 1 scale 1:50 (Author's diagram)



Technical section 2 scale 1:20 (Author's diagram)

4.2. Plant selection.

Plants selected for the park need to be able to cope with the extremes of inundation and wide tolerance in a free draining soil. The plants below have been specially selected as being able to meet these conditions.

	Name	Type	Height (m)	Spread (m)
1	Robinia pseudoacacia	Woody	9 - 15	6 - 10
2	Populus nigra	Woody	12 - 15	3 - 5
3	Populus alba	Woody	15 - 20	15 - 20
4	Acer negundo	Woody	12 - 15	7 - 10
5	Salix alba	Woody	15 - 21	15 - 21
6	Tilia 'Szent István'	Woody	10 - 15	10 - 15
7	Alnus x spaethii	Woody	10 - 15	10 - 15
8	Quercus robur	Woody	12 - 15	12 - 15
9	Prunus padus	Woody	7 - 8	6 - 7
10	Prunus ceracifera 'Nigra'	Woody	5 - 6	5 - 6
11	Prunus maackii	Woody	8 - 10	8 - 10
12	Acer buergerianum	Woody	10 - 12	8 - 10
13	Malus 'Winter Gold'	Woody	6 - 7	6 - 7
Rain Garden				
14	Carex muskingumensis	Perennial	0.6 - 0.9	0.6 - 0.9
15	Iris pseudacorus	Perennial	0.6 - 0.9	0.9 - 1
16	Asclepias incarnate	Perennial	1.2 - 1.5	0.6 - 0.9
17	Rudbeckia subtomentosa	Perennial	0.9 - 1.5	0.6 - 0.9
18	Bergenia cordifolia	Perennial	0.3 - 0.6	0.6 - 0.7
19	Sanguisorba officinalis	Perennial	0.6 - 0.9	0.6 - 0.9
20	Persicaria affinis	Perennial	0.15 - 0.3	0.3 - 0.6
21	Phlomis russeliana	Perennial	0.6 - 0.9	0.3 - 0.6
22	Filipendula rubra	Perennial	1.8 - 2	0.9 - 1.2
23	Diervilla sessilifolia	Deciduous shrub	0.9 - 1.5	0.9 - 1.5
24	Sorbaria sorbifolia	Deciduous shrub	1.2 - 1.5	0.8 - 1
25	Viburnum opulus	Deciduous shrub	2.4 - 3	3 - 4
Wetland				
26	Typha angustifolia	Perennial	0.9 - 1.2	0.9 - 1.2
27	Butomus umbellatus	Perennial	0.3 - 1.5	0.3 - 0.6
28	Sagittaria sagittifolia	Perennial	0.3 - 1.2	0.3 - 0.9
29	Symphytum grandiflorum	Perennial	0.3 - 0.9	0.3 - 0.9
30	Ranunculus acris	Perennial	0.3 - 0.6	0.3 - 0.6
31	Lythrum salicaria	Perennial	0.6 - 1.2	0.6 - 0.9

Plant selection table (Author's work)

IV. BIBLIOGRAPHY AND LITERATURE

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- Site map of the “Bárkaprojekt” scale 1:500, Kolozsvári street, Budaörs landscaping of property no. Hrsz 4007/3, 4007/2, 4007/5.

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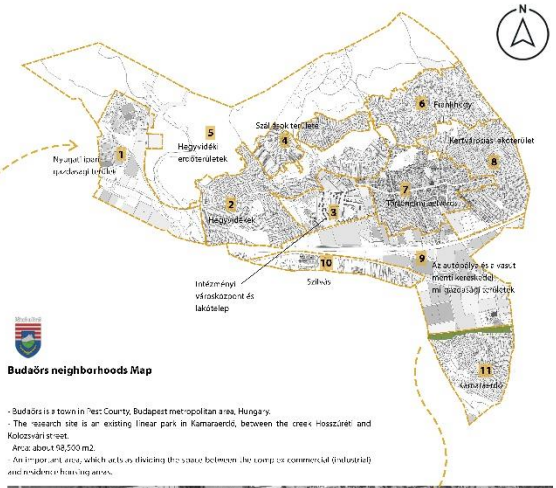
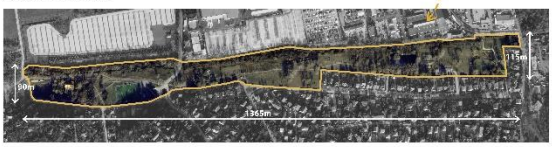
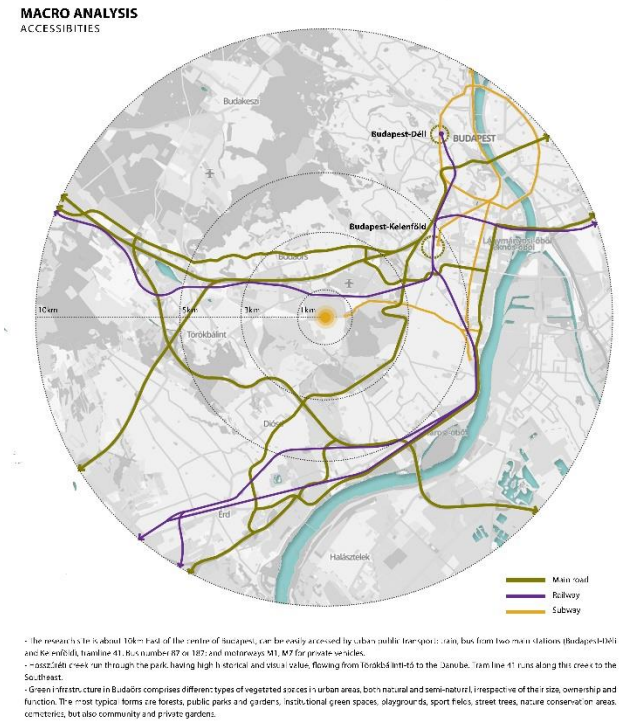
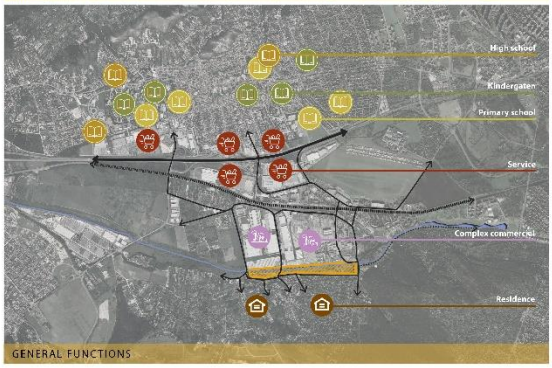
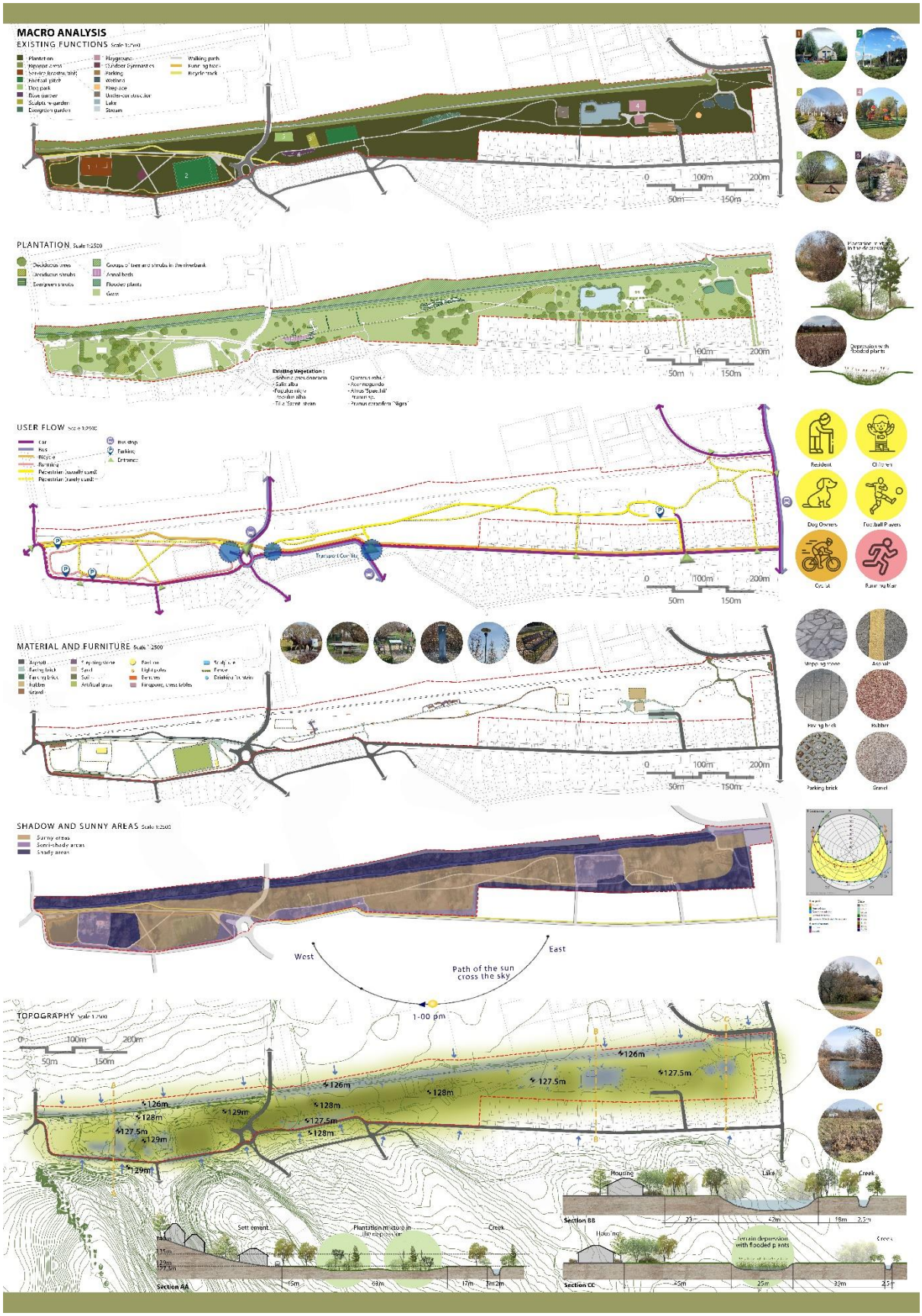
POSTERS (B1 100 x 70cm)





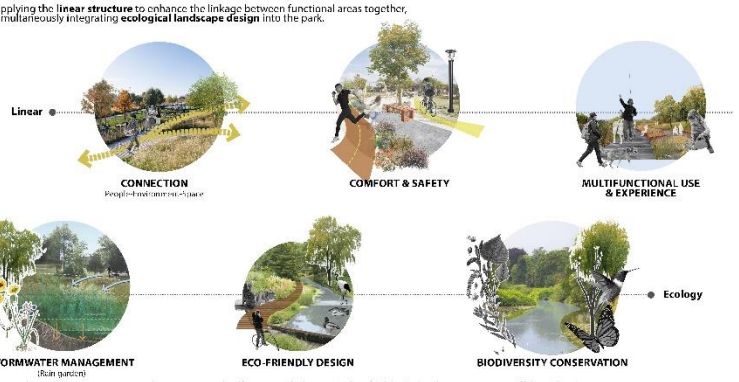




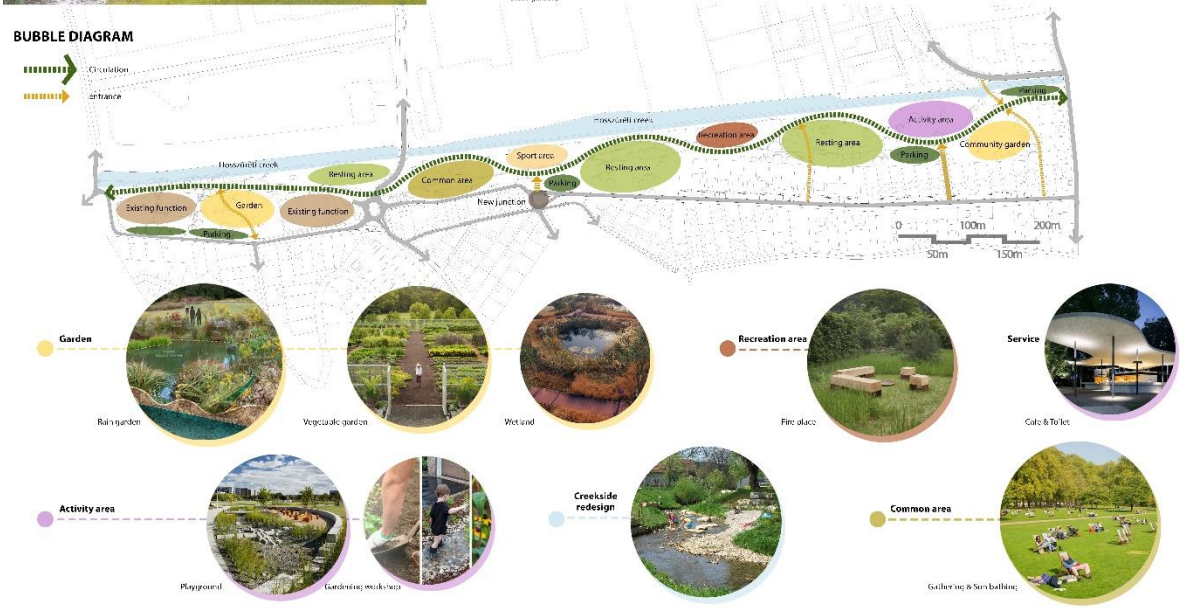

MACRO ANALYSIS
EXISTING FUNCTIONS
PLANTATION
USER FLOW
MATERIAL AND FURNITURE
SHADOW AND SUNNY AREAS
West
East
Path of the sun cross the sky
1-00 pm
TOPOGRAPHY
Section AA
Section BB
Section CC

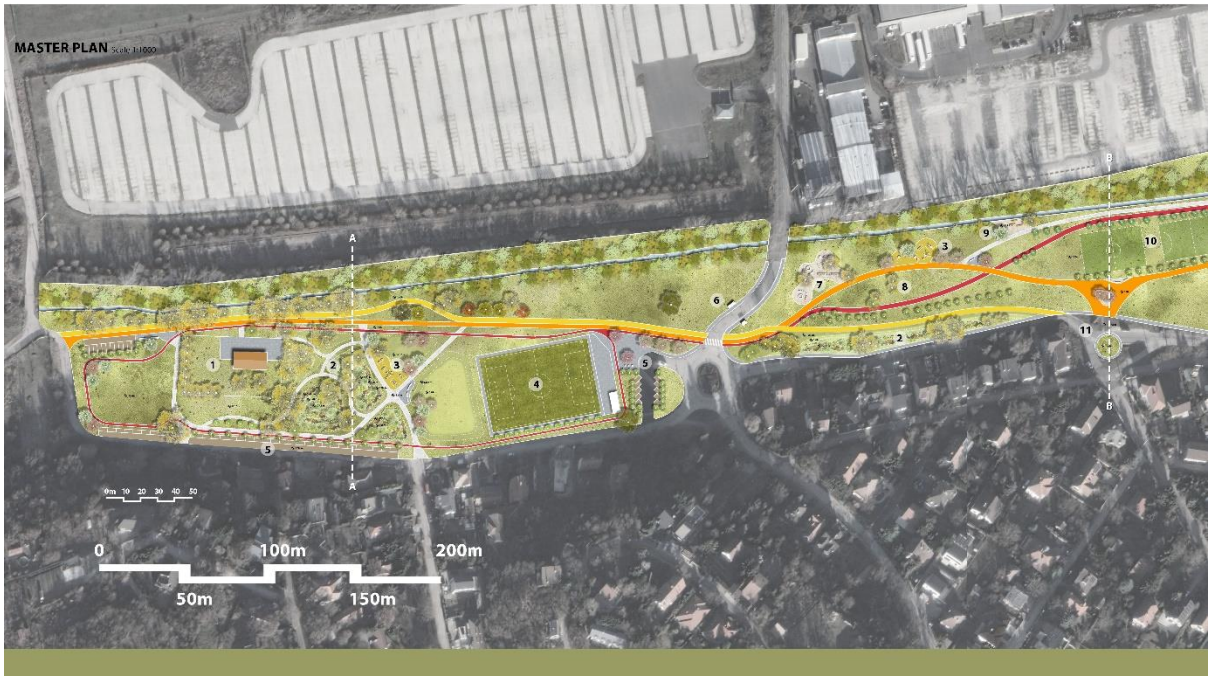
CONCLUSION

Applying the **linear structure** to enhance the linkage between functional areas together, simultaneously integrating **ecological landscape design** into the park.

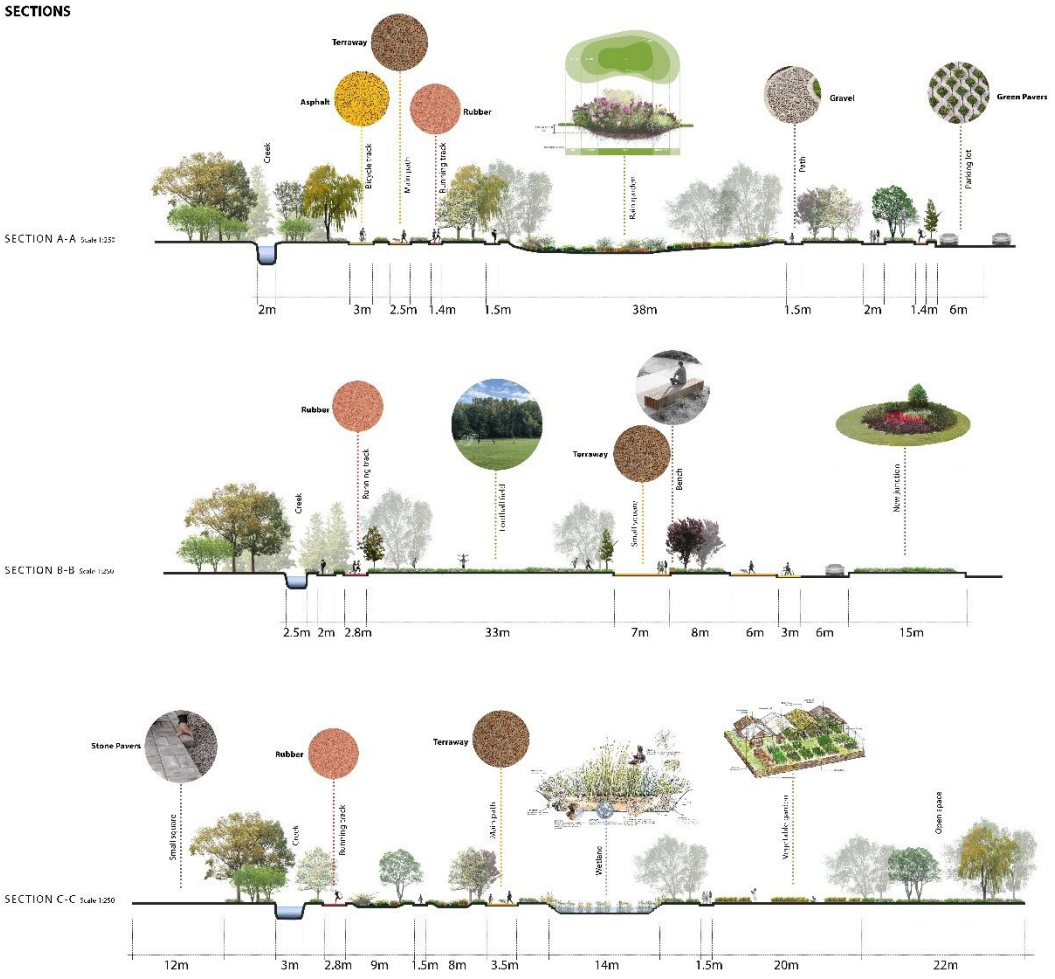


BUBBLE DIAGRAM





SECTIONS


Terraway
Asphalt
Rubber
Gravel
Green Pavers
Creek
Bicycle track
Main path
Running track
Path
Parking lot
SECTION A-A Scale 1:250
2m
3m
2.5m
1.4m
1.5m
38m
1.5m
2m
1.4m
6m
Rubber
Terraway
Creek
Running track
Football field
Bench
New junction
SECTION B-B Scale 1:250
2.5m
2m
2.8m
33m
7m
8m
6m
3m
6m
15m
Stone Pavers
Rubber
Terraway
Small square
Creek
Running track
Main path
Wetland
Vegetable garden
Open space
SECTION C-C Scale 1:250
12m
3m
2.8m
9m
1.5m
8m
3.5m
14m
1.5m
20m
22m


1. Existing Restaurant
2. Rain Garden
3. Outdoor Gymnastic
4. Existing Football Pitch
5. Parking Lot
6. Bus Stop
7. Dog Park
8. Sunbathing Area
9. Creekside Open Space
10. Football & Hockey Field
11. New Entrance & Junction
12. Resting Area
13. Perennial Bed
14. Fireplace
15. Lake
16. Woody Platform
17. Playground
18. Café & Toilet
19. Rain Garden Workshop
20. Wetland
21. Vegetable Garden
Bicycle Track
Running Track
Main Path
Path

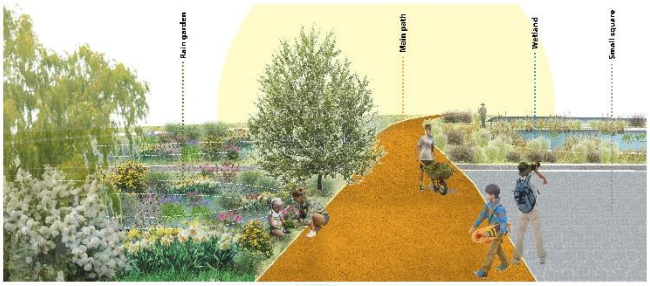
PLANTING CONCEPT

0 100m 200m
50m 150m

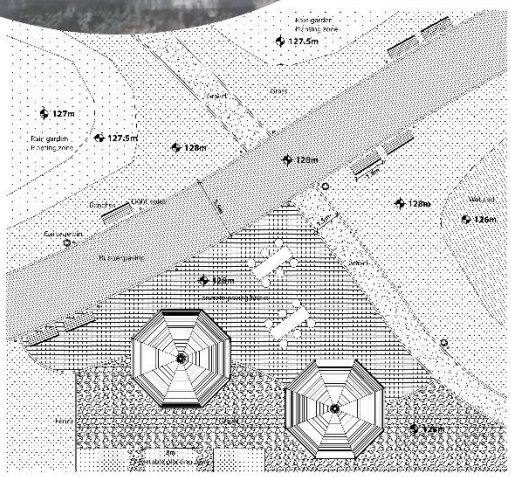
Rain Garden

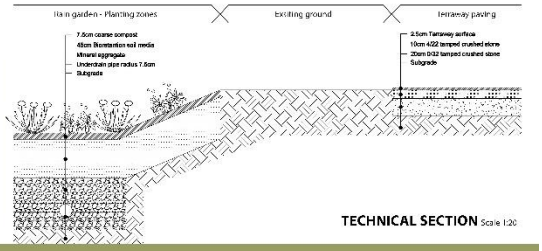
Wetland

FOCUSED AREA Scale 1:500



DETAILED DESIGN Scale 1:100





TECHNICAL SECTION Scale 1:20

ANNEX

DECLARATION

on authenticity and public assess of mater's thesis

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Student's Neptun ID:	GP7DLQ
Title of the document:	Landscape Design Plan for Hosszúréti Park, Budaörsi Kamaraerdő
Year of publication:	2023
Department:	Landscape Architecture, Urban Planning And Garden Art

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The document contains state secrets or professional secrets: yes no*[2]

Place and date: 2023 year 05 month 03 day

Internal supervisor

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