



BICYCLE BOULEVARD ČRNOMEREC

13/02/2018

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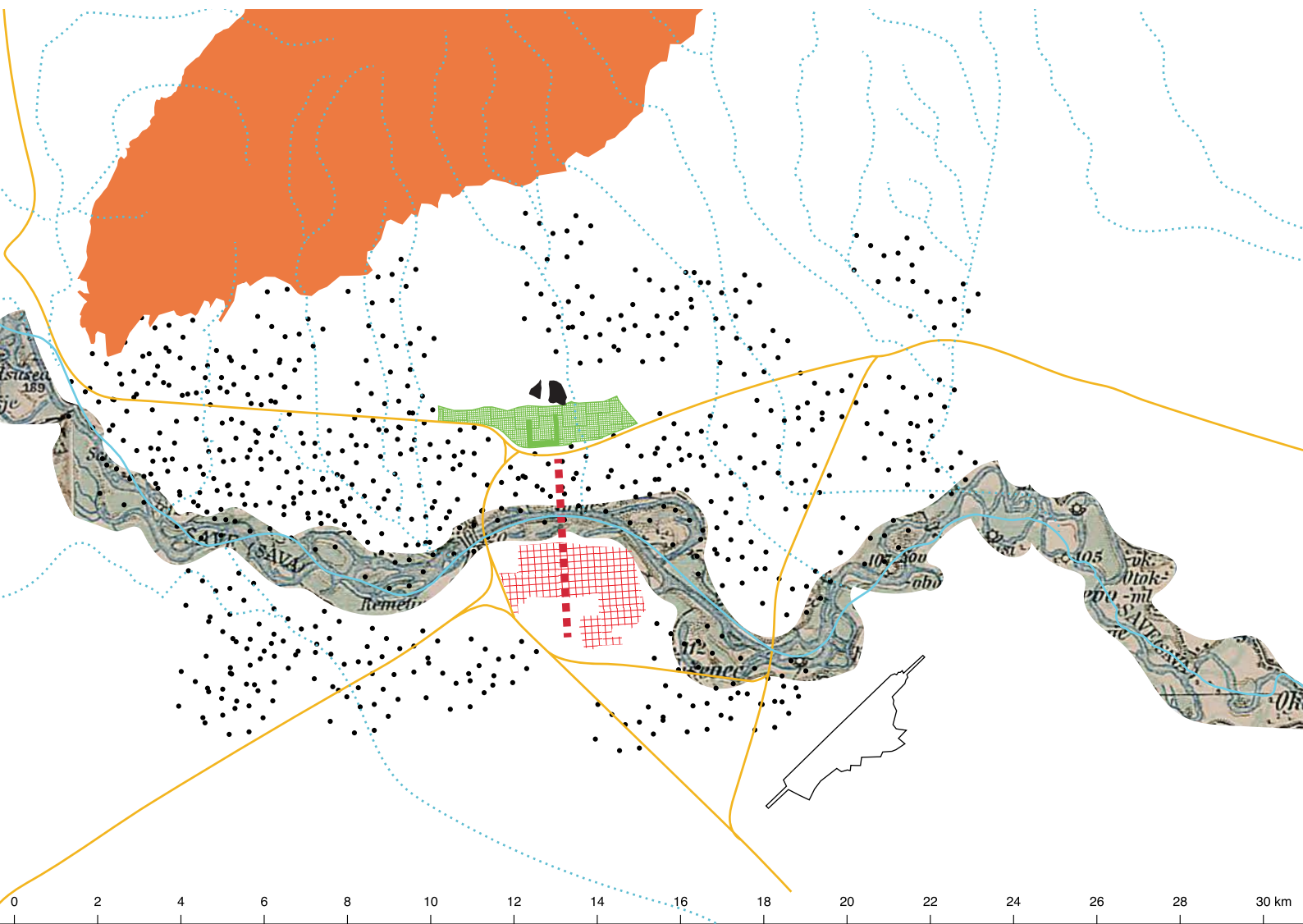
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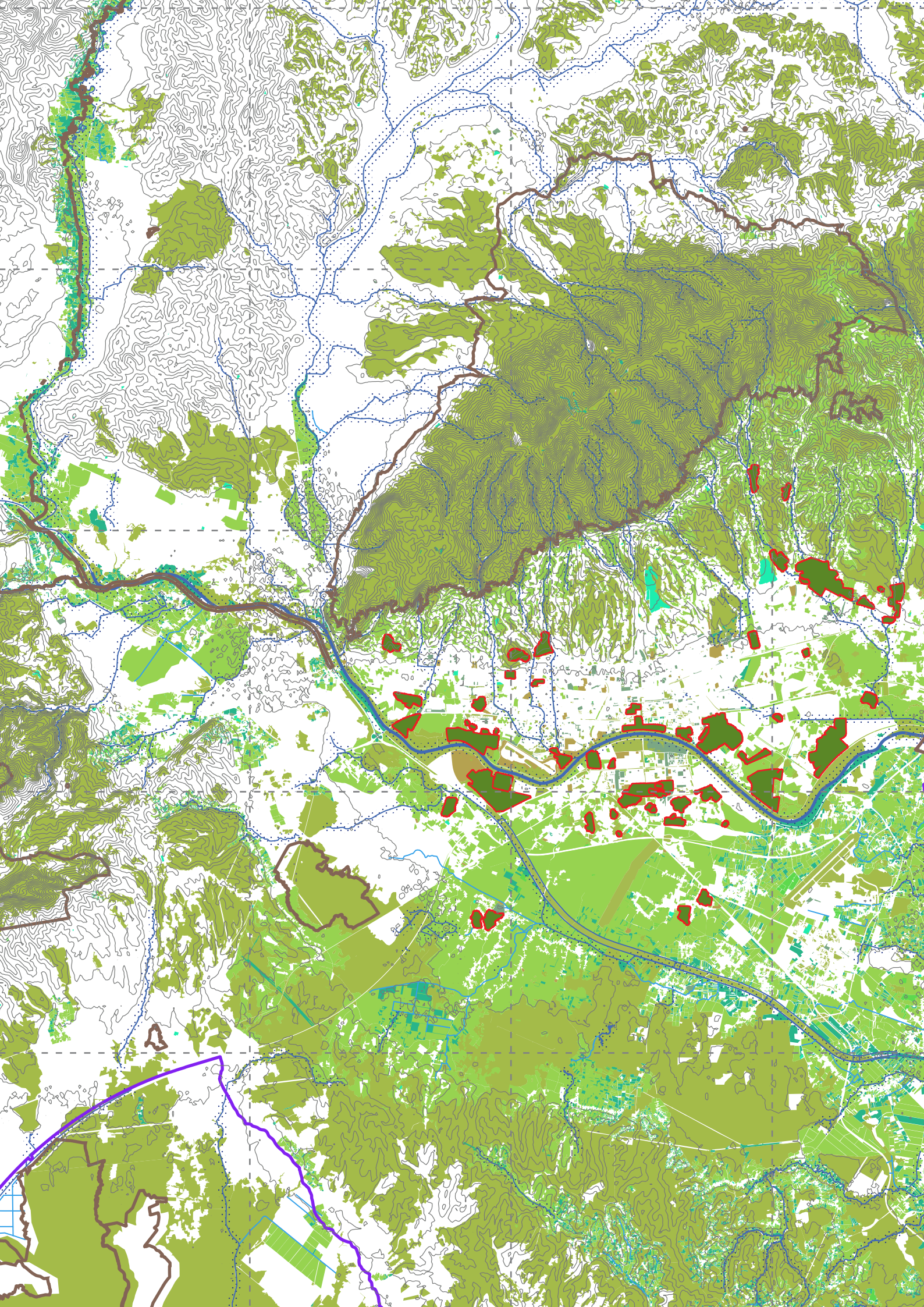
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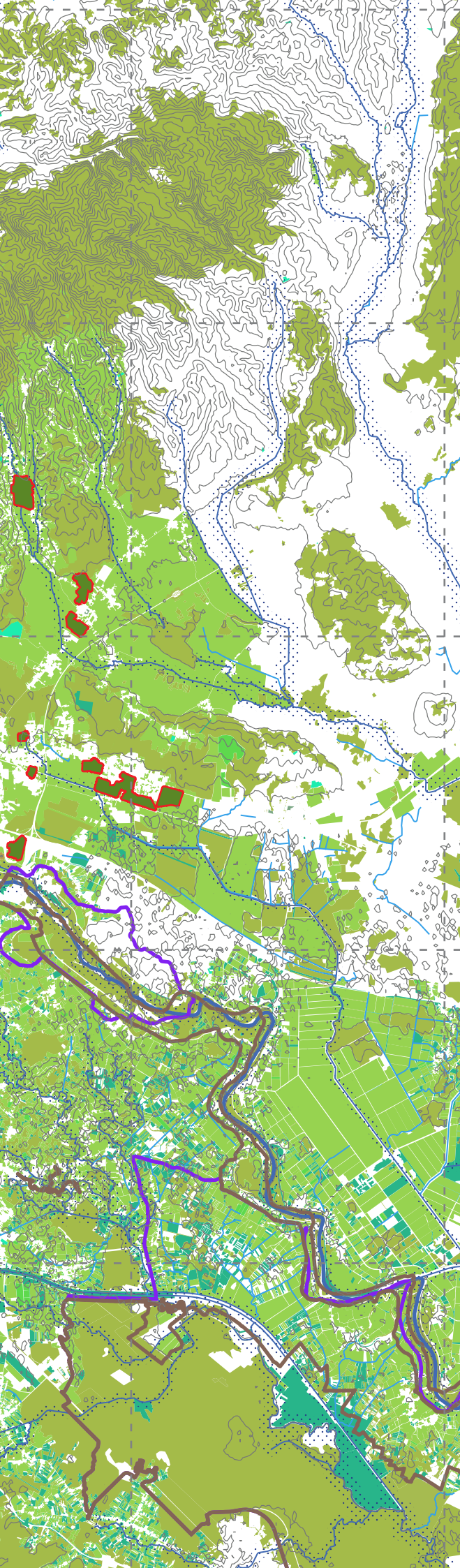


Why an ecological connection is necessary in Zagreb?

The ecological structure of Zagreb consists of two main elements: the Medvednica mountain and the Sava river. The streams that connect the two elements from the hydraulic point of view, over the last few decades, have been almost entirely buried. Črnomerec is one of the few streams that are still visible. Until the 1990s, the urban growth has been strongly regulated and addressed in the southern part of the river (Novi Zagreb). In the last thirty years the city has been densified and it has almost totally filled up its empty spaces, even if the abandoned buildings are numerous. This process of densification occupied many stream and the general tendency is to transform the space of the streams in roads. The streams must return to solve to their hydraulic and ecological function: during heavy rain periods they drain the water towards the river. In addition to the hydraulic and ecological functions, these streams could also perform the function of linear parks, offering an alternative to pedestrians and cyclists in north-south movements.

The ecological structure of Zagreb: the streams connect Medvednica and Sava river (source: Towards an environmental project)





The environmental situation today

Observing the environmental situation today two main problems emerge:

1) the urban environment blocks all the possible relations between the mountain and the Sava valley. This relation is strategic for the biotic balance, and for the percolation of biodiversity: it is better to conceive the urban tissue as a porous material where biodiversity could pass, instead of thinking of urbanity as a stopper for biodiversity.

2) the risk link of flooding is very high: as in 1964 when most parts of the city were flooded.

The vision for Zagreb should consider this risk as an opportunity to manage the water both coming from the mountain and from upstream Sava. (source: Zagreb, toward an environmental project, 2017)





0 500 1000 1500 2000 2500 3000 m

A park already there!

The map on the left side, made by aggregated datas, shows public activities over the last two years recorded by the users (via Strava).

It shows also the network of bike lane proposed by the municipality.

First of all we can observe the general strategy used for conceive this network: the most part of the bike lanes proposed run along the major roads, which suffer of an high level of congestion. This strategy doesn't take in account the secondary path (such the along of the Črnomerec) losing a great opportunity for create a credible alternative at the supremacy of the car. A second observation concerns the realized branches: now the bike paths provide a incomplete network.

This map is also important because it demonstrates that the park along the Črnomerec is already there and it is defined by the use of all the citizens, that walk and cycle already along this green connection.

This map shows also that this existing park could be very much implemented in order to became a real green infrastructure.

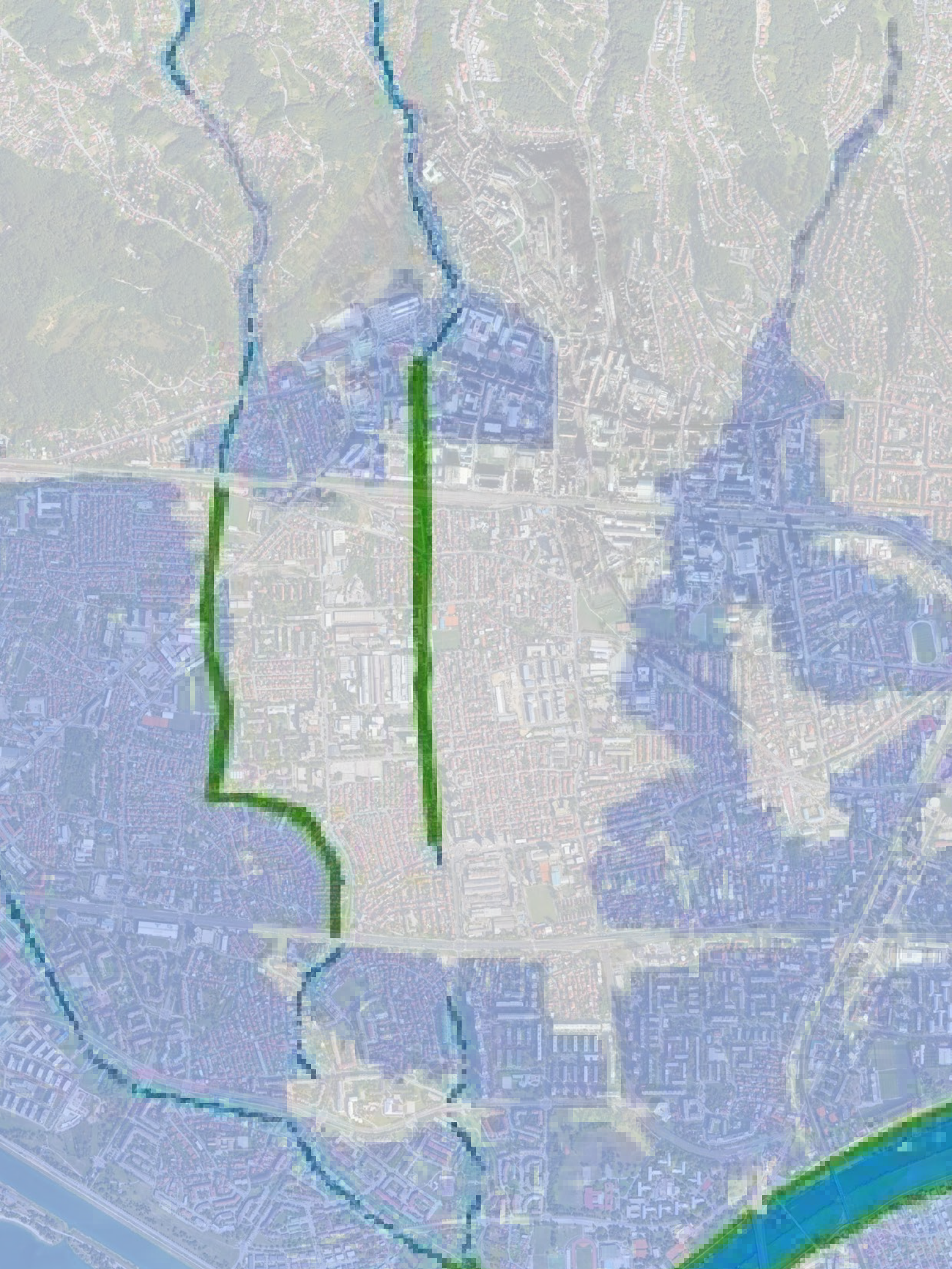
———— bike paths proposed (source gup)

———— bike paths realized (redesign)

Map of the open air sport activities recorded by the users. In black the bike lane proposed by the municipality (Source: GUP / 3a_Promet_Line / BIKIKLISTICKA STAZA)

© 2018 Strava © Mapbox © OpenStreetMap

1. Diagnostic report



0 500 1000 1500 2000 2500 3000 m

1.1.1 Hydrology or the risk of culvert

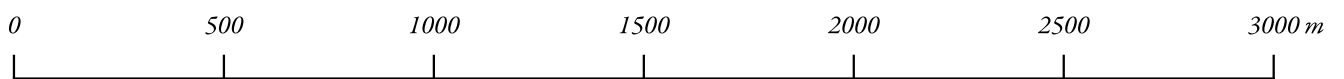
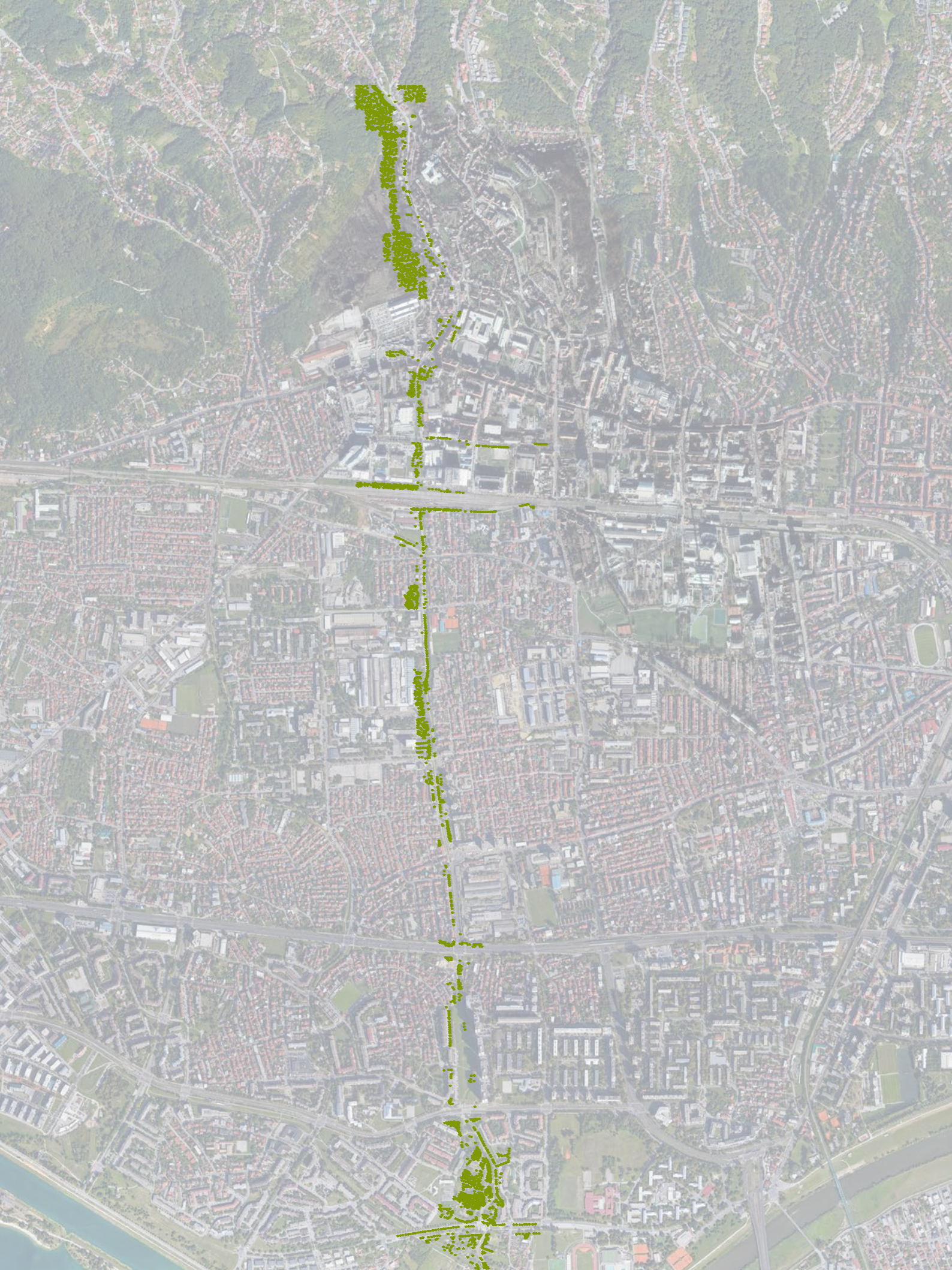
The water bodies are alive and not dead bodies. The water that can no longer be infiltrated to the ground because it is blocked by cement and asphalt, has to go somewhere. In case of heavy rains, the water that, before the massive urbanization, flowed in a wide torrential river bed does not manage to pass into a narrow underground channel. Now that the weather has changed, or it does not rain for many days, or when it rains, it rains a lot, the water that reaches the bottleneck of the banked river, “explodes”, and goes where there are houses and people. Furthermore, the maintenance of the pipes used to cover the bodies of water is difficult and the sediment risks obstructing the piping.

The left map shows the flood risk along the Črnomerec; also if it labelled as a low probability of occurrence, the risk needs to be taken very seriously. Making the Črnomerec in a culvert will only augment the risk of flooding without creating a support for the biodiversity.

 *low probability of occurrence*

 *embankments*

Flood risk map according to the probability of the flooding (Source: HRVATSKE VODE)



1.1.2 Existing vegetation classification

From the observation of the existing vegetation along the stream and in the neighbourhood, we could divide the species (native and naturalized) in four main group, according to their typical features: conifer, large trees, medium and small broadleaved trees, shrubs.

Here a non-exhaustive list of the main species:

Legend

Isolated tree (I)

Row of trees (R)

Groups of trees (G)

Hedgerows (H)

Groups of shrubs (gS)

Conifers

Picea abies – (I)

Cedrus atlantica – (I)

Pinus nigra – (R)

Large trees

Populus nigra ‘Italica’ (R)

Populus nigra – (I)

Salix alba – (R)

Salix babylonica – (I-G)

Alnus glutinosa – (I)

Acer platanoides – (R-G)

Acer platanoides ‘Krimson King’ – (G)

Aesculus hyppocastanum – (I-G)

Platanus x acerifolia – (R-I)

Platanus orientalis – (R-I)

Quercus spp. – (I)

Fagus sylvatica – (G)

Fagus sylvatica ‘Atropurpurea’ – (G)

Ginkgo biloba – (I)

Albizia julibrissin – (I)

Gleditzia triacanthos – (R)

Robinia pseudoacacia – (R)

Celtis occidentalis – (R)

Sophora japonica – (R)

Medium and small broadleaved trees

Acer spp. – (R-G)

Betula pendula – (R-I)

Liquidambar styraciflua – (G)

Tilia spp. – (R)

Juglans regia – (R)

Catalpa bignonioides – (I)

Prunus cerasifera ‘Pissardi’ – (R-G)

Cercis siliquastrum – (I-G)

Ficus carica – (I)

Prunus avium – (G)

Prunus domestica – (G)

Shrubs

Sambucus nigra – (gS)

Hydrangea spp. – (gS)

Thuja orientalis – (gS)

Vitex agnus castus – (gS)

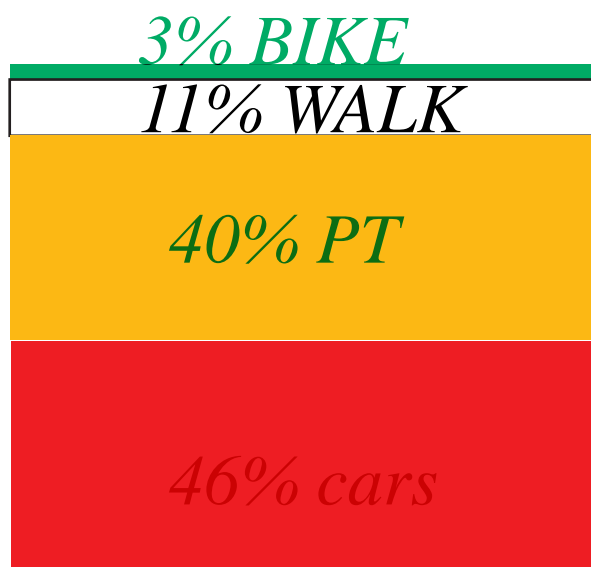
Pittosporum spp. – (gS)

Syringa vulgaris – (gS-H)

Prunus laurocerasus – (H)

Ligustrum ovalifolium – (H)





*Above: modal Grad Zagreb
(source: Final Report, phase I of master plan
of the transport system of the city of Zagreb,
Zagreb county and Krapina-Zagorje county)*

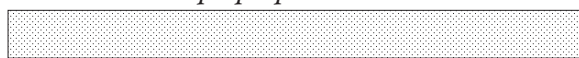
TRANSIT: 25.000 people per hour



WALKING: 9.000 people per hour



BIKING: 7.500 people per hour



CARS: 600 TO 1.600 people per hour



*Above: how many people can move through a
city using different transportation options.
(Source: NACTO)*

Existing tramlines Existing railways

Črnomerec
one way roads

● Bus stops

● Bus stops

bike paths (source GUP)

.....

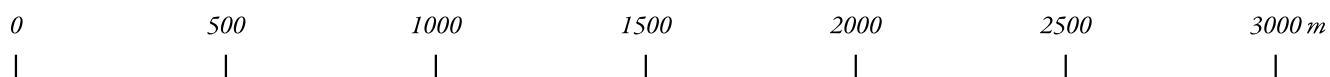
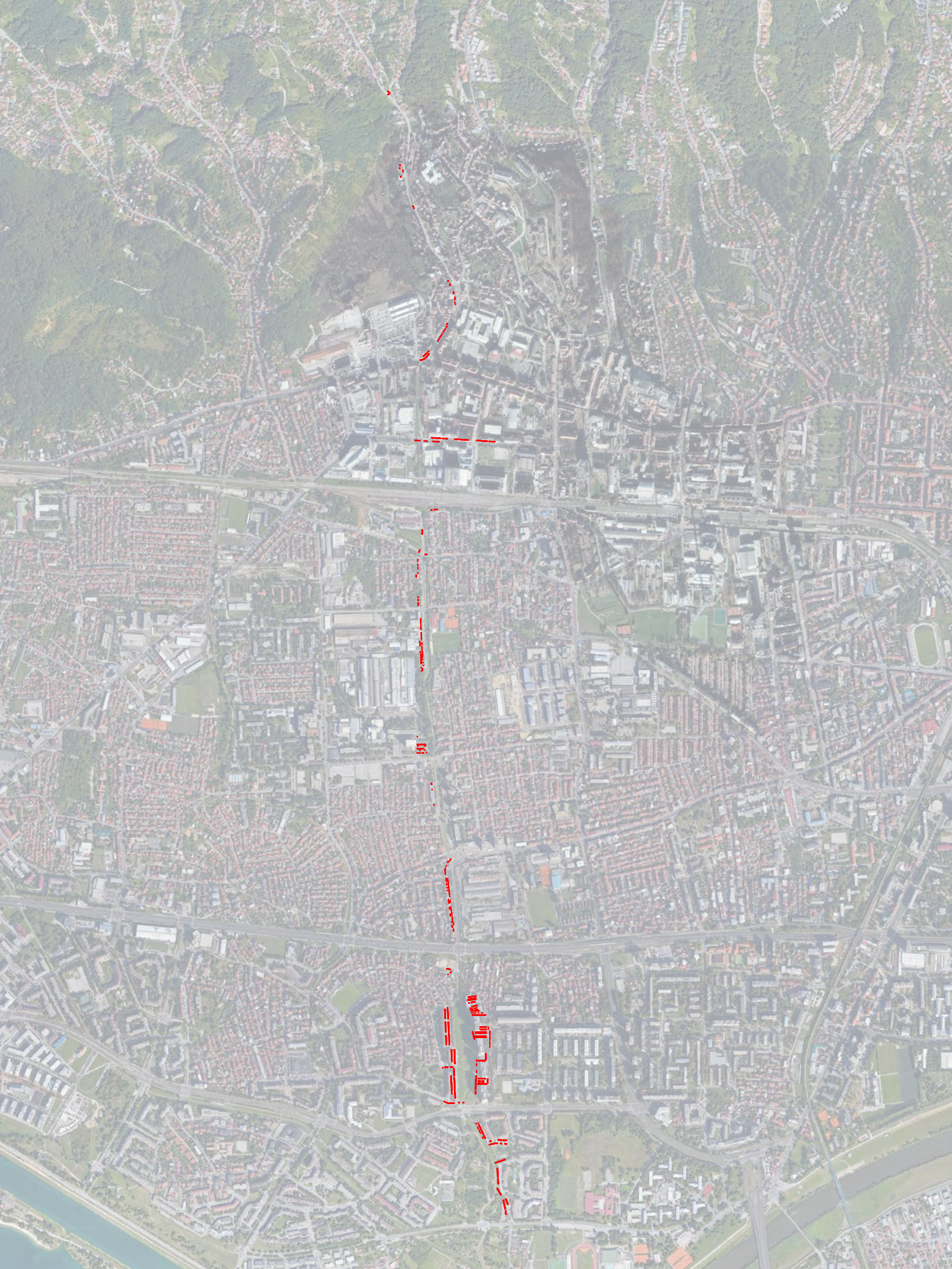
1.1.3 The mobility along Črnomerec

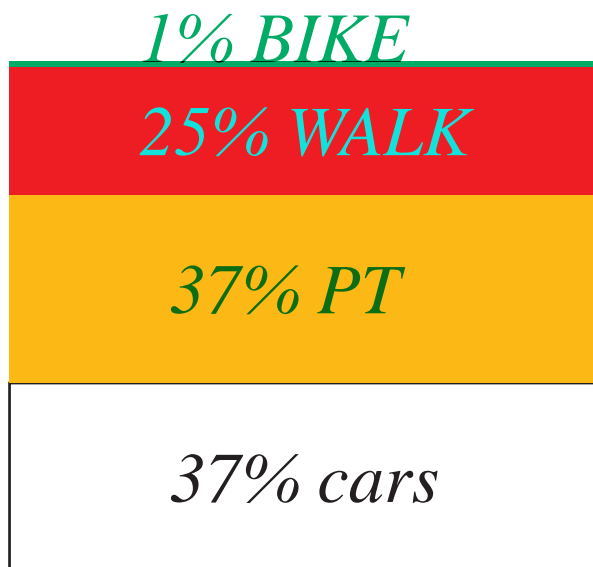
The space of Črnomerec is strategic from the point of view of the traffic for three main reasons:

1) moving cars: the first reason is the battle between the bicycles and the pedestrians on one side and the cars on the other side; in Zagreb we observed the gradual erosion of the public space in order to provide more space for cars. This tendency is against the best European practices on the conception of public space. Along the Črnomerec the priority have to be shifted from the design car oriented towards one oriented to the pedestrians and the bicycle users. The bike paths proposed on the GUP didn't use the Črnomerec, but are located in the crowded roads. This strategy make the cycling harder to implement. The existing modal split shows clearly that the biking needs to be implemented - in 1998 was 1% of all the movement and the only way to implement the share of biking is provide a well designed bike path network.

2) the connection with the public transport: the great potential of the Črnomerec is that it is crossed by three tramways lines and many buses lines. Thanks to this potential the linear park could became a slow mobility connection with the purpose to connect all the est west lines. Nowadays there is any signal systems in order to help the user to understand the proximity of the public transport. The efficiency of the public transport network in Zagreb is high, and tramways are frequent. What is missing is a strong public space design link to the space of the public mobility - the bus and the tram stops.

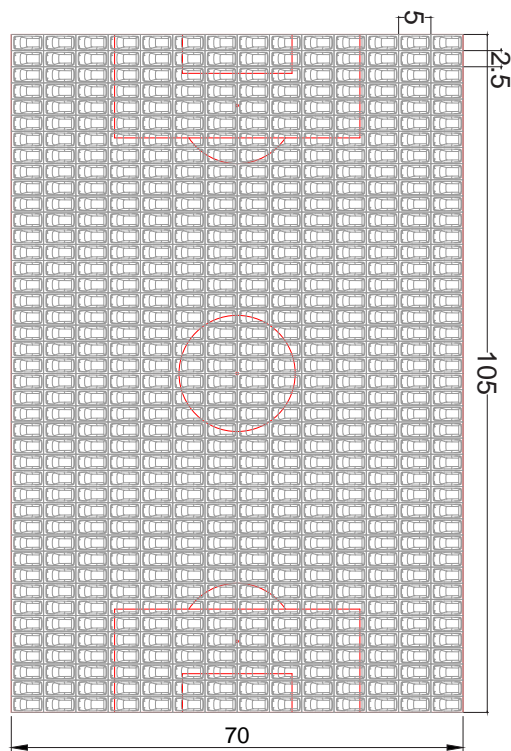
3) parked cars: the third reason is the space dedicated to the parked cars. Along the Črnomerec 1140 cars are parked. It means that 14.250 square meters (1,425 hectares)





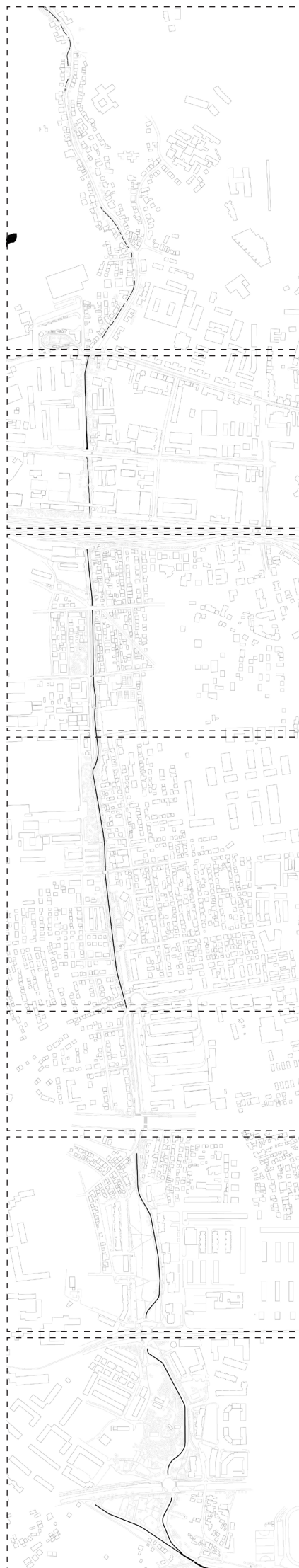
*Above: the modal split in Zagreb
(source: Zagrebplan, 1998)*

are stolen by cars. All this asphalt space poses also problem related to the catchment of the rain water. Impermeability is a problem for the water cycle. There are many technical solutions in order to ameliorate the capacity of a parking to absorb and infiltrate rain water. This enormous quantity of asphalt poses also problems from the point of view of the urban heat island (UHI) during the hot season: the UHI could be mitigated via simple strategies like green roofs, planting trees and green parking lots.



Above: a football field corresponds to the space necessary to park 588 cars: along the Črnomerec there are 1140 cars, which corresponds to 1.425 hectares.

Left: in red all the cars parked along the Črnomerec space. This space could be reconquered by a new public space.



1.2.7 The upstream part / hillside
Črnomerec valley

1.2.6 The corridor between the railway and Ilica

1.2.5 Green corridor (north segment)

1.2.4 Green corridor (south segment)

1.2.3 Culvert creek: along the tram deposit or the new
Ljubljanska trg

1.2.2 The central Park

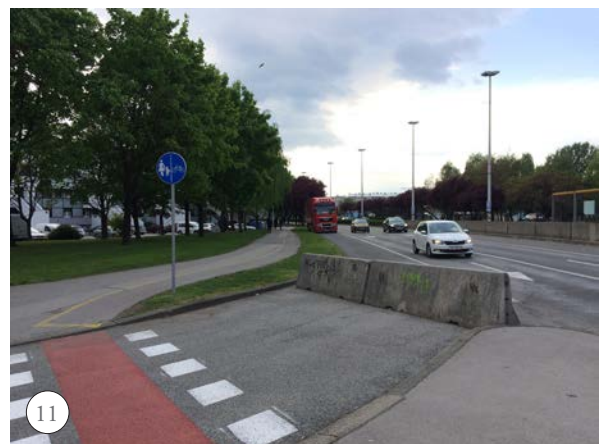
1.2.1 The connection with Sava river and
Potok Vrapčak - ecological park

1.2 The different parts of the creek Črnomerec

The “new” ecological connection has been divided into 7 parts. Dividing it into parts allows an appropriate design for each segment, maintaining a unitary image.

Starting from south to north we find:

- The connection with Sava river and Potok Vrapčak - ecological park; this area is rich in green surfaces and vegetable gardens.
- The central park; a large green area, with very poor vegetation but with a great spatial potential to become an attractive park.
- Culvert creek: along the tram deposit or the new Ljubljanska trg; this space must assume the role of connection between the south part - wider Črnomerec - and the most compressed part to the north. The new Ljubljanska trg holds together the small market, the Ljubljana tram terminus with the northern and the southern part of Črnomerec, crossing the busy Zagrebačka avenija.
- the green corridor towards the railway; it has a limited width, but can be re-designed to allow the coexistence of pedestrian and bike flows.
- From the railway to Ilica the linear park becomes an opportunity to create a new space for aggregation, in a context strongly characterized by a suburban aesthetic.
- the Črnomerec valley - the north part of Ilica - needs to enhance the stream, giving it back its role of structuring urban element.





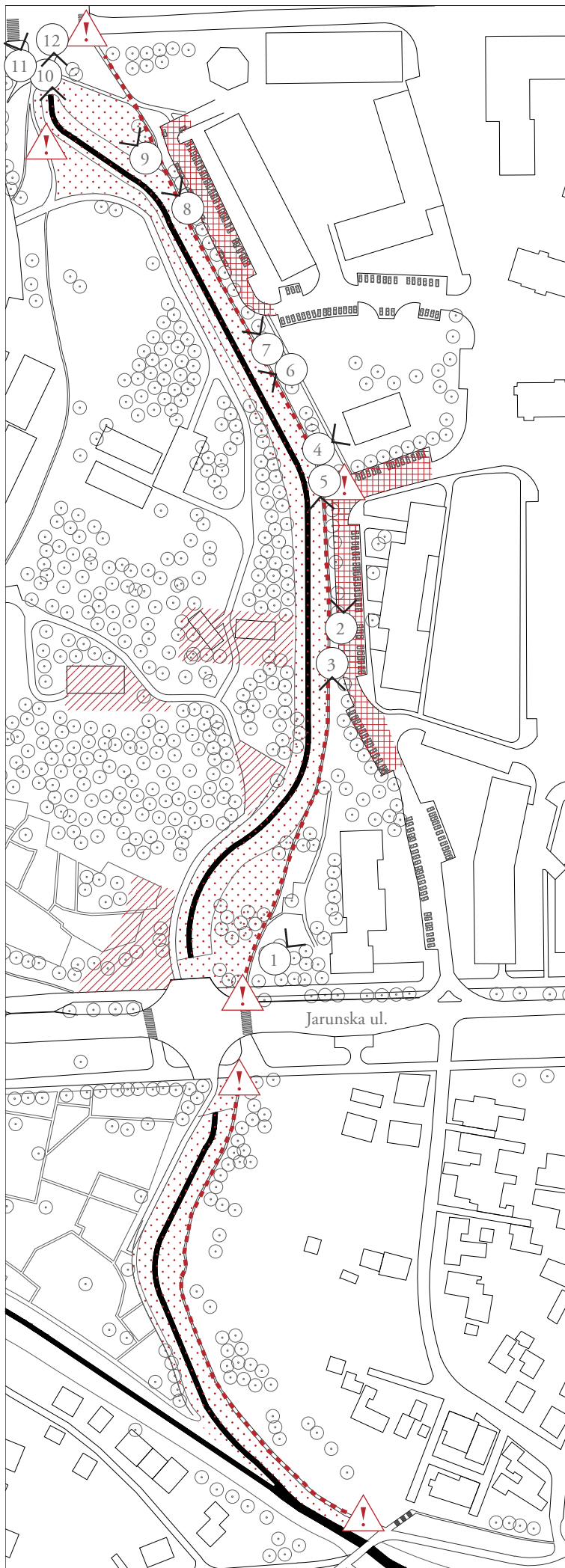
1.2.1 The connection with Sava river and Potok Vrapčak - ecological park

The part which connect the Sava river park with Jarunska ulica has a great ecological value, thanks to the rich vegetation and the big green surfaces. The major problem is the lack of the signage able to provide identity to the Črnomerec park. The existing path is an informal dirt road; it has not the right material surface in order to guarantee the comfort for bikes and people with reduced mobility. In the part between Jarunska ulica and Horvaćanska cesta there are big asphalted surfaces dedicated to parking; those areas divide the Črnomerec park from the housing.

The connection with the nearby housing is very poor conceived: the existing parking areas in asphalt are extended.

On Jarunska ulica and on Horvaćanska cesta (picture 11 and 12) there are the junctions which show that there was the project to transform the Črnomerec in a road. This residual space needs to be redesign in order to make the road crossing safer and the interruption of the park softer.





Critical issues

--- Paths materials not appropriate

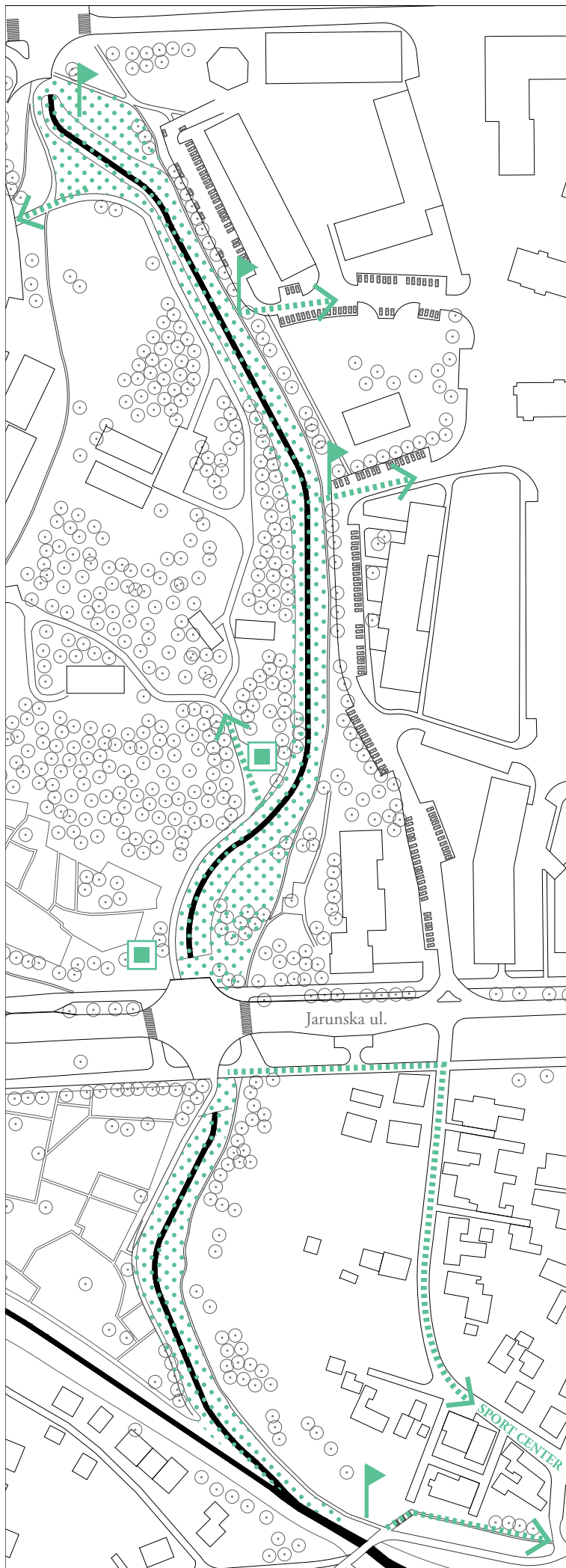
! Lack of signage / indications

• Lack of biodiversity


Abandoned or misused area

Asphalt surfaces






Potentialities / Actions

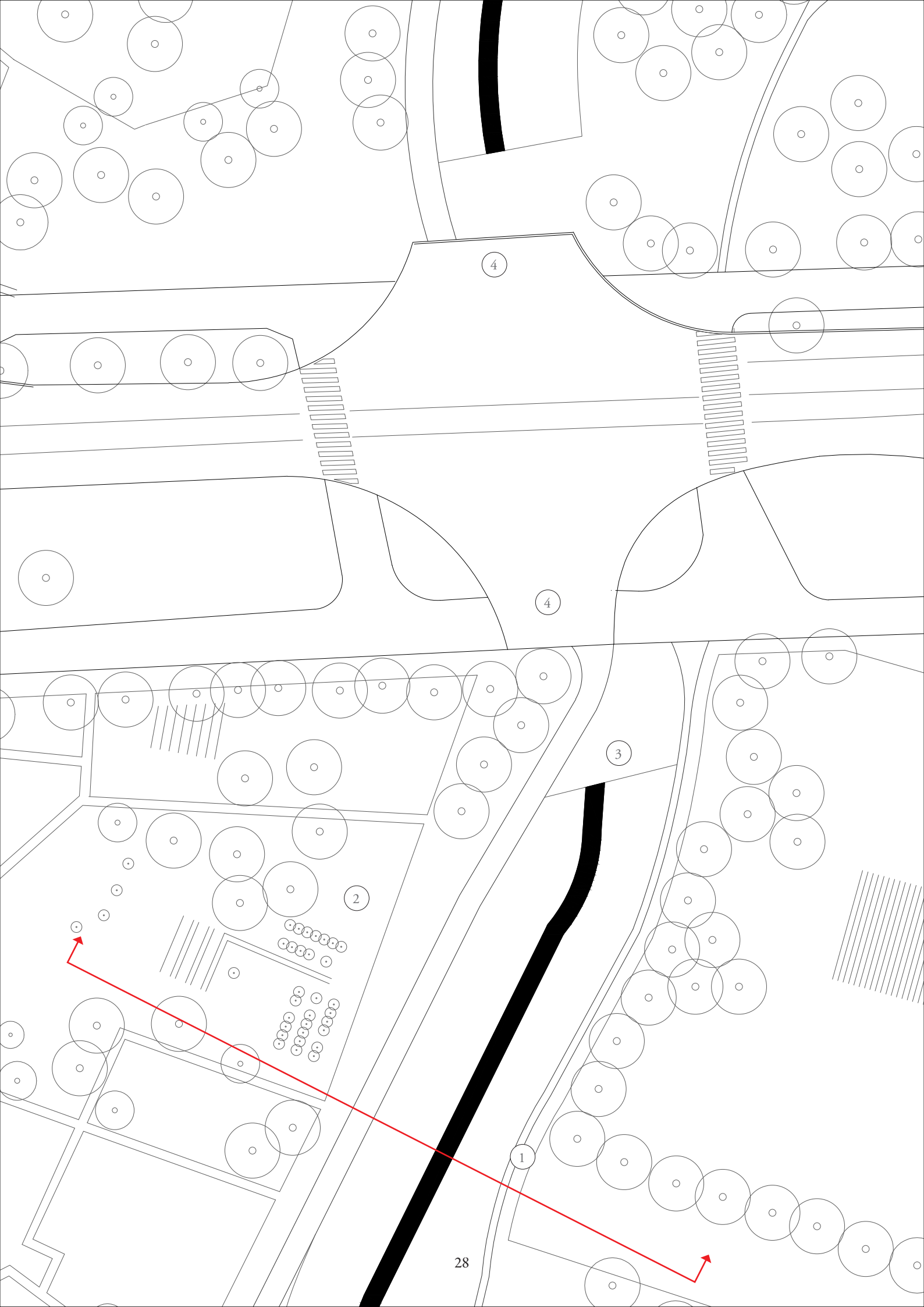
 Connection with the urban context

 New activities

 Planting riverbanks

 Signage

 0 25 50 100 m



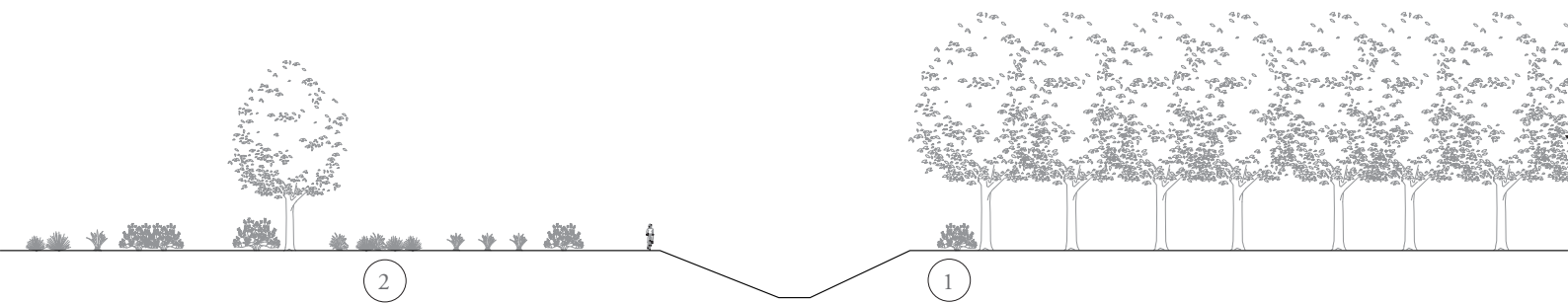
4

4

3

2

1



- ① *unpaved existing path*
- ② *vegetable gardens*
- ③ *the culvert part of the creek is degraded*
- ④ *extended asphalt surfaces*





1.2.2 The central Park

The stream space north to Horvaćanska cesta is very broad. The width of this central park is obviously due to the housing project around it. The 30 stories height buildings around the park pose a shadow problem, but they offer also a very urban landscape. The quality of this park is very poor due to the fact that this park has never been designed: the vegetation is scarce and the paths are or very informal or undersized. There is no division between bicycles and pedestrian and the stream becomes a dividing element instead of an element that manages to guide the design of the park. Observing the buildings in the East side, it is clear that the park plays the role of the backyards. The small shops and the entrance of the towers are on the other side: from this point of view there is a lack of relation between the towers and the central park.

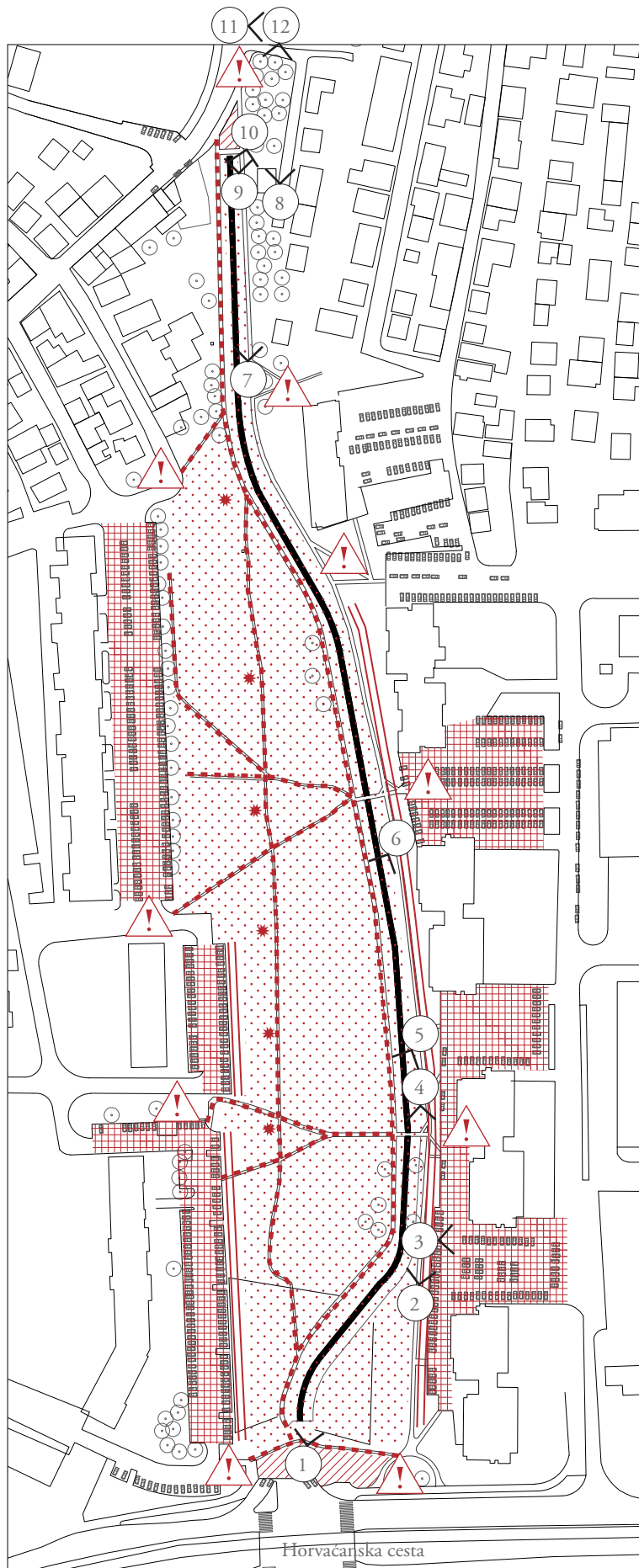


The West side buildings are lower and are stronger linked to the park, having the entrances toward the park. In both cases the asphalt surfaces for parking divide the buildings from the park. The elevated wells in the middle of the park give a feeling of unplanned and unlivable space.



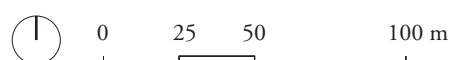
The green corridor toward the Zagrebačka avenija is much narrower compared to the central park, but has a great potential to become a very efficient highway for bikers and pedestrians (each means could occupy one bank of the stream).

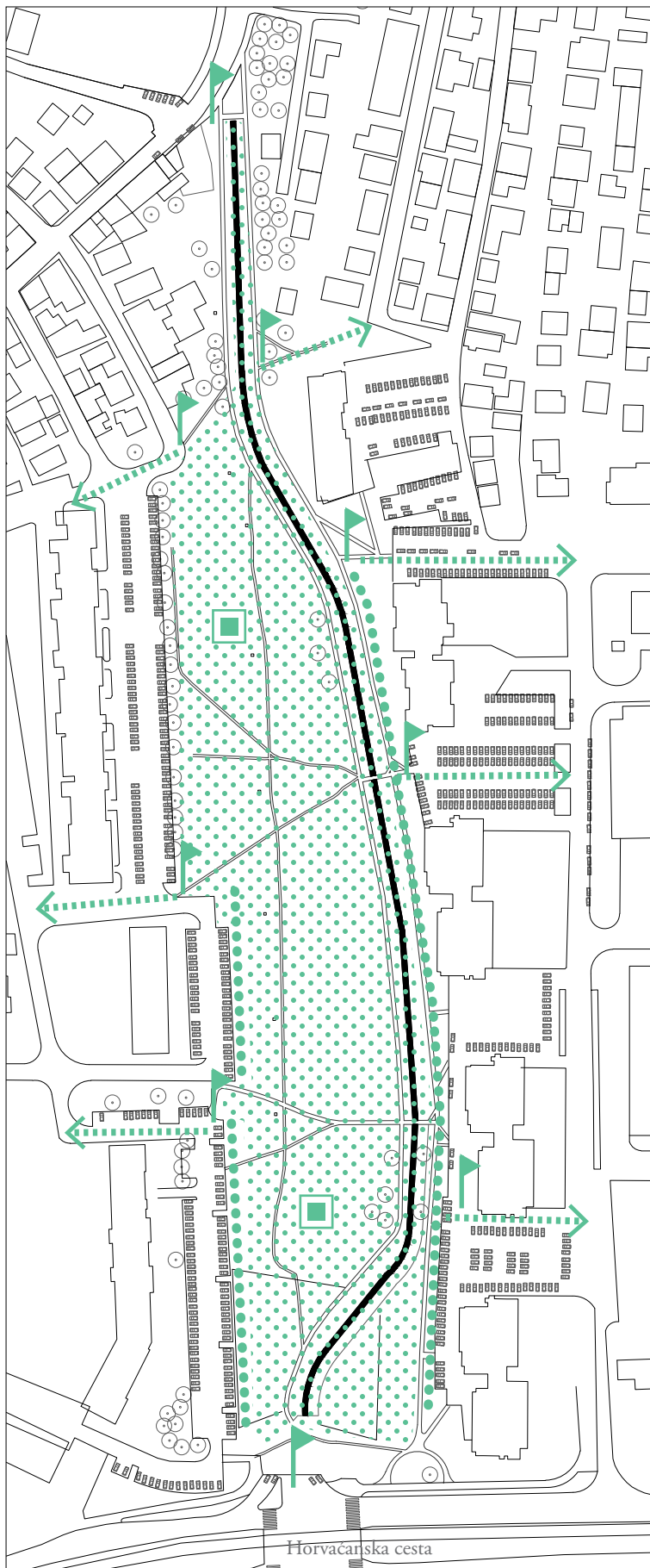





Critical issues

- Paths materials not appropriate
- ! (triangle) Lack of signage / indications
- Lack of biodiversity
- // Abandoned or misused area
- [grid] Asphalt surfaces
- Lack of green filter
- ✱ Object not appropriate





Potentialities / Actions

 Connection with the urban context

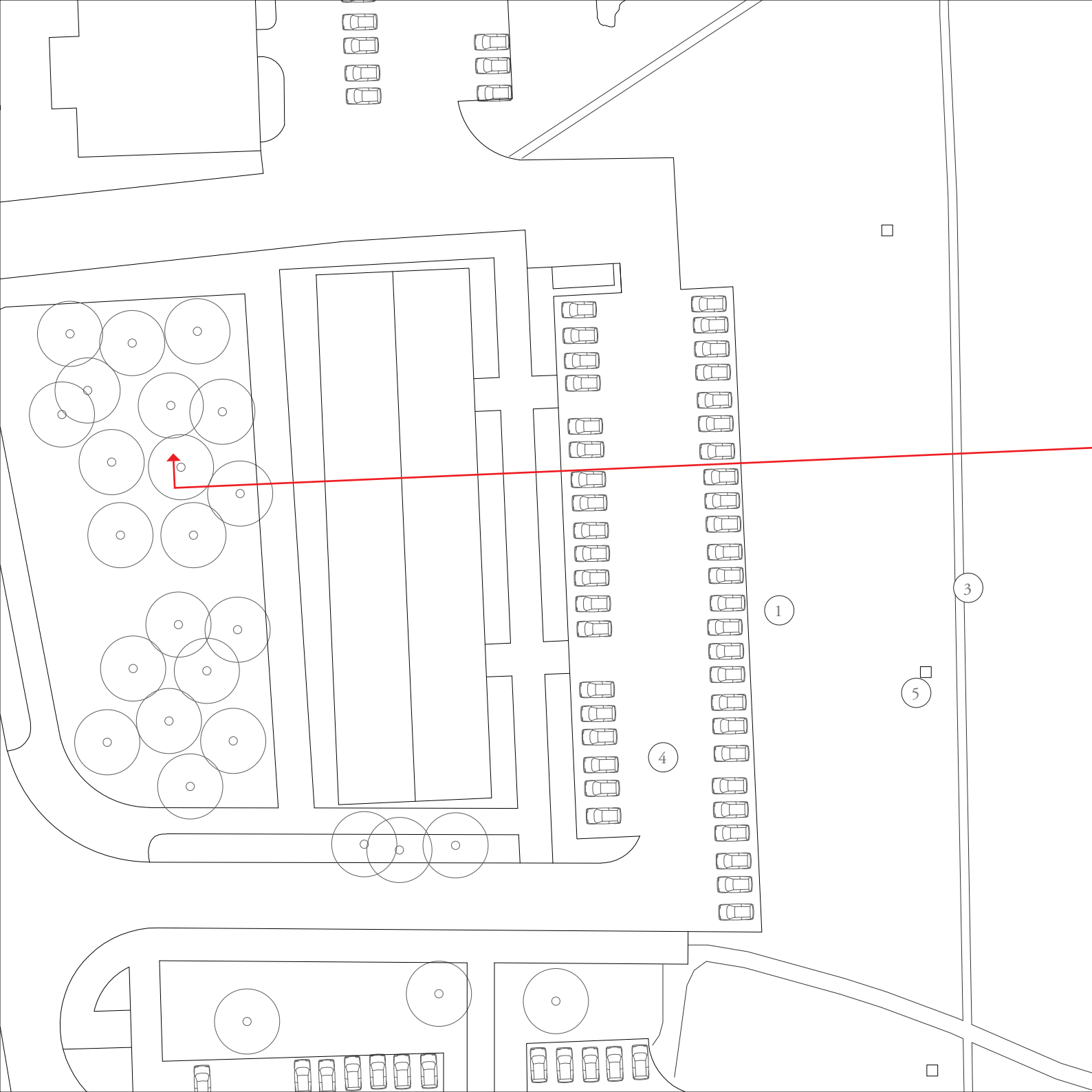
 Green filter

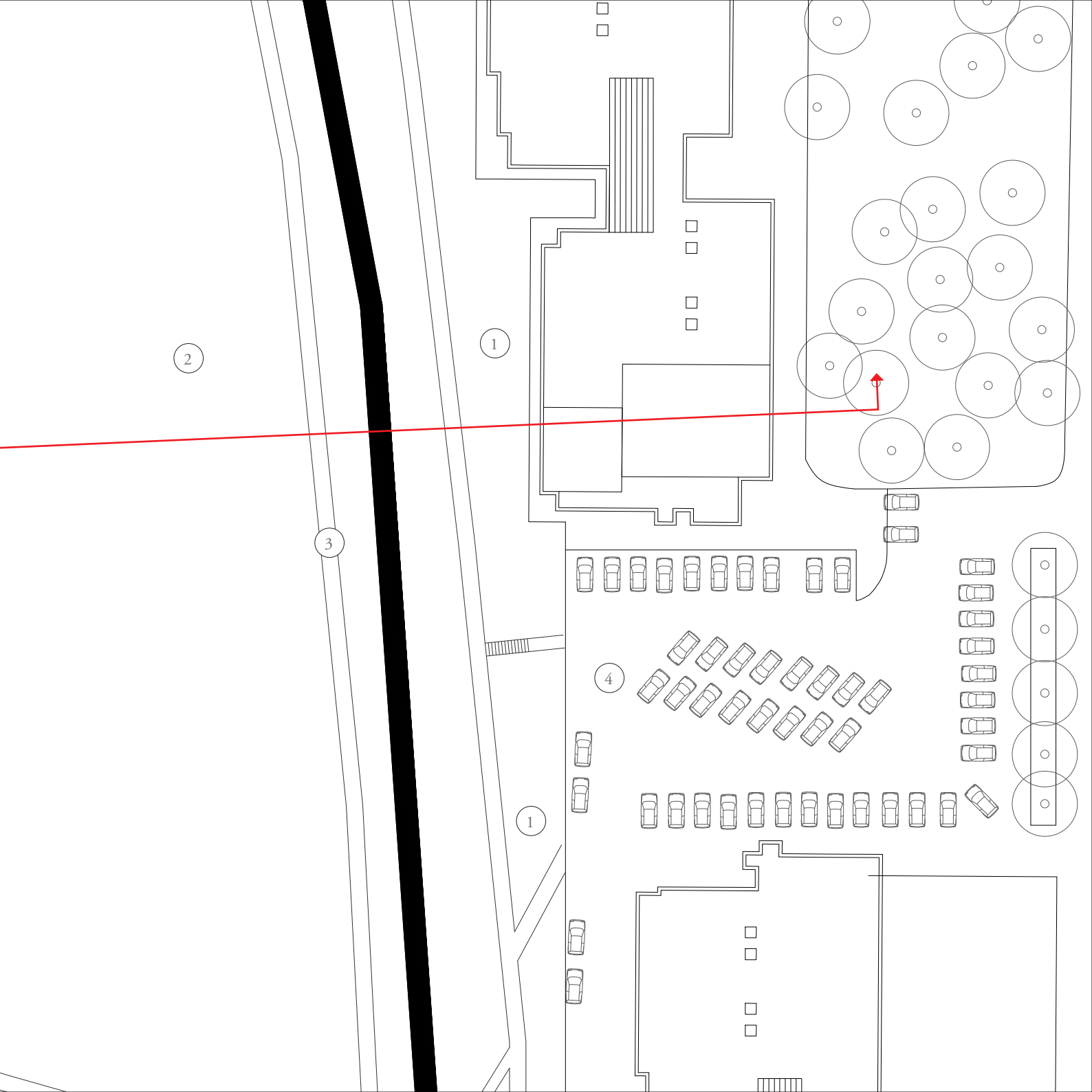
 New activities

 New planting

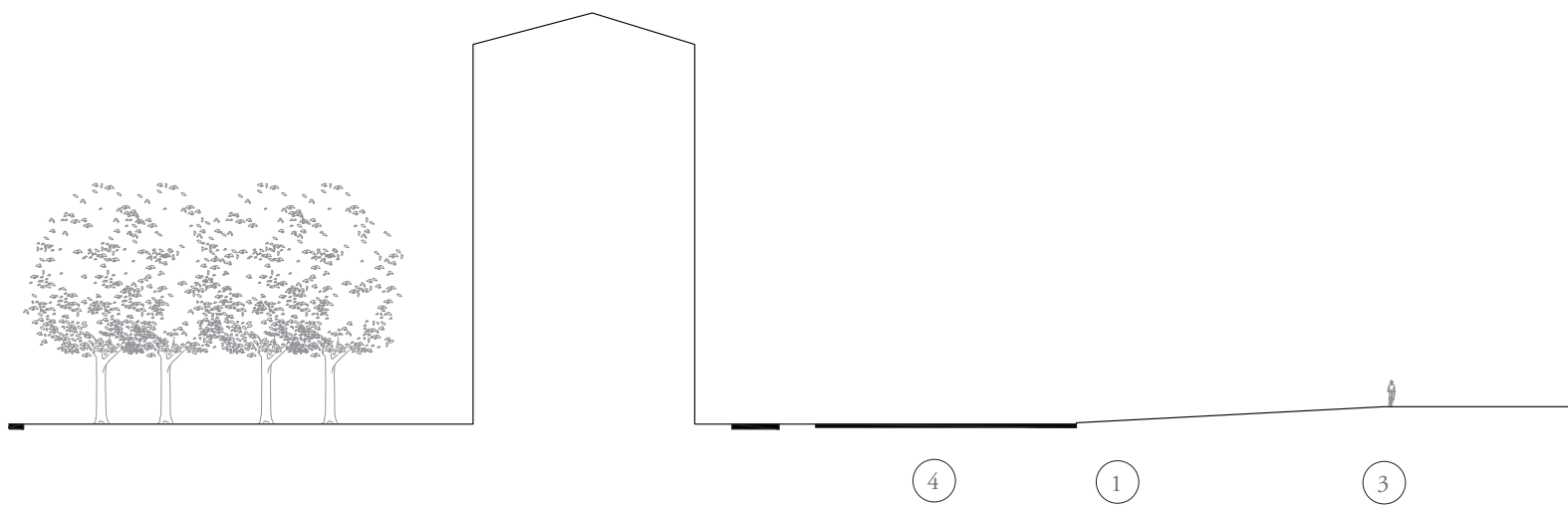
 Signage

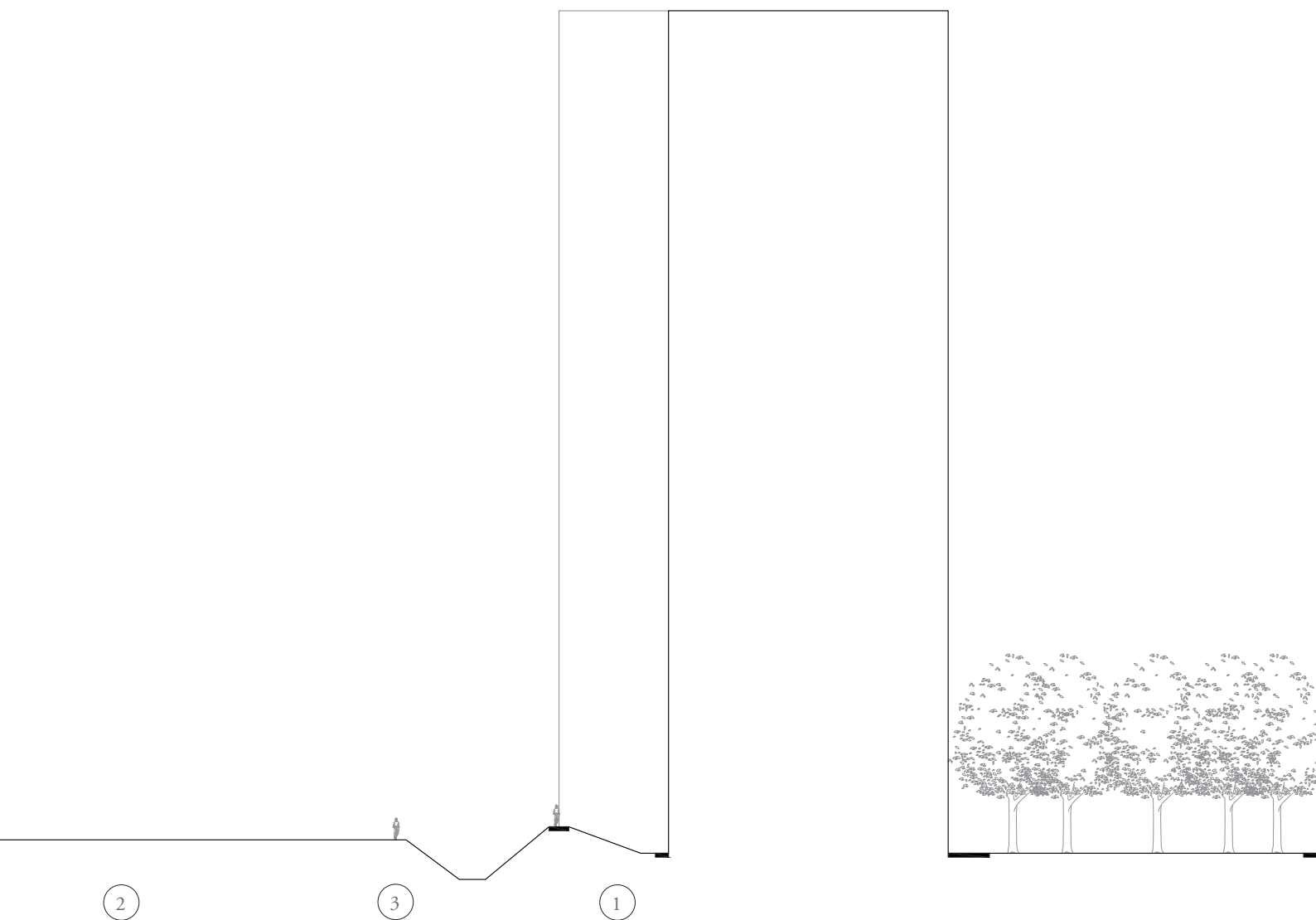






- ① *lack of green filter*
- ② *poor vegetation*
- ③ *unpaved existing path*
- ④ *extended asphalt surfaces*
- ⑤ *object not appropriate*





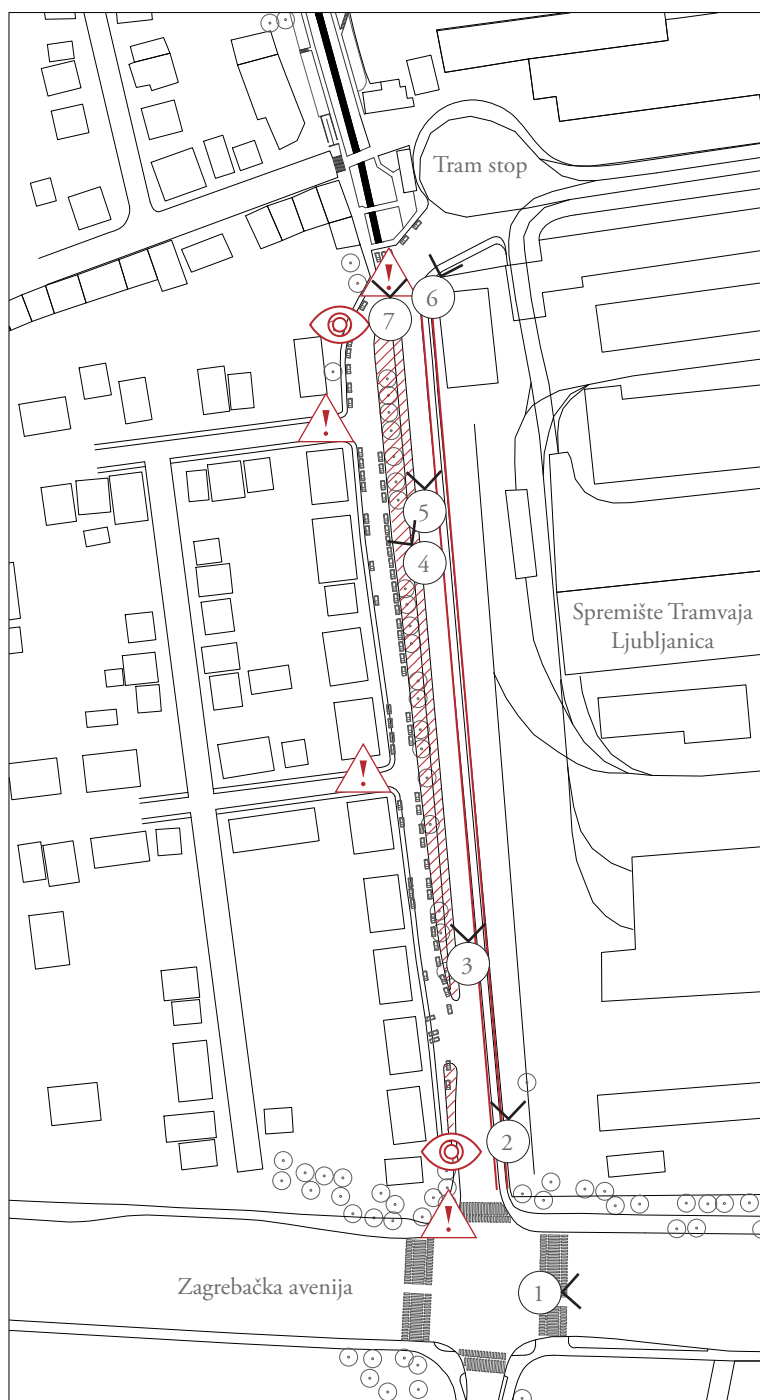
- ① *lack of green filter*
- ② *poor vegetation*
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- ④ *extended asphalt surfaces*
- ⑤ *object not appropriate*









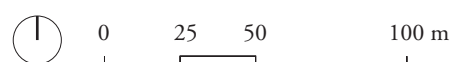
1.2.3 Culvert creek: along the tram deposit

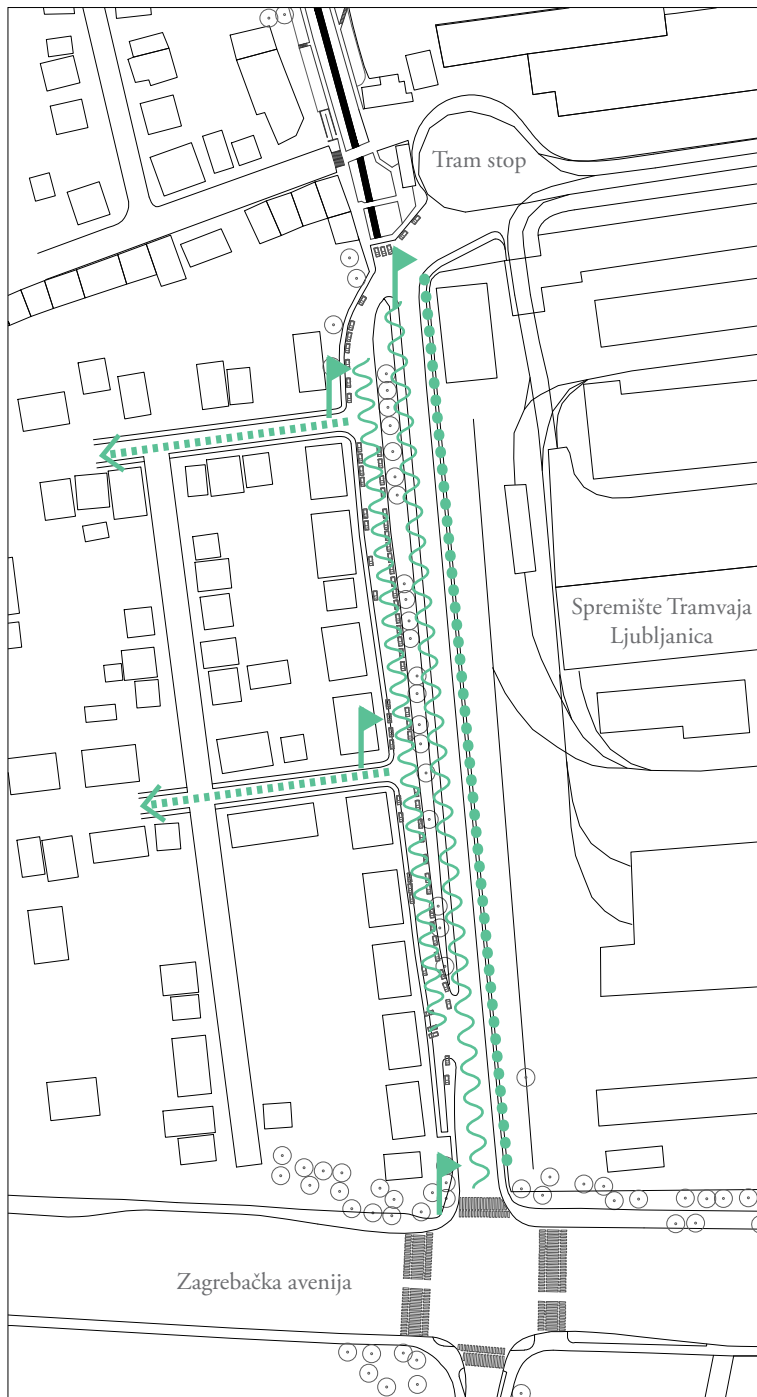
The part between Zagrebačka avenija and Ozaljska ulica is defined by the absence of the stream - culvert in this portion - and by the presence, on the East side, of the tramway deposit. The West side is characterized by two/three stories buildings, all of them have a two meters width garden stripe dividing them from the road. The road section is 25 meter wide: from West to East the organization of the space starts with a simple, two meter tall, fence of the Spremište Tramvaja Ljubljana. The transparency of this fence allow the pedestrian to see the operations and the reparations on the tramways. Along this fence there is a simple sidewalk - approximately two meter wide - with all the pylons that hold up the tram power cables. Then there is a road, six meters wide, dedicated to buses and taxi (the taxi stop is at the north bound of this road). On the west side there is a lower road characterized by single houses. North to this road there is the Ljubljana tram terminus, with many shops and a market.




Critical issues


-  *Lack of green filter*
-  *Lack of signage / indications*
-  *Degradated area*
-  *No perception of the creek*





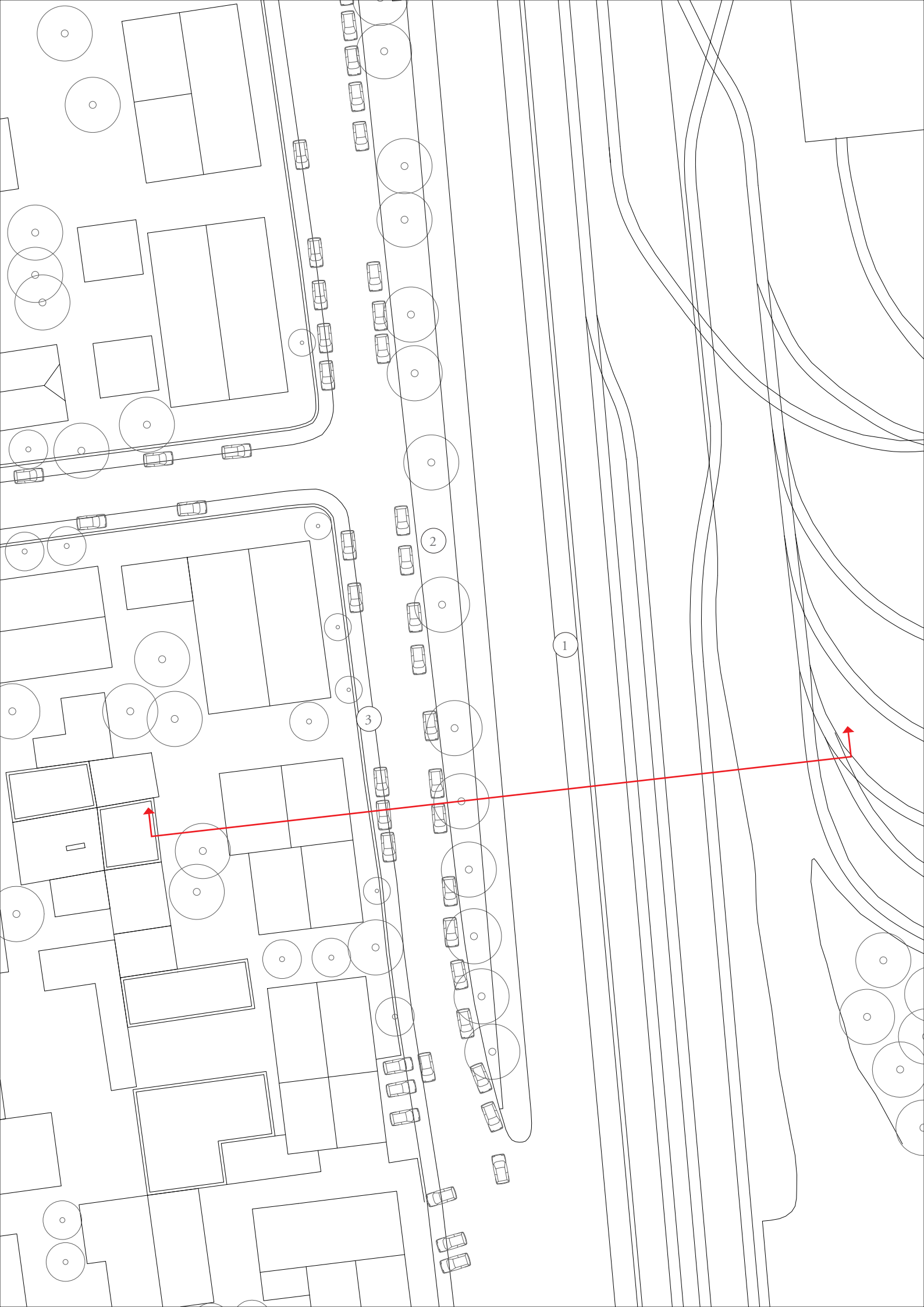
Potentialities / Actions

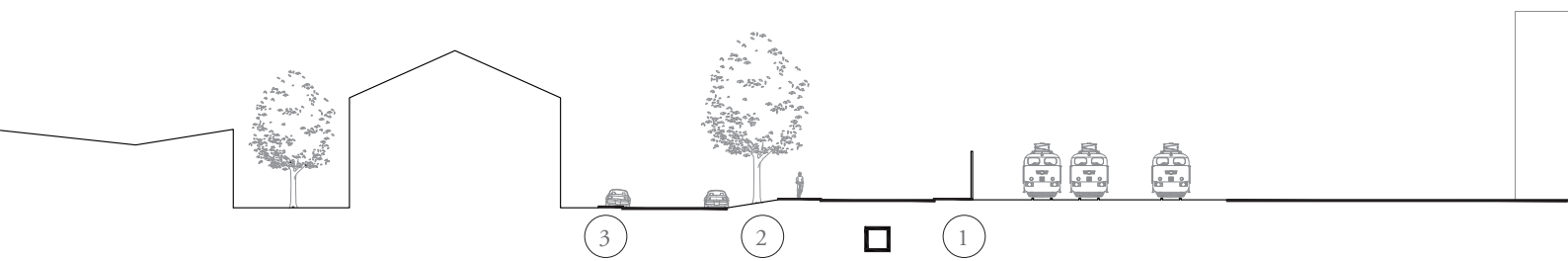
 *Connection with the urban context*

 *Improving pedestrian connection*

 *Green filter*

 *Signage*





- ① *lack of green filter*
- ② *poor vegetation*
- ③ *car parking on the sidewalks*



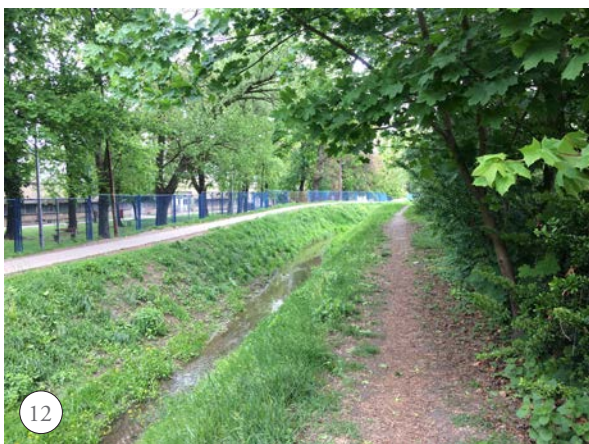


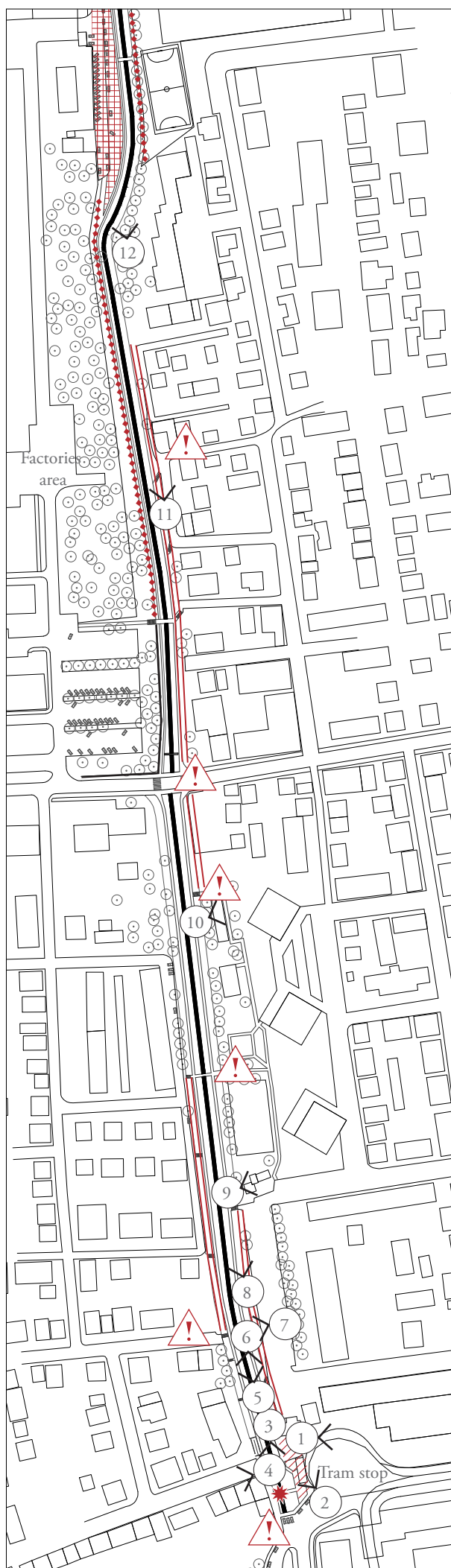
1.2.4 Green corridor (south segment)

From the Ljubljana tram terminus, for 1,3 kilometers, the stream is a narrow corridor with the banks partially walkable.

The south part of the corridor is more urban and the main type of land use facing that part is housing, single and collective, with some shops. Wide surfaces along this part are dedicated to parking made by asphalt.

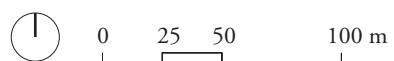
Many small roads are facing the stream and the fact they are death end allows to rethink them as a shared space, where all the speeds limit needs to be 30 km/h.

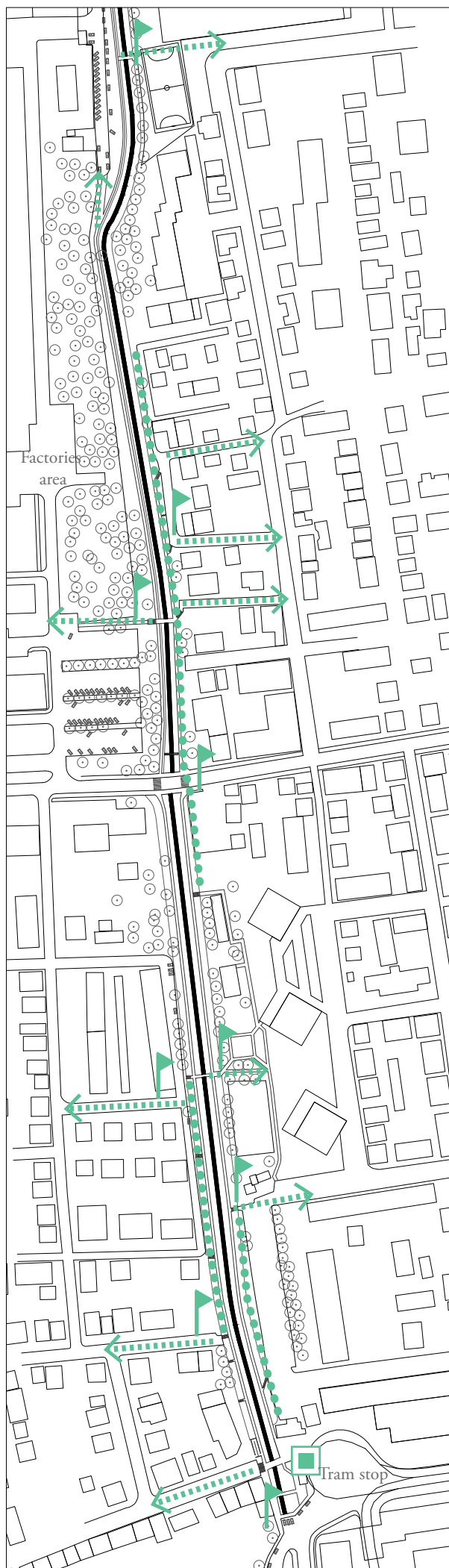





Critical issues


- ◆◆◆◆ Fence along the bank
- ⚠ Lack of signage / indications
- ▨ Abandoned or misused area
- ▦ Asphalt surfaces
- ══ Lack of green filter
- ✱ Object not appropriate





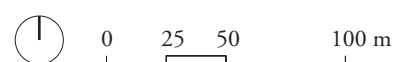
Potentialities / Actions

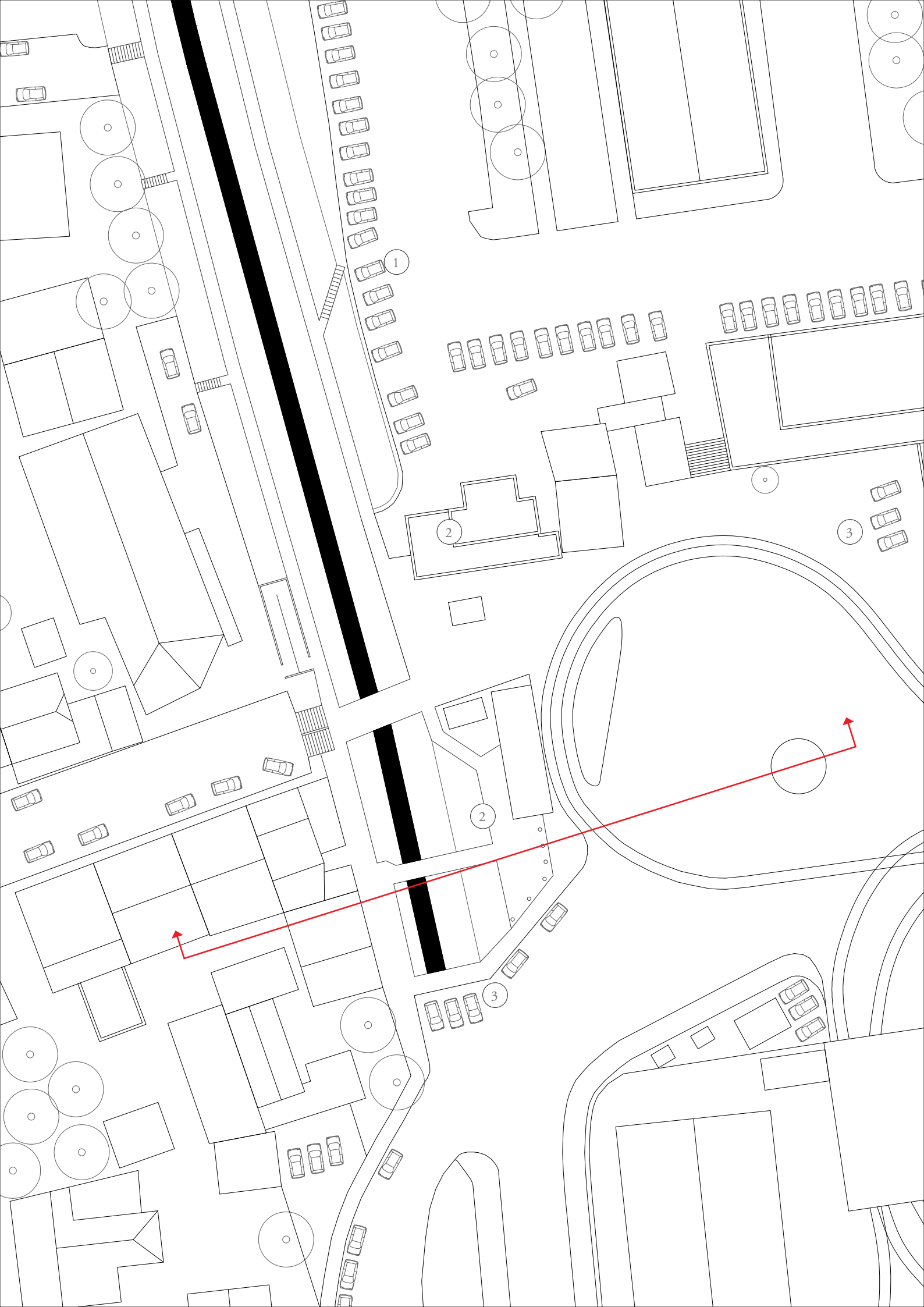
 Connection with the urban context

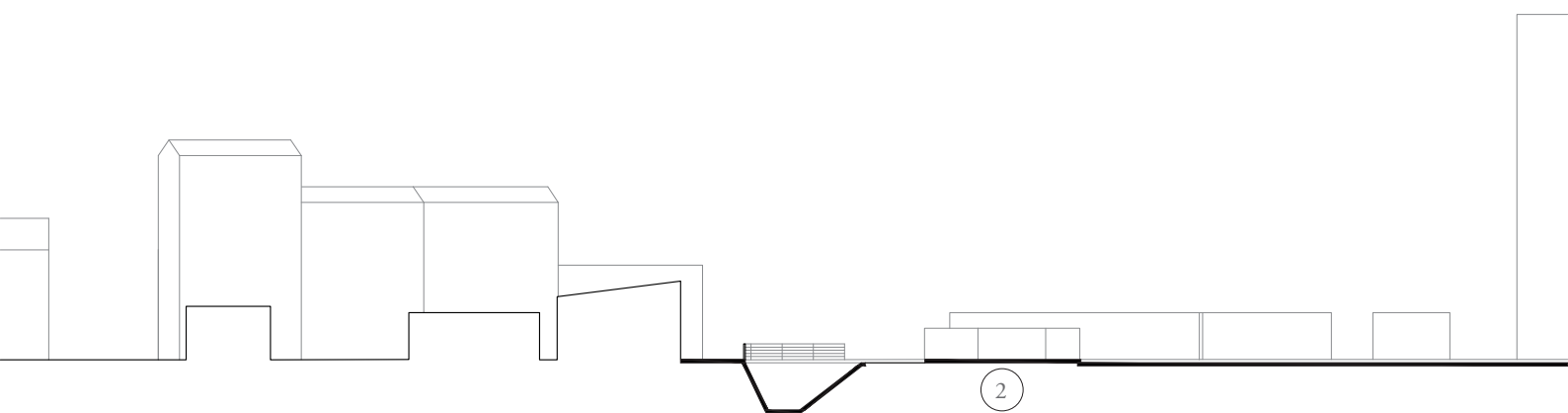
 Improving pedestrian connections

 Green filter

 Signage







- ① *extended asphalt surface*
- ② *misused area*
- ③ *car parking on the sidewalks*

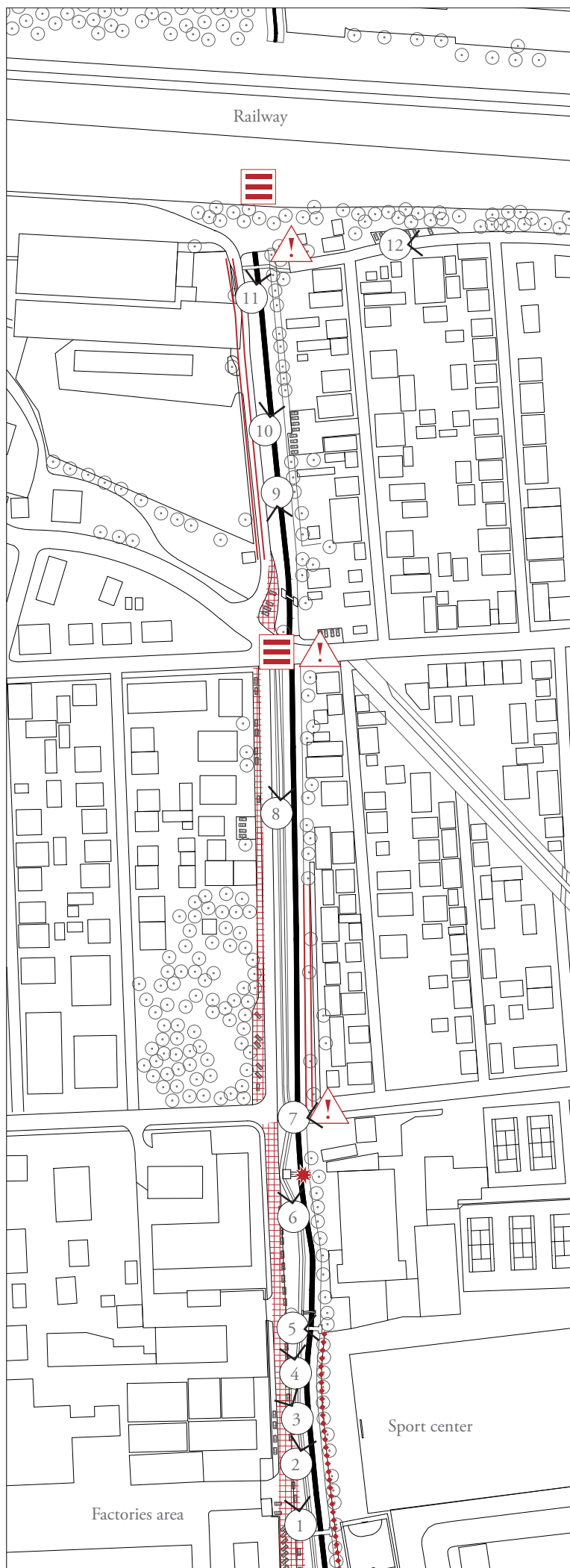




1.2.5 Green corridor (north segment)

KONČAR occupies a relevant segment of the along the stream, on the west side; the factory has an important need of parking which could not only find an answer along the Črnomerec. KONČAR could benefit from the presence of the new Črnomerec linear park. In front of the factory there is the Sports centre Concordia. The north south path is interrupted by two roads; the crossing of those roads needs to be ameliorated. From Zagorska ulica there is a former rail line which need to be taken in account and enhanced as a secondary connection.

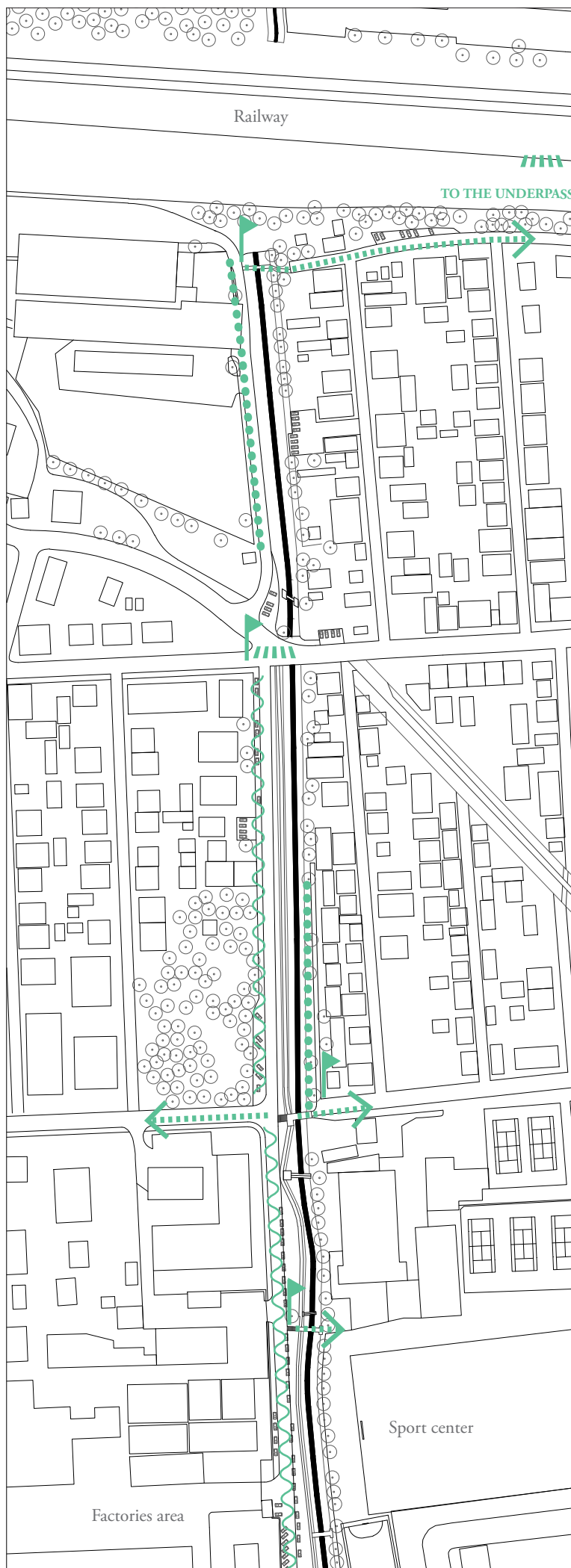





Critical issues


- Fence along the bank
- ! Lack of signage / indications
- Abandoned or misused area
- Asphalt surfaces
- Lack of green filter
- Object not appropriate
- No pedestrian crossing






Potentialities / Actions

 Connection with the urban context

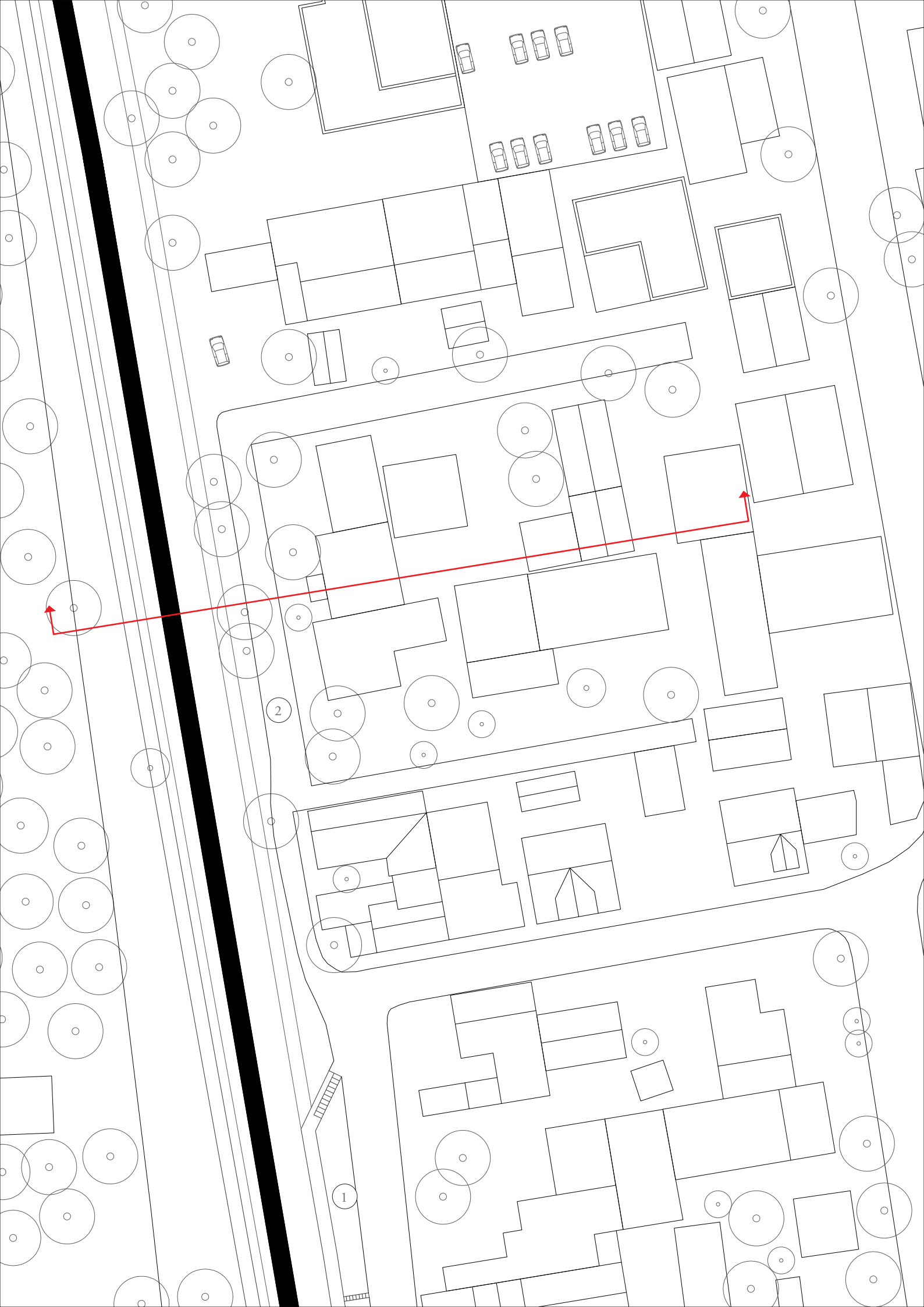
 Improving pedestrian connections

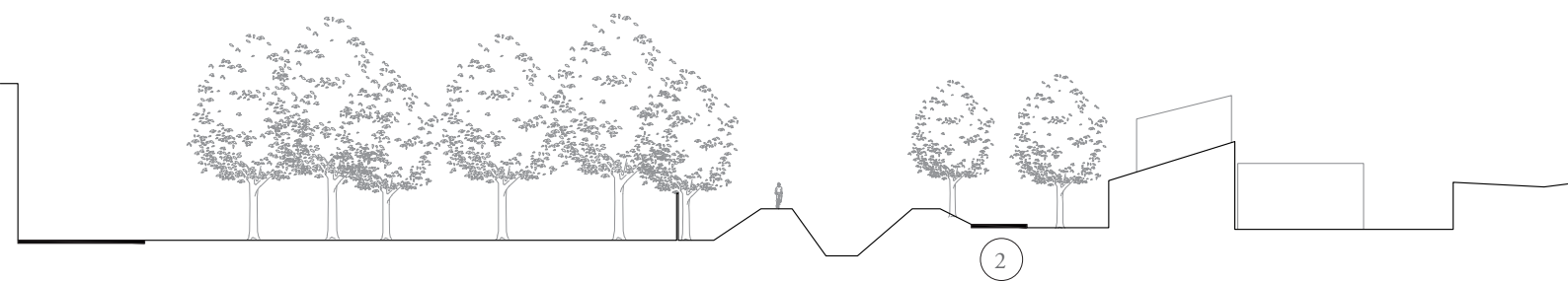
 Green filter

 Signage

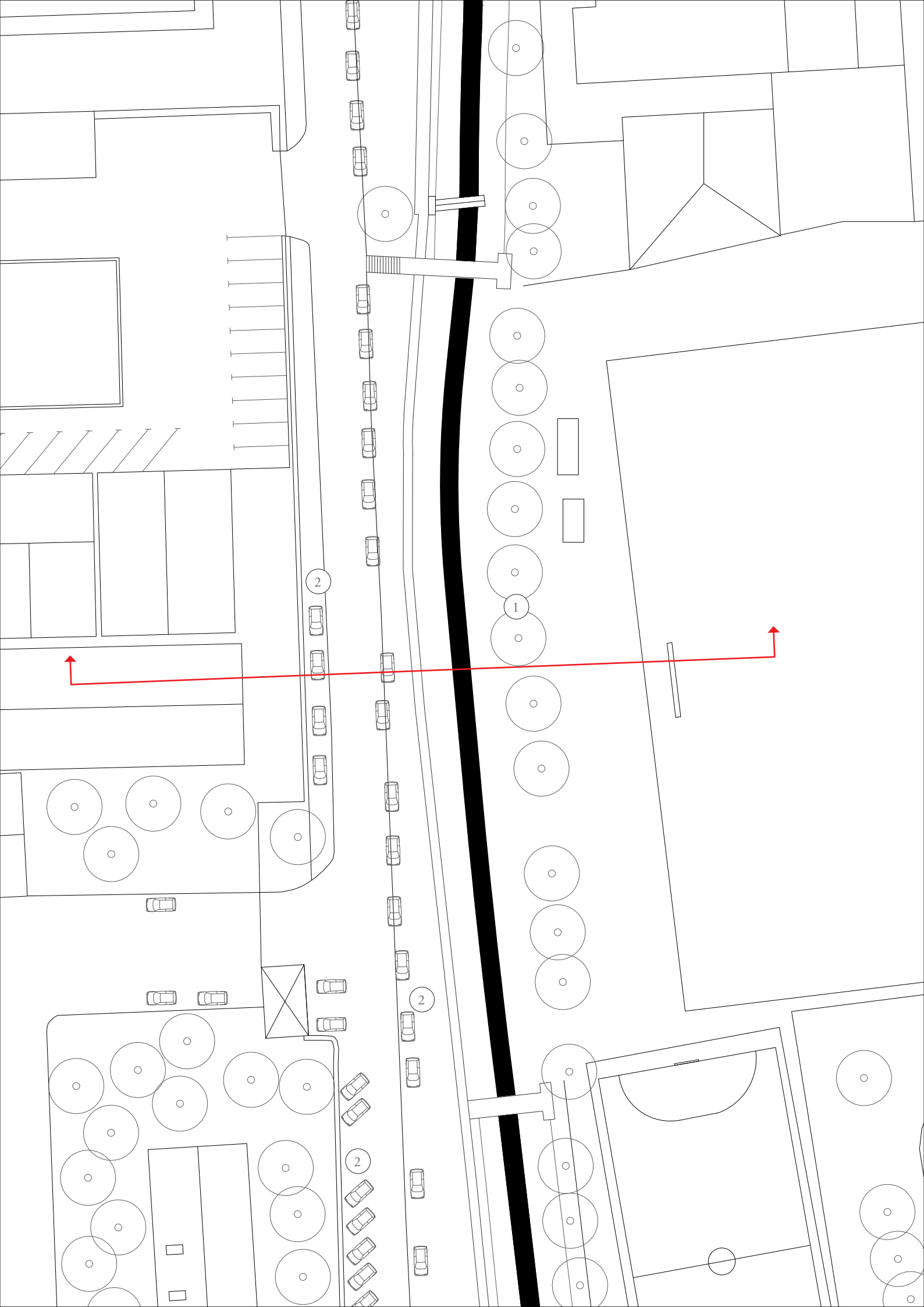
 Improving pedestrian crossing

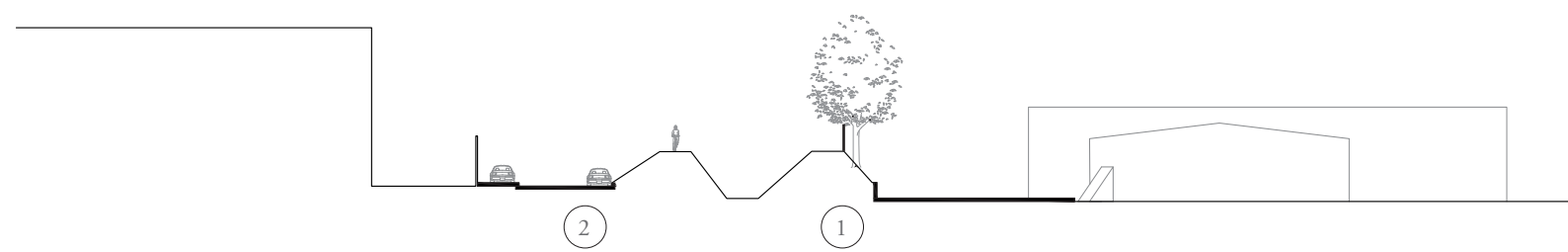






- ① *lack of green filter*
- ② *car parking on the sidewalks*





- ① *fence towards sport center*
- ② *car parking on the sidewalks*





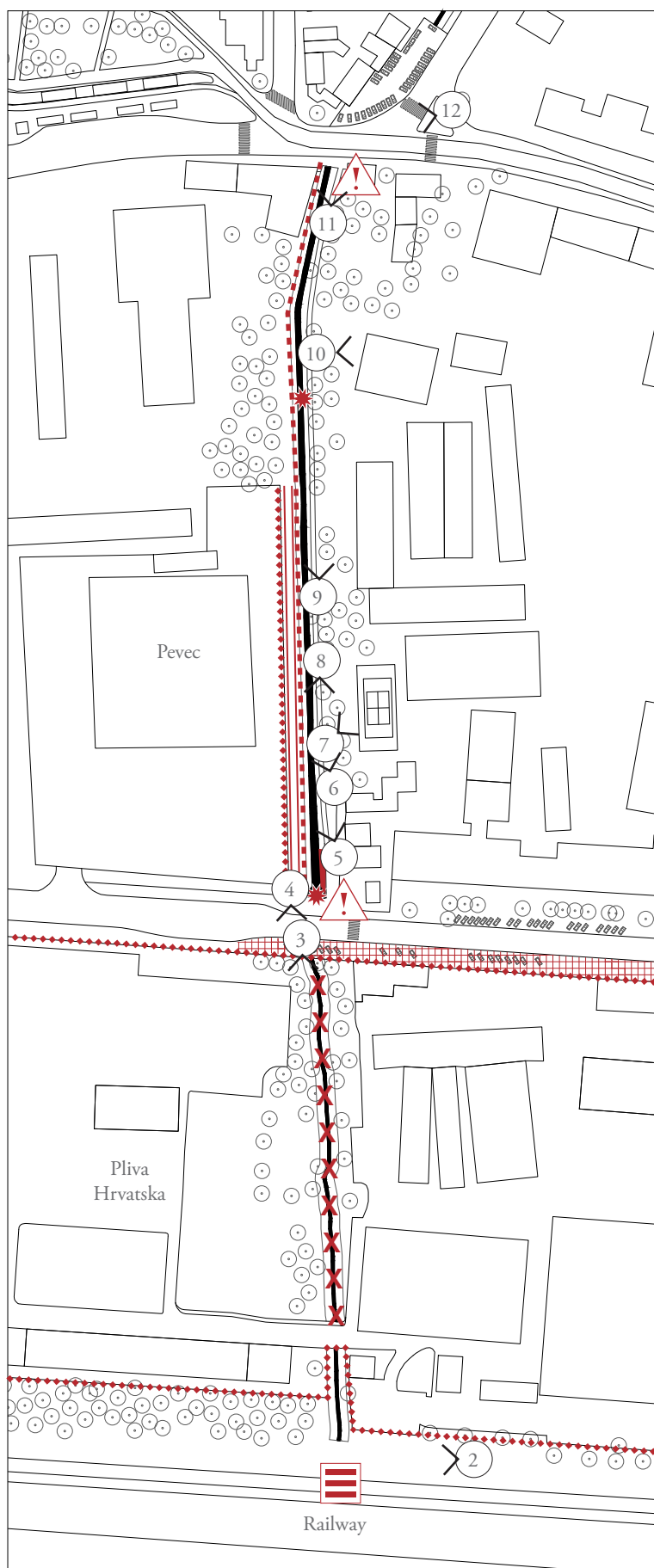
1.2.6 The corridor between the railway and Ilica

In order to crossing the railway, the Ivanečka ulica could play the role of the connection using the existing underground passage.

North to the railway, the first part of the stream is inside the area of the pharmaceutical company (Fidelta). For this reason Gradišćanska ulica needs to be used to reach the point where the stream is public again, and it needs to be rethought in this direction. The Črnomerec, in front of the Pevec, has a lot of episodes of abandonments: all those spaces could contribute to create a park and the bike highway.

The connection with Ilica is now very narrow, but there are areas that could be used to enlarge the contact space between Ilica and the Črnomerec new linear park.





Critical issues

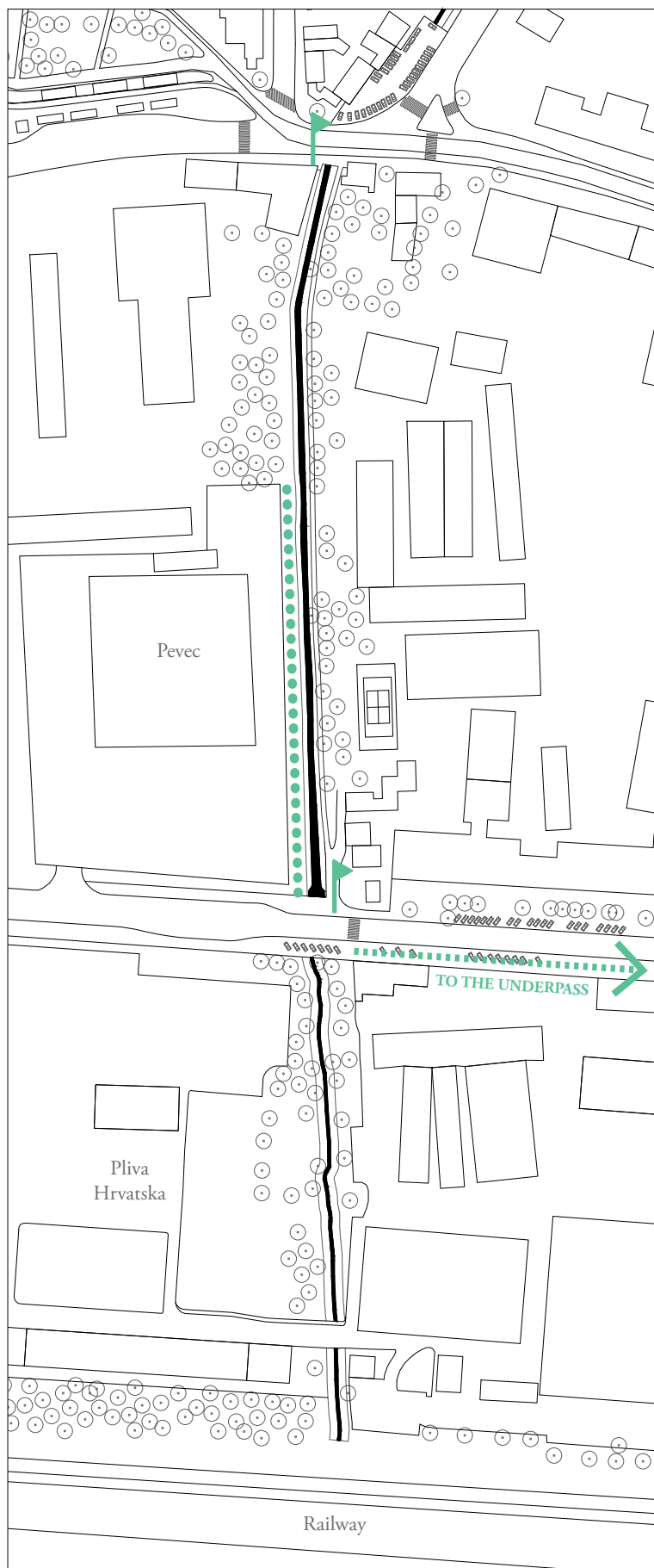
- Fence along the bank
- ! Lack of signage / indications
- Abandoned or misused area
- Lack of green filter
- * Object not appropriate
- ≡ No pedestrian crossing
- X No accessibility
- Concrete banks

2

1



0 25 50 100 m

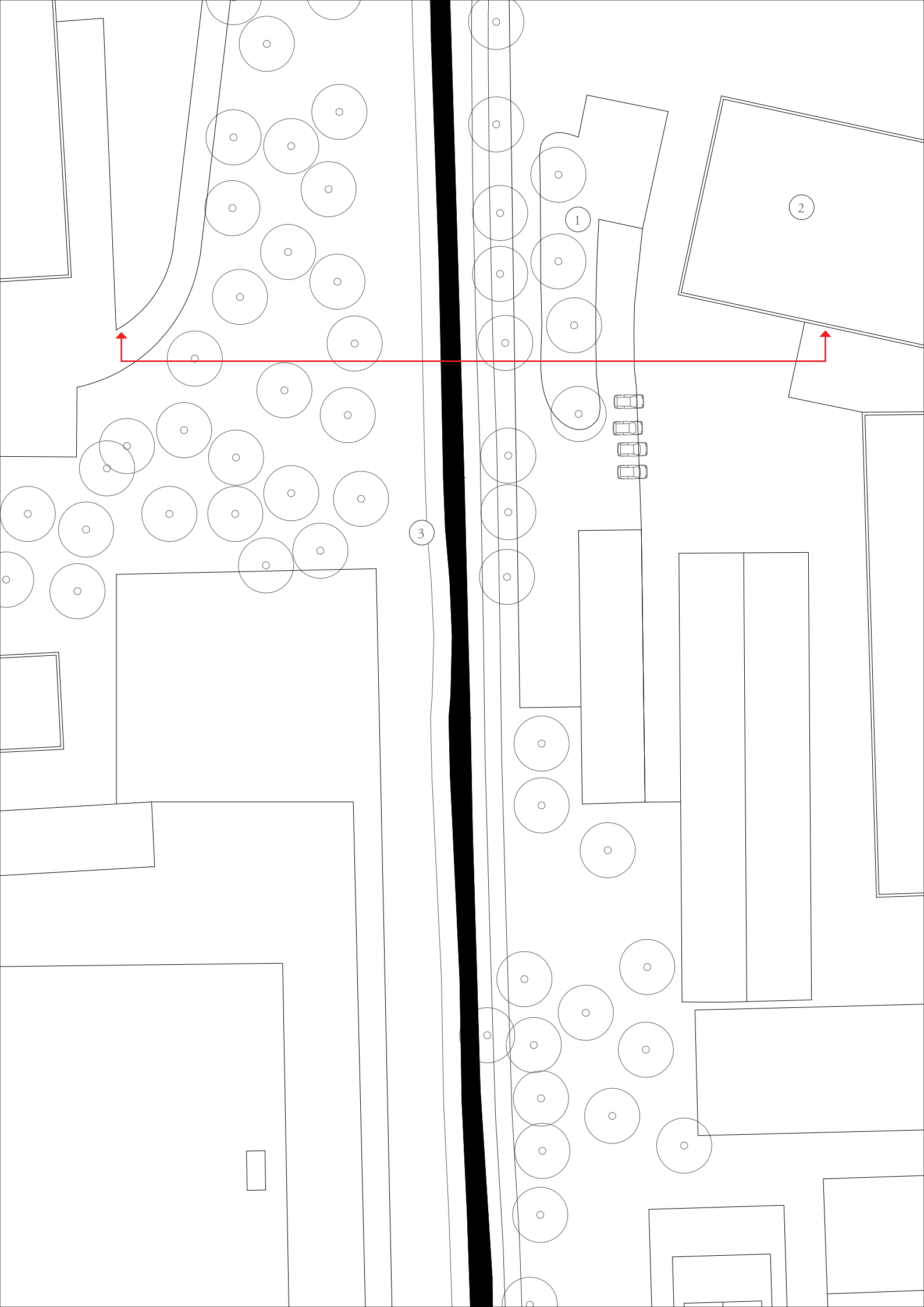


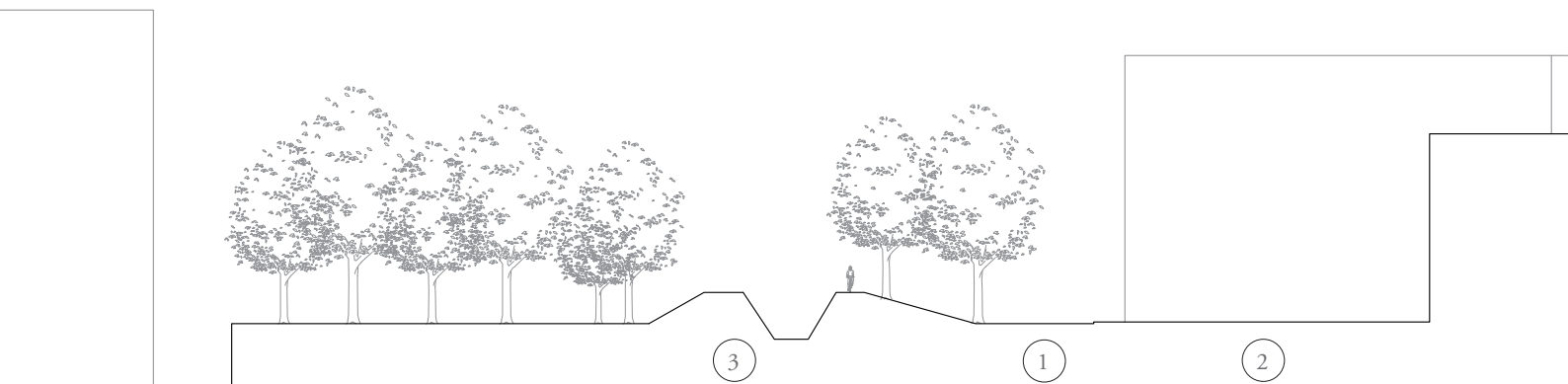
Potentialities /Actions

.....> Connection with the urban context

..... Green filter

▲ Signage





- ① *abandoned area*
- ② *building to be restored*
- ③ *asphalted banks*

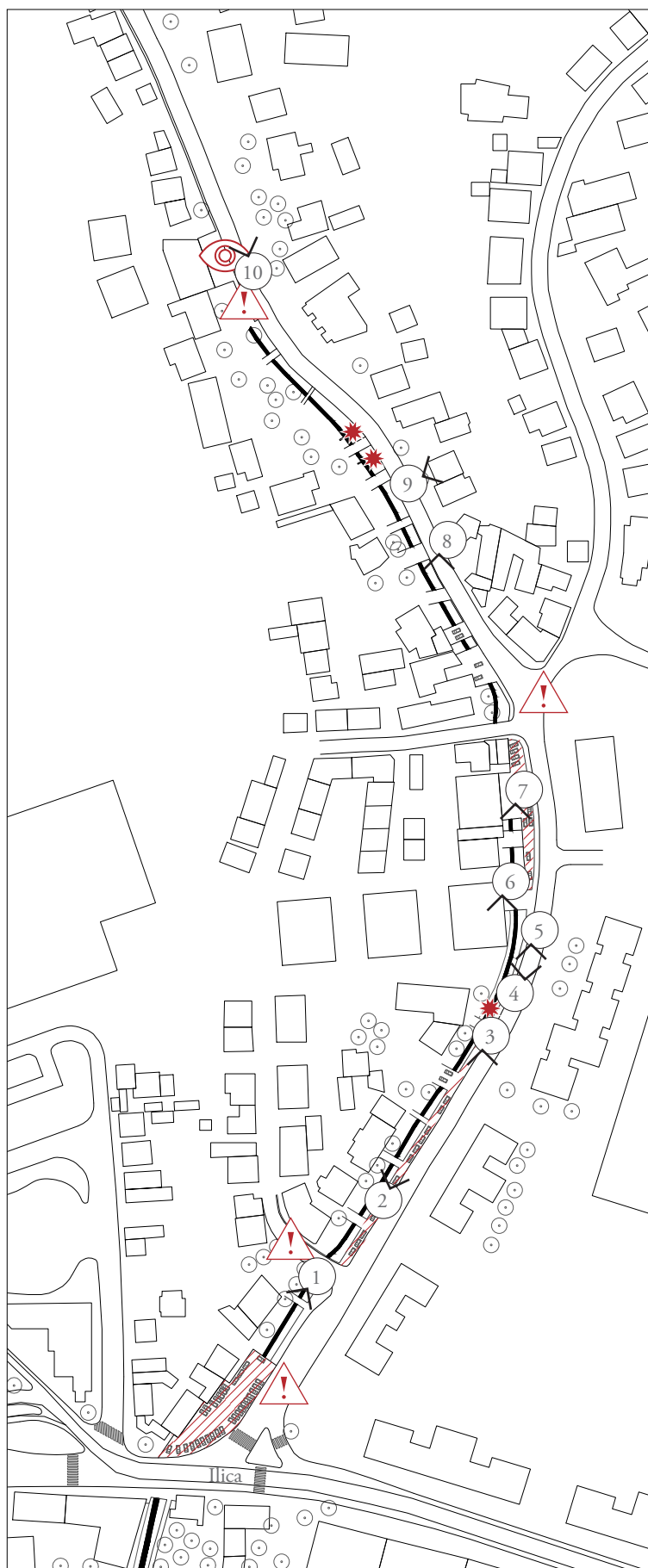




1.2.7 The upstream part / hillside

North to Ilica, the Črnomerec valley starts. This first part is more urbanized and it has different problems: the wild parking, the presence of many self made bridges (in many cases the plots on the west side of the stream could have other vehicular access) and the lack of vegetation. In that sense is possible to imagine to reduce the numbers of bridges. In the first part the street section is wide and the sidewalk is appropriate. The second part is more narrow and in many cases without a sidewalk. The riverbanks are coated with cement and the building developments are very close to the stream.





Critical issues



Lack of signage / indications



Abandoned or misused area



Object not appropriate



No perception of the creek



0 25 50 100 m

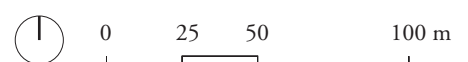


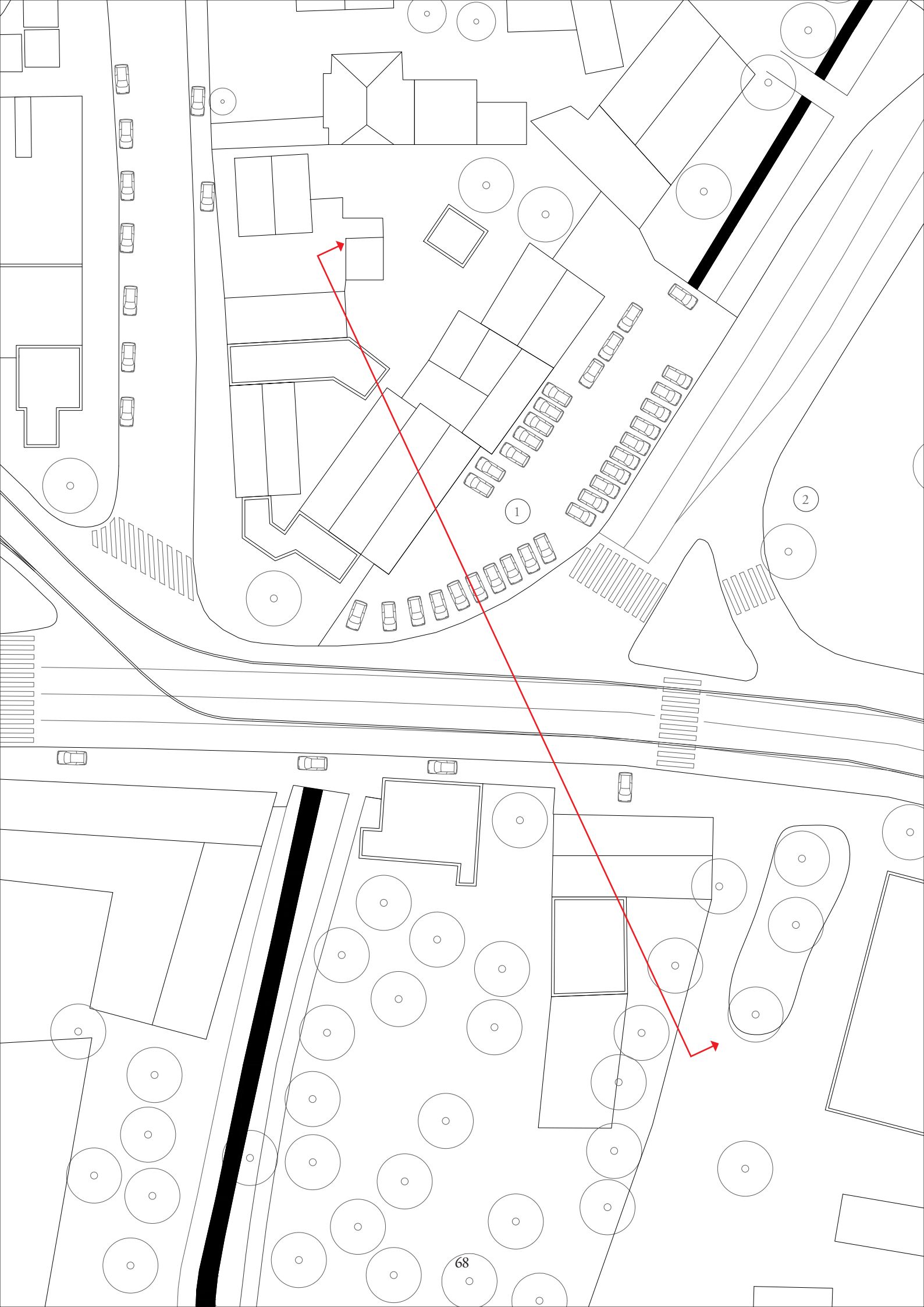
Potentialities / Actions

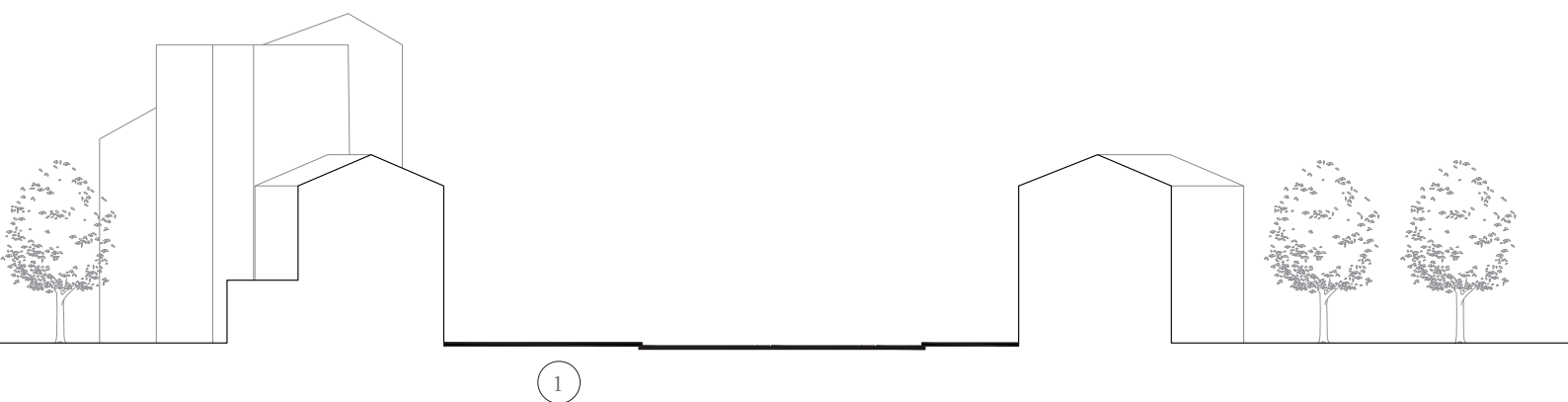
Improving pedestrian connections

Signage

Riprap bank stabilization







- ① *inappropriate car parking*
- ② *lack of public furniture*



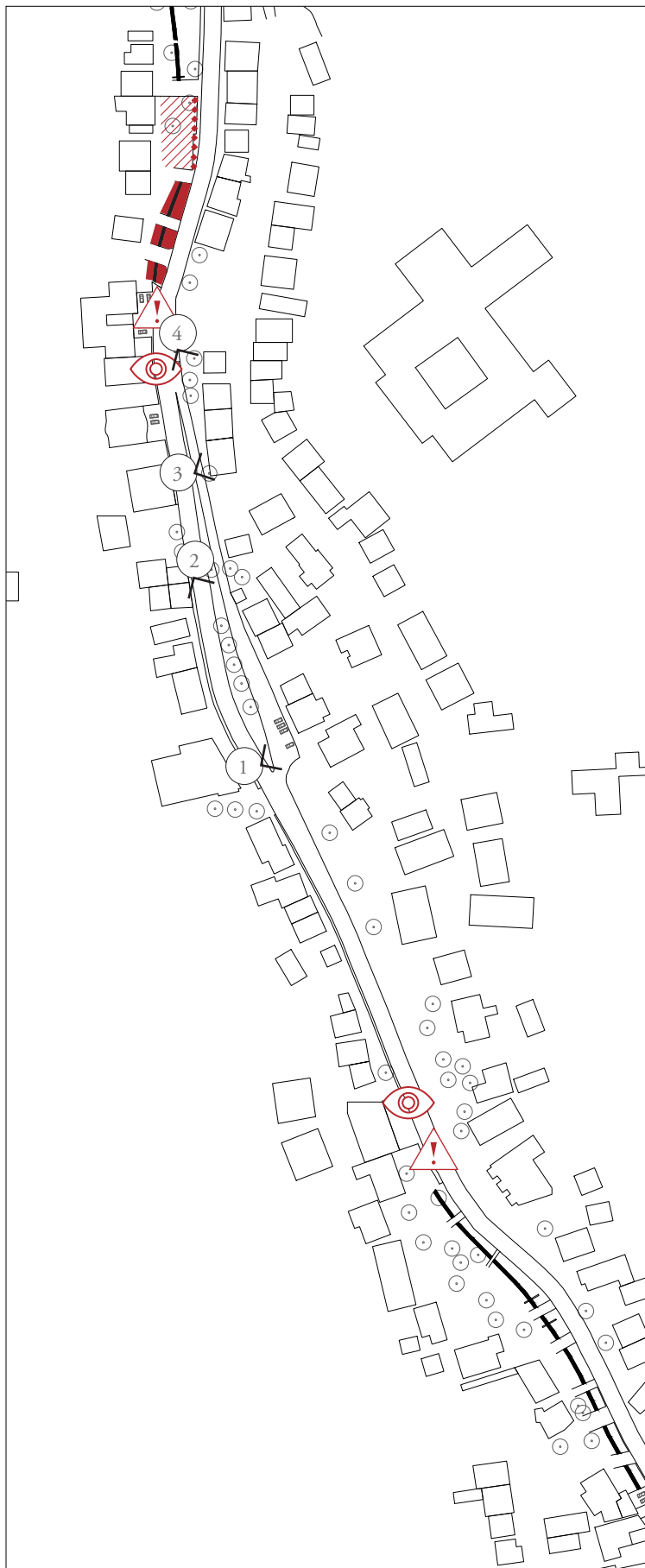


1.2.7 The upstream part / hillside

The northern part is characterized by hillside landscape. The stream is culvert. In many parts there aren't appropriate sidewalks and there are any bike paths.

At the very end of this section, the park of Medvednica mountain starts and the stream's flow runs more natural.






Critical issues

- Fence along the bank
- ! Lack of signage / indications
- Abandoned or misused area
- Concrete banks
- ⦿ No perception of the creek






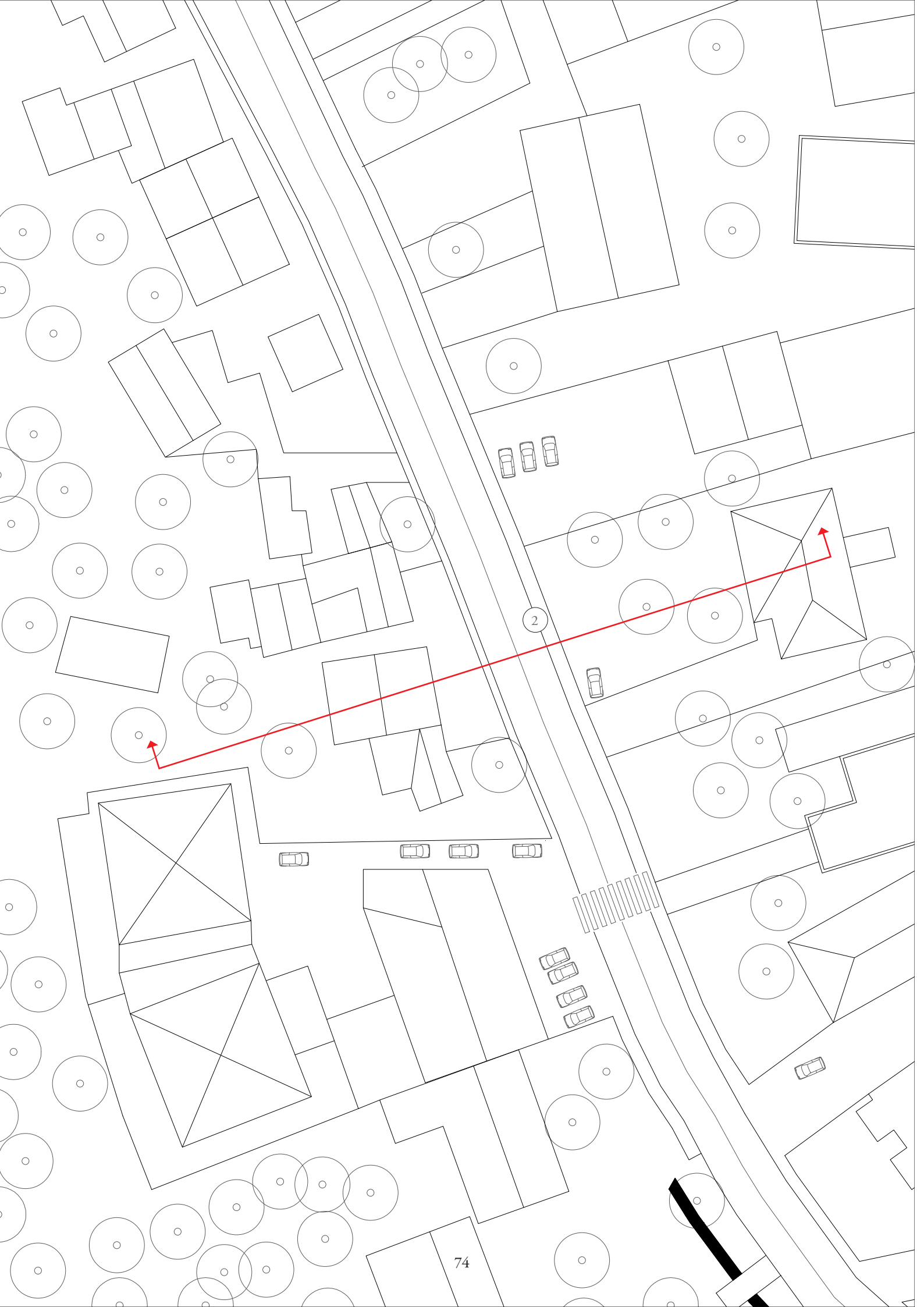
Potentialities / Actions

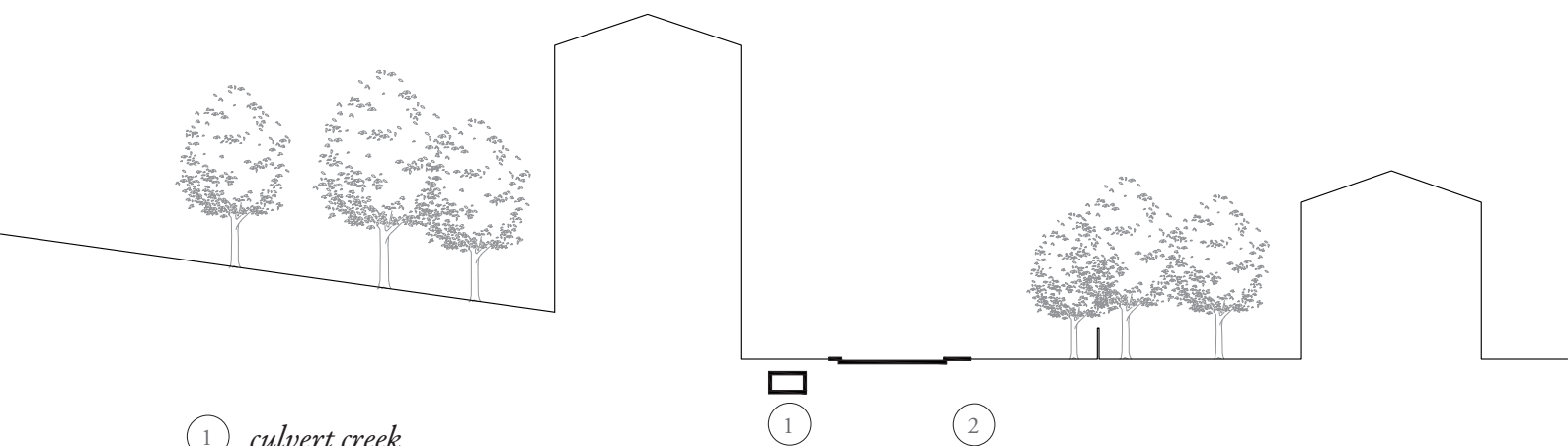
 *Improving pedestrian connections*

 *Signage*

 *Riprap bank stabilization*

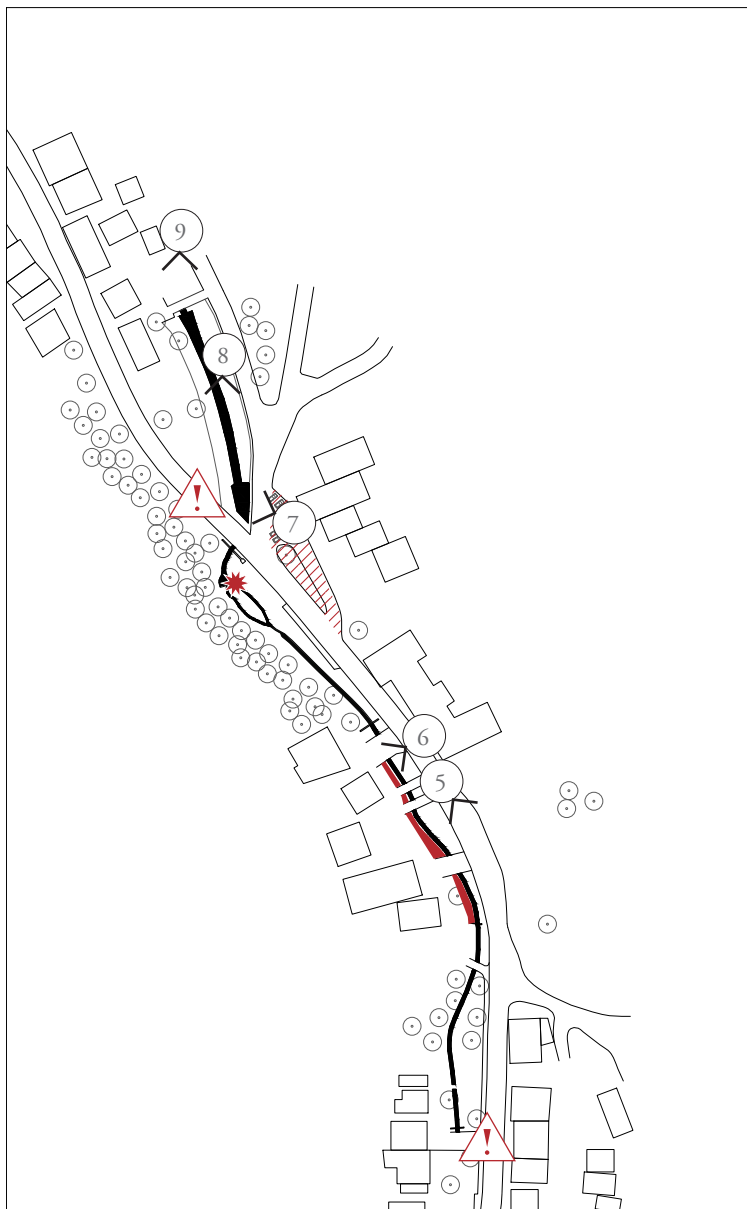






① *culvert creek*

② *no space for cycle path*



Critical issues



Lack of signage / indications



Abandoned or misused area



Concrete banks




Object not appropriate



0 25 50 100 m

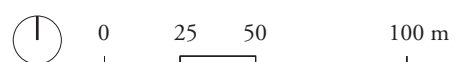


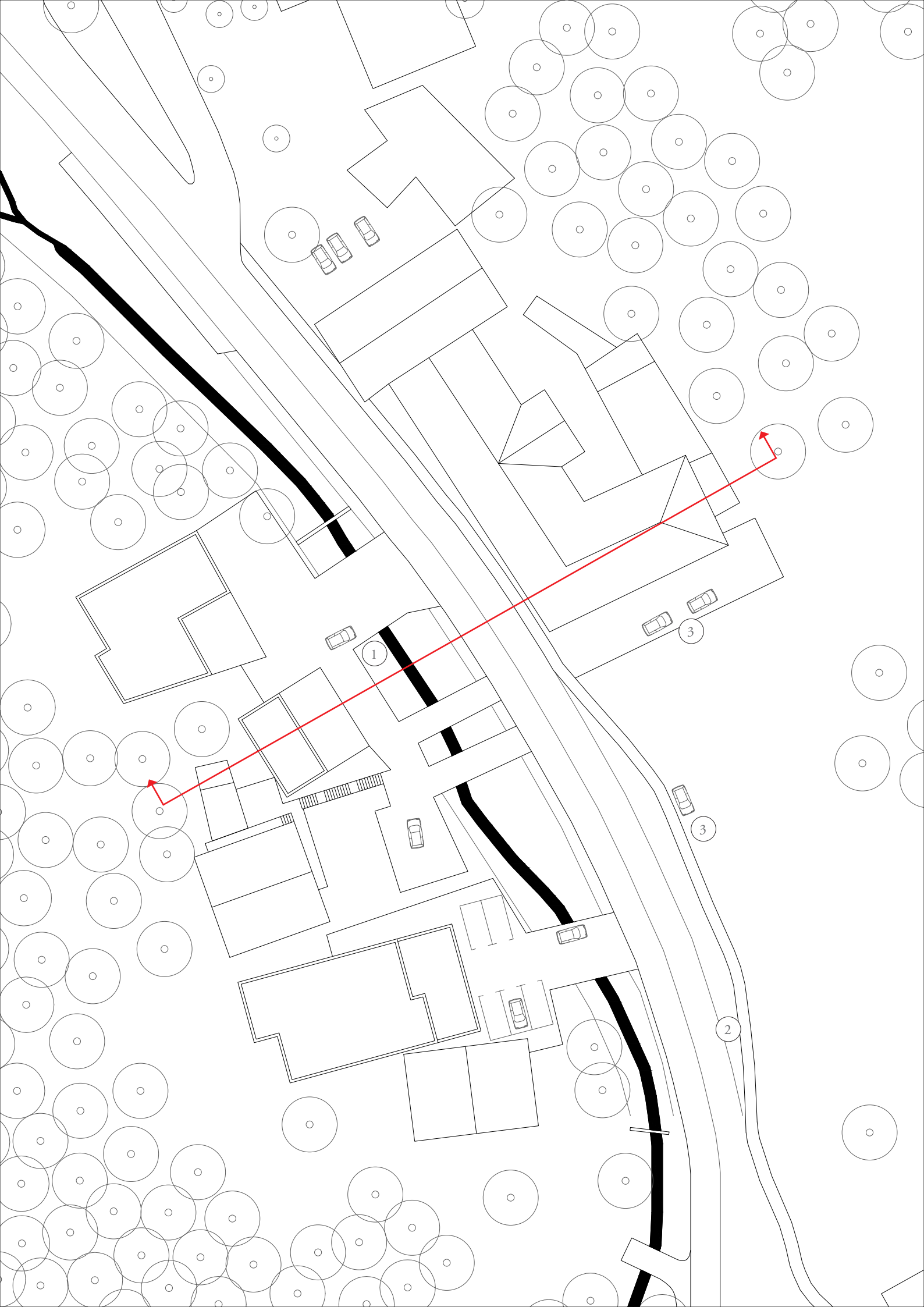
Potentialities / Actions

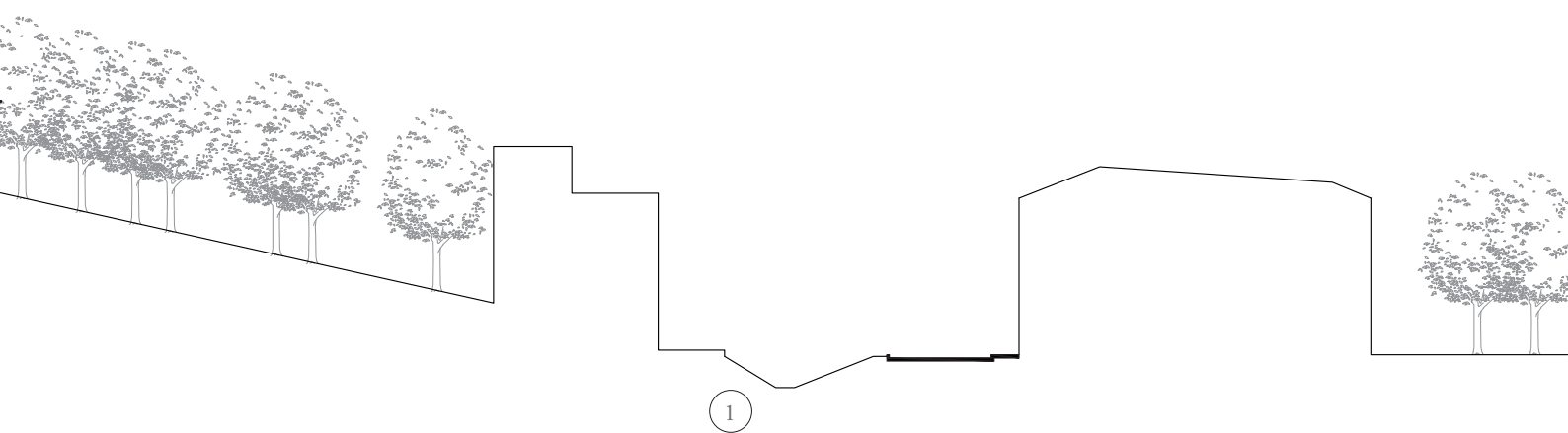
 *Improving pedestrian connections*

 *Signage*

 *Riprap bank stabilization*







- ① *asphalted banks*
- ② *no space for cycle path*
- ③ *inappropriate car parking*

2. Strategies/ guidelines

The risk using the term of strategies is to propose solutions valid for every contest.

To avoid the problem to be generic we developed two moves: the first one was to study the best practices already in use in the main European capitals and the second is to adapt them for Croatia, for Zagreb and for Črnomerec; the second move was to localize every strategy on a specific location. This approach allows to have a specific project and to provide spacial solutions also for similar contexts in the city.

We believe that a strategic vision needs to be created; it need to be shared among the different stakeholders, in order to have a common goals according to the objectives of the city. In that landscape the strategies become the tools for building the vision and create a safer and a nicer environment for all the citizens and at the same time fight against the effects of the climate change and air pollution.

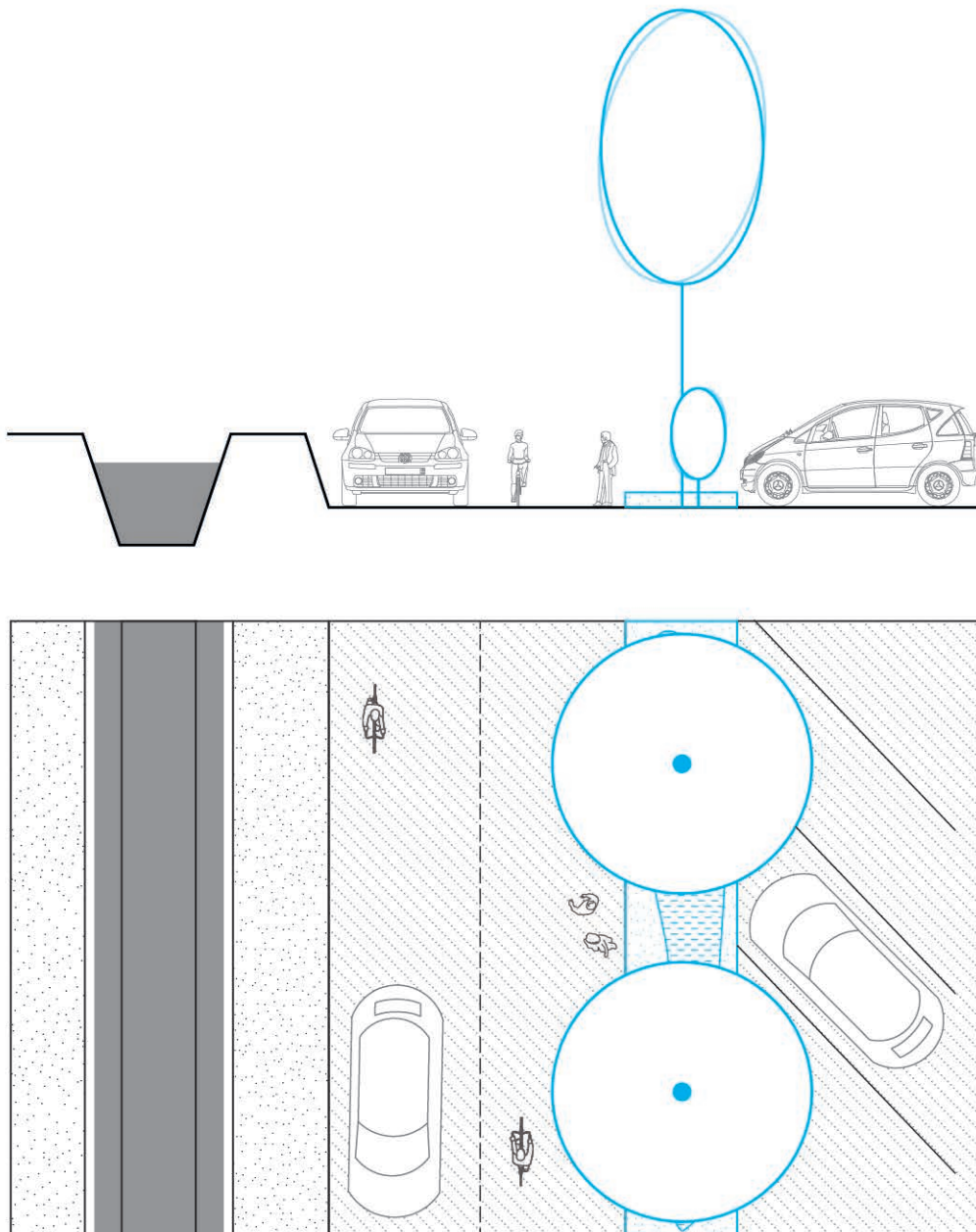
The main materials of this projects are paths for slow mobility, which means less cars and less pollution, and vegetation which means purifying the air and will make the soil more resistant.

2.1 Ecology

Green filter towards parking

Mono-specific rows of medium and small deciduous trees, evergreen hedge and ground covers for the parking areas mitigation.

The selected vegetation will have an ornamental character considering the relationship with the urban area.





Shrubs and groundcover along the parking

ENVIRONMENTAL BENEFITS

- Parking area mitigation
- Improved biodiversity
- Reduced atmospheric CO₂

ECONOMIC BENEFITS

- Reduced energy costs via microclimate regulation



Drainage band between parking and green area



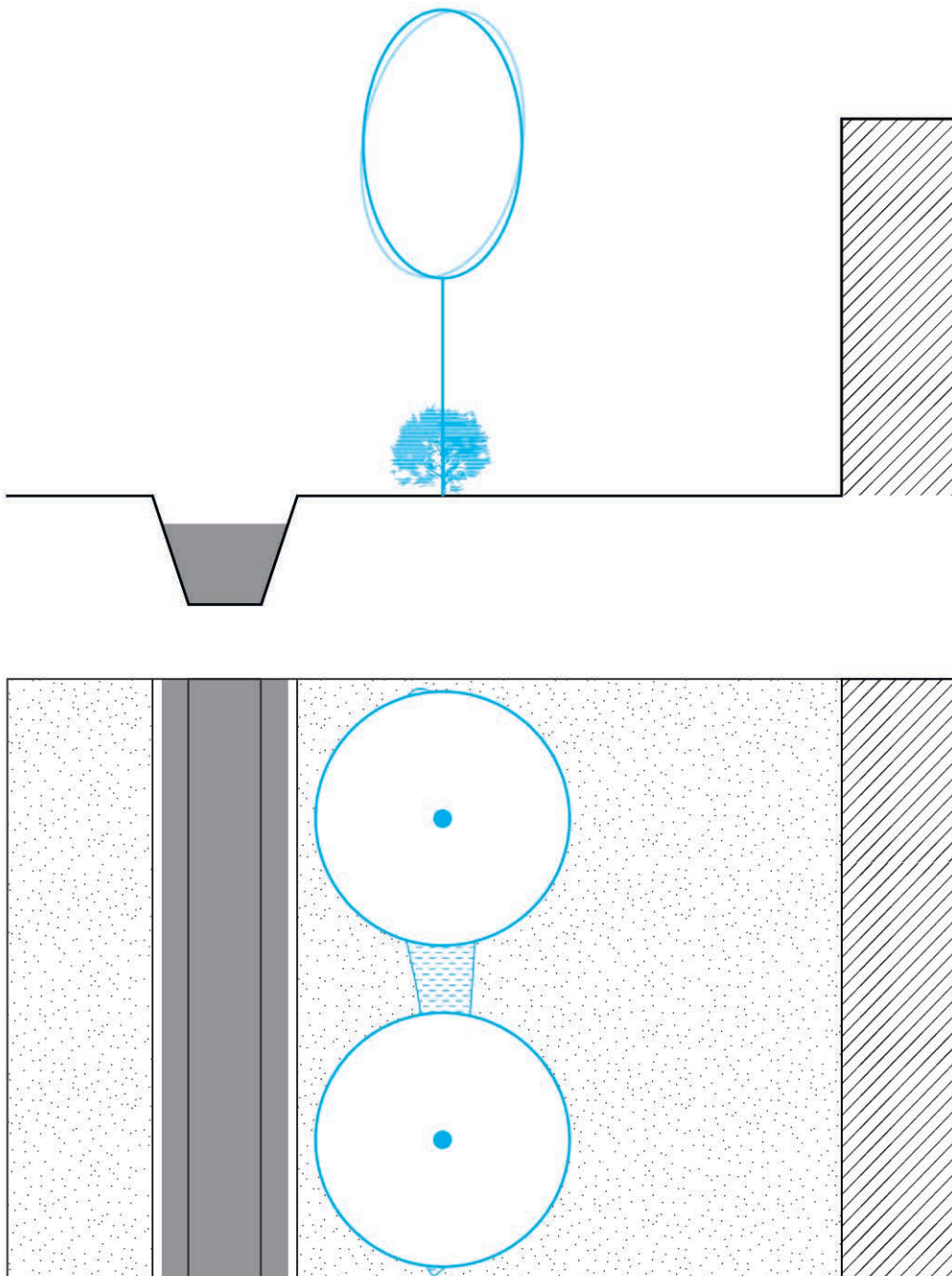
Mono-specific rows of medium tree, grasses and perennials at the base

2.1 Ecology

Green filter towards houses and industries

Rows of deciduous trees with columnar bearing or large crown (according to available space) and discontinuous rows or groups of multi-species shrubs.

The hygrophilous vegetation will be planted near the stream to enhance the ecological value.





Rows of trees

ENVIRONMENTAL BENEFITS

- Improved visual amenity
- Green landmark
- Enhanced urban microclimate
- Improved air quality
- Improved biodiversity
- Reduced ambient noise
- Reduced atmospheric CO₂
- Improved environmental resilience
- Reduced urban heat island effect

SOCIAL BENEFITS

- Improved mental health
- Reduces stress
- Improved quality of life and health and well being

ECONOMIC BENEFITS

- Boosting property values including house prices due to proximity to green space
- Faster property sales
- Encourages inward investment
- Reduced energy costs via microclimate regulation



Mono-specific rows of large trees to mitigate the view of buildings



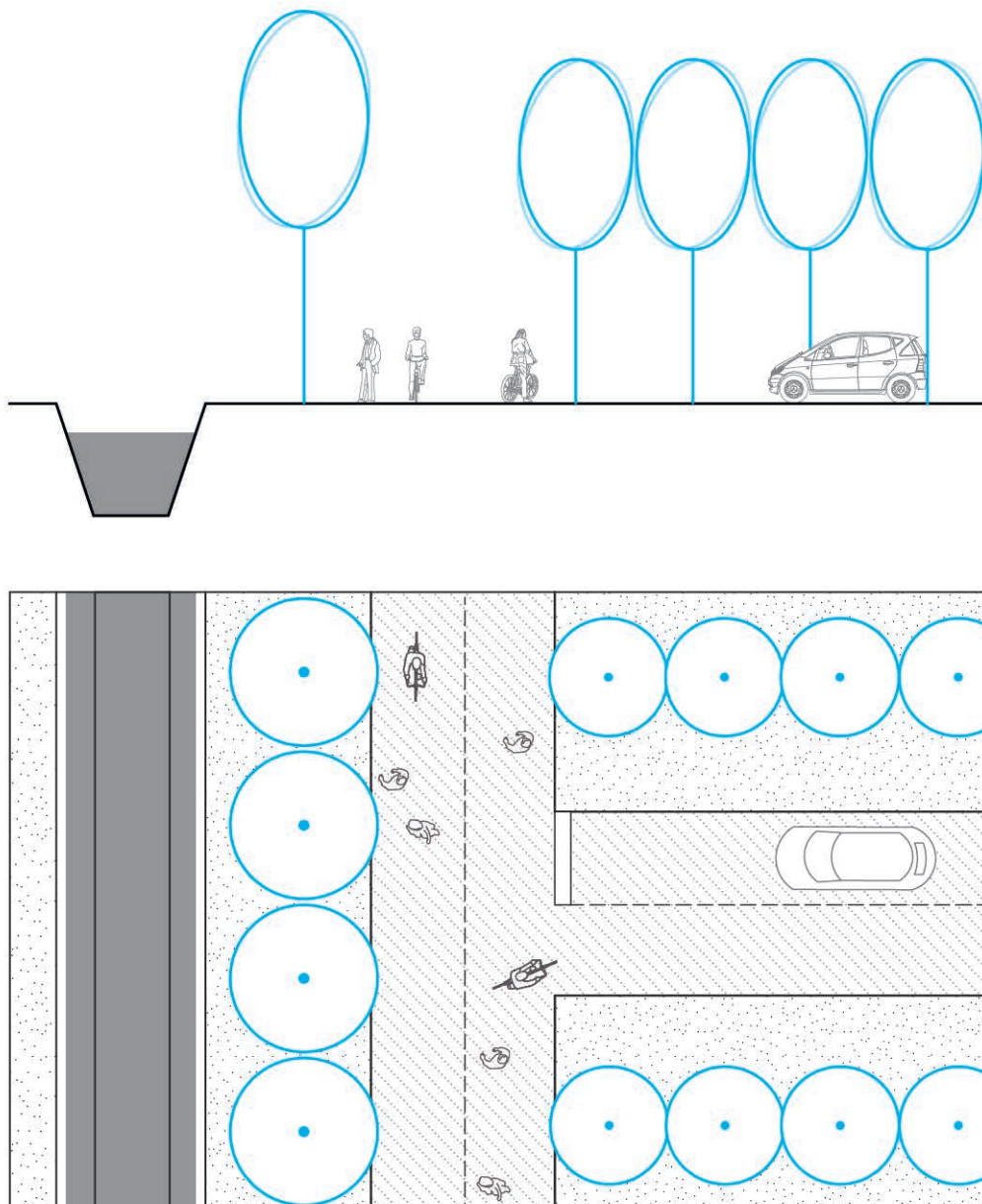
Large trees along the path

2.1 Ecology

Green connections towards the residential area/green street

Mono-specific rows of large trees near the stream and multi-specific rows of medium and small trees along the secondary path.

The main rows will enhance the ecological value of the stream while the secondary rows will allow a connection with the urban areas.





Mono-specific rows of large trees near the stream

ENVIRONMENTAL BENEFITS

- Improved visual amenity
- Green landmark
- Enhanced urban microclimate
- Improved air quality
- Improved biodiversity
- Reduced ambient noise
- Reduced atmospheric CO₂
- Improved environmental resilience
- Reduced urban heat island effect

SOCIAL BENEFITS

- Improved mental health
- Improved workplace productivity
- Reduces stress
- Improved quality of life and health and well being

ECONOMIC BENEFITS

- Boosting property values including house prices due to proximity to green space
- Faster property sales
- Encourages inward investment
- Reduced energy costs via microclimate regulation



Multi-specific rows of medium and small trees along the secondary path.



Multi-specific rows of medium and small trees along the secondary path.

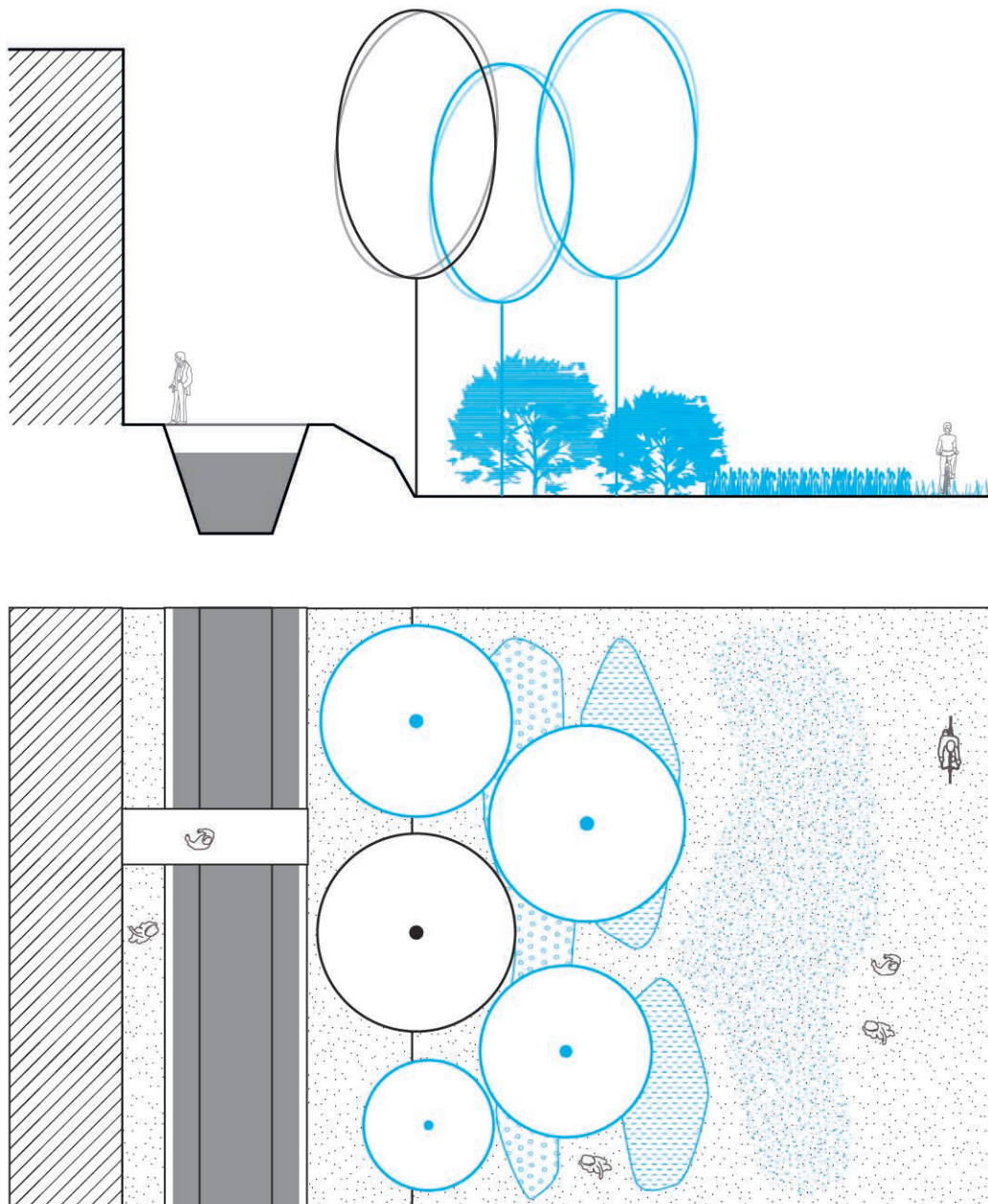
2.1 Ecology

Increase the biodiversity into the green areas

Rows and groves of plurispecific trees of different sizes and groups of shrubs to increase the biodiversity in the green areas.

A flowered meadow will be sown in the larger areas to increase the aesthetic value and to reduce maintenance operations.

Hygrophilous vegetation will be planted near the stream and ornamental trees, shrubs and grasses near the playground and rest areas, closer to the urbanized areas





Trees and groups of grasses along the path



Groves of plurispecific trees near the playground



Flowered meadow to increase biodiversity and the aesthetic value of the green areas

ENVIRONMENTAL BENEFITS

- Improved biodiversity
- Improved air quality
- Reduced ambient noise
- Reduced atmospheric CO₂
- Enhanced urban microclimate
- Improved environmental resilience
- Reduced urban heat island effect

SOCIAL BENEFITS

- Encourages physical activity
- Provides more opportunities and places for children to play
- Improved mental health
- Creates and improves spaces for socialising, interaction and events
- Improved workplace productivity
- Reduces stress
- Improved quality of life and health and well being

ECONOMIC BENEFITS

- Boosting property values including house prices due to proximity to green space
- Faster property sales
- Encourages inward investment
- Reduced energy costs via microclimate regulation
- Improved tourist and recreation facilities
- Lower healthcare costs
- Lower maintenance costs of flowered meadow

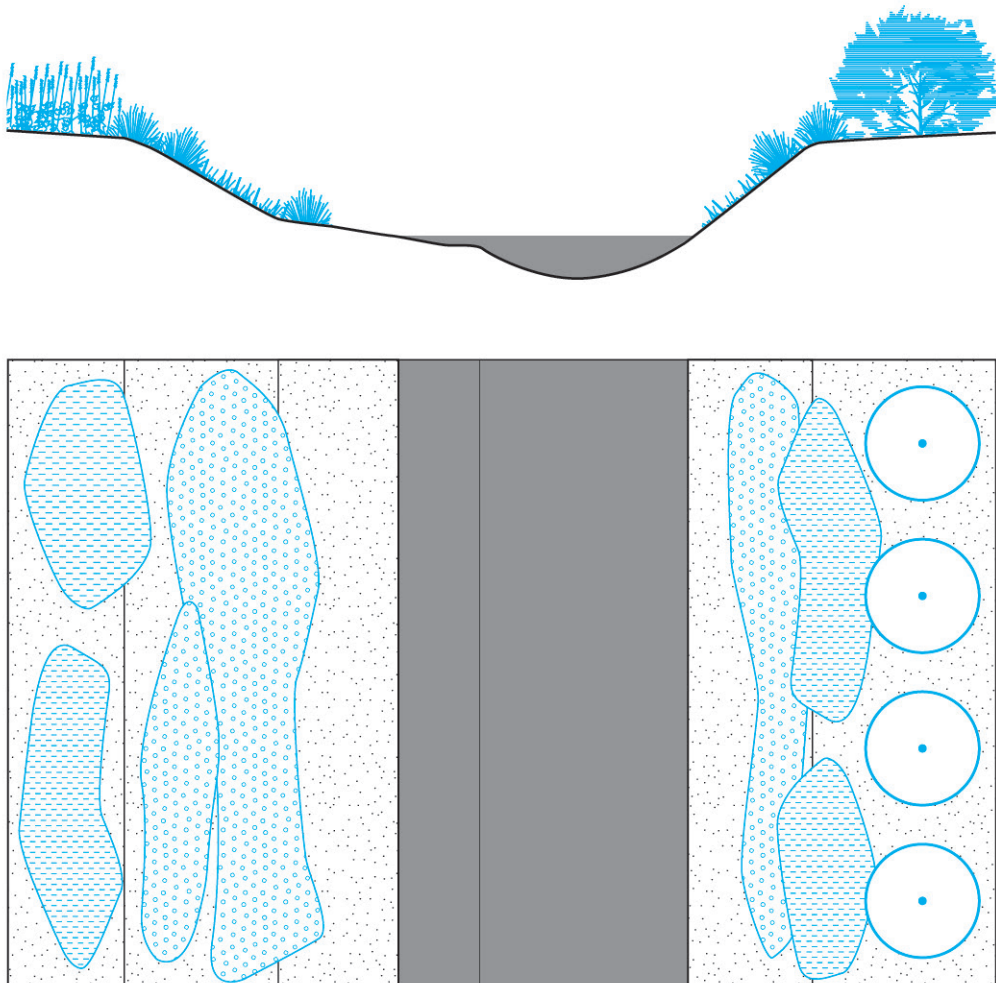
2.1 Ecology

Planting riverbanks

Groups of hygrophilous shrubs and grasses for the re-naturalization of the river banks.

This action will increase flora and fauna biodiversity, will consolidate the banks and increase the aesthetic value of the canal.

The stream will become more resilient to climate events





Groups of hygrophilous shrubs and grasses planted on the riverbanks



Groups of hygrophilous shrubs and grasses planted on the riverbanks



The pink flowering of Lithrum salicaria as a landmark

ENVIRONMENTAL BENEFITS

- Reduced flood risk
- Better water quality
- Improved biodiversity
- Improved environmental resilience

ECONOMIC BENEFITS

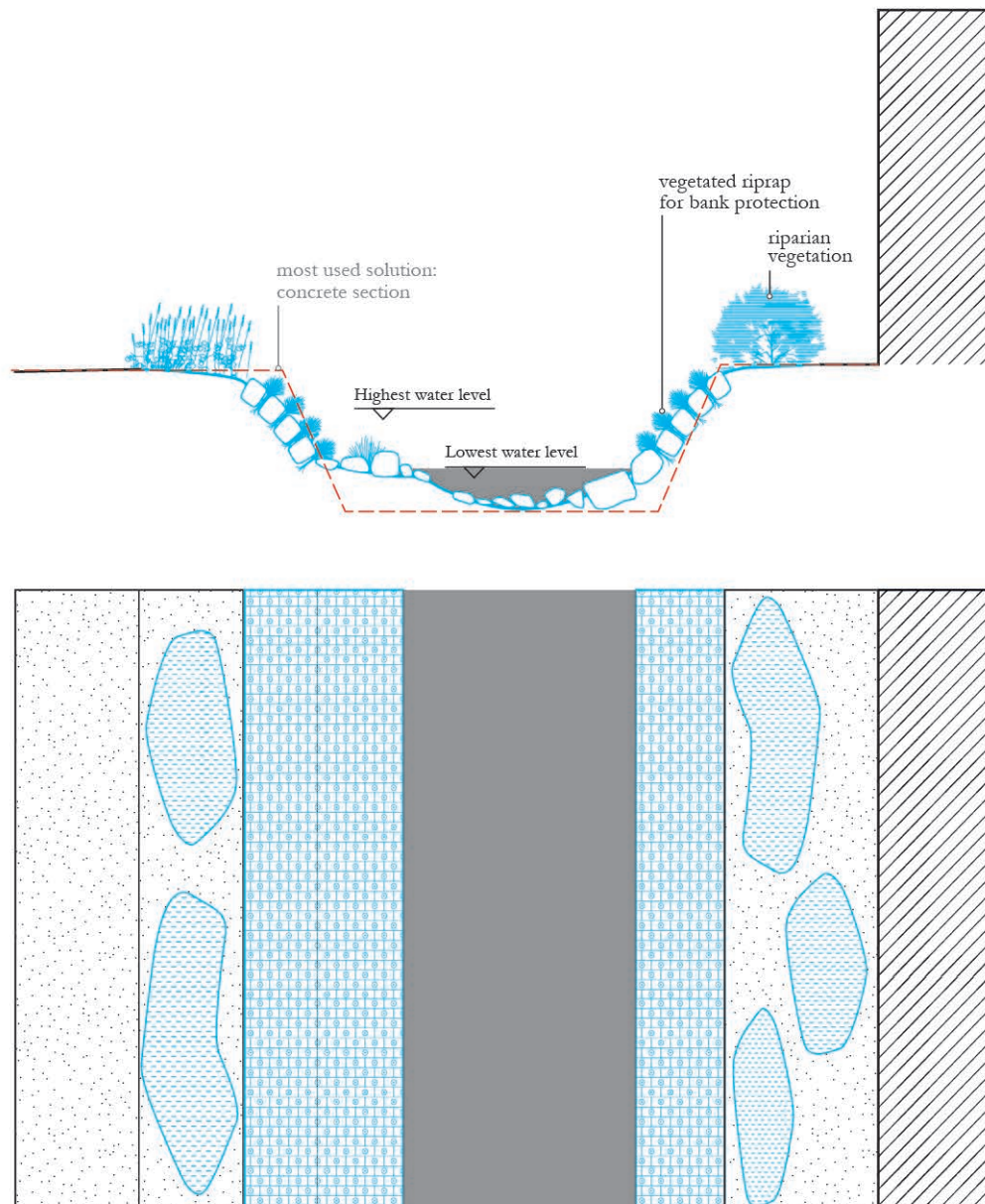
- Boosting property values including house prices due to proximity to green space
- Faster property sales
- Encourages inward investment
- Reduced energy costs via microclimate regulation

2.1 Ecology

Preservation of the natural hydraulic section in the new building works near to the stream

Maintenance of a more natural section of the river (wherever possible) through containment works based on naturalistic engineering techniques.

The environmental benefits of this solution range from the increase in plant and animal biodiversity to the control of possible floods thanks to the increase in water run-off time (as well as being aesthetically more pleasant).





ENVIRONMENTAL BENEFITS

- Reduced flood risk
- Better water quality
- Improved biodiversity
- Improved environmental resilience

ECONOMIC BENEFITS

- Boosting property values including house prices due to proximity to green space
- Faster property sales
- Encourages inward investment
- Reduced energy costs via microclimate regulation

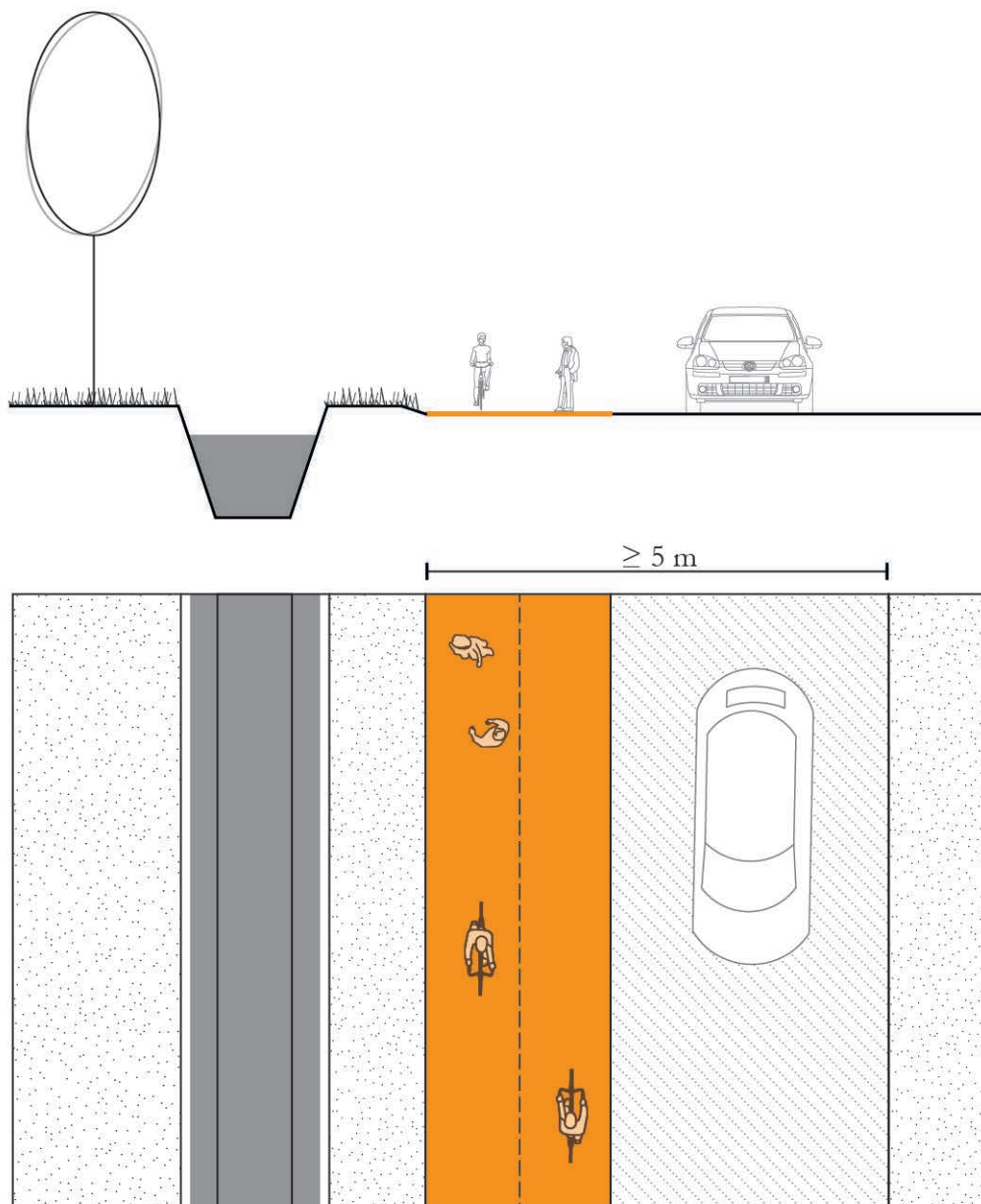


Naturalistic engineering techniques and shrubs to improve environmental resilience

2.2 Mobility

Reducing the size of the carriageways

A portion of the carriageway is reduced to create a protected cycle/pedestrian path.
The objective is to use existing asphalt without removing green areas.





ENVIRONMENTAL BENEFITS

- Improved visual amenity
- Enhanced urban microclimate
- Improved air quality
- Reduced ambient noise
- Reduced atmospheric CO2
- Improved environmental resilience

SOCIAL BENEFITS

- Encourages physical activity
- Improved mental health
- Reduces stress
- Improved quality of life and health and well being
- Ease of access to social, recreation and sporting activities

ECONOMIC BENEFITS

- Improved tourist and recreation facilities
- Lower healthcare costs

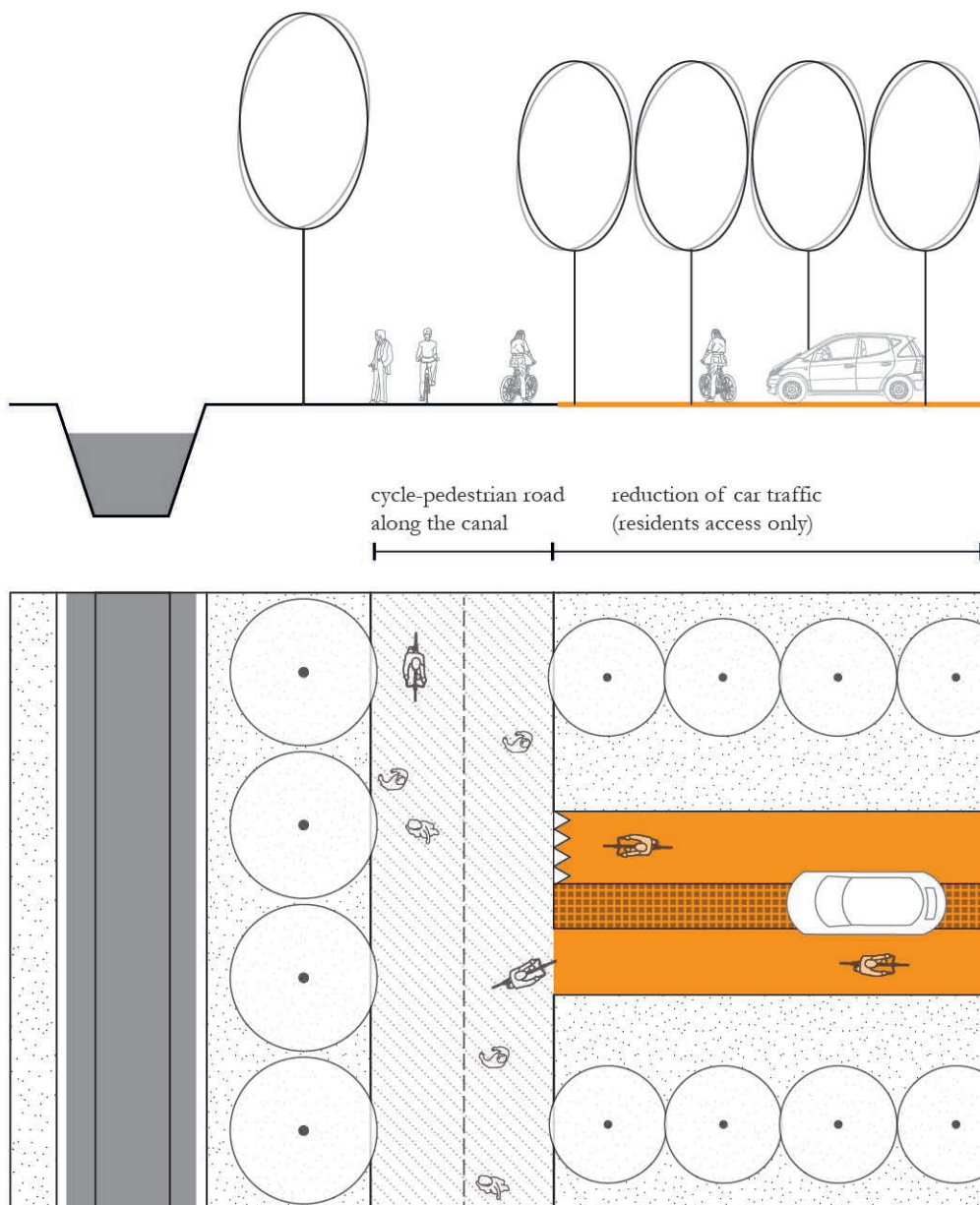


Reducing the size of the carriageways in order to built safe and green cycle-pedestrian path

2.2 Mobility

Reduction of traffic on residential roads

Traffic is reduced on secondary roads where only residents have access. The speed is limited to allow the safe transit of pedestrians and cyclists.





Traffic reduction for safe transit of pedestrian and cyclist



Traffic-calming solutions for a mixed use of the road and safety for cyclists and pedestrians

ENVIRONMENTAL BENEFITS

- Improved visual amenity
- Enhanced urban microclimate
- Improved air quality
- Reduced ambient noise
- Reduced atmospheric CO₂
- Improved environmental resilience

SOCIAL BENEFITS

- Encourages physical activity
- Provides more opportunities and places for children to play
- Improved mental health
- Creates and improves spaces for socialising, interaction and events
- Improved workplace productivity
- Creates opportunities for community participation and volunteering
- Reduction in crime
- Reduces stress
- Improved childhood development
- Improved quality of life and health and well being
- Ease of access to social, recreation and sporting activities
- Increased social cohesion
- Increased sense of community

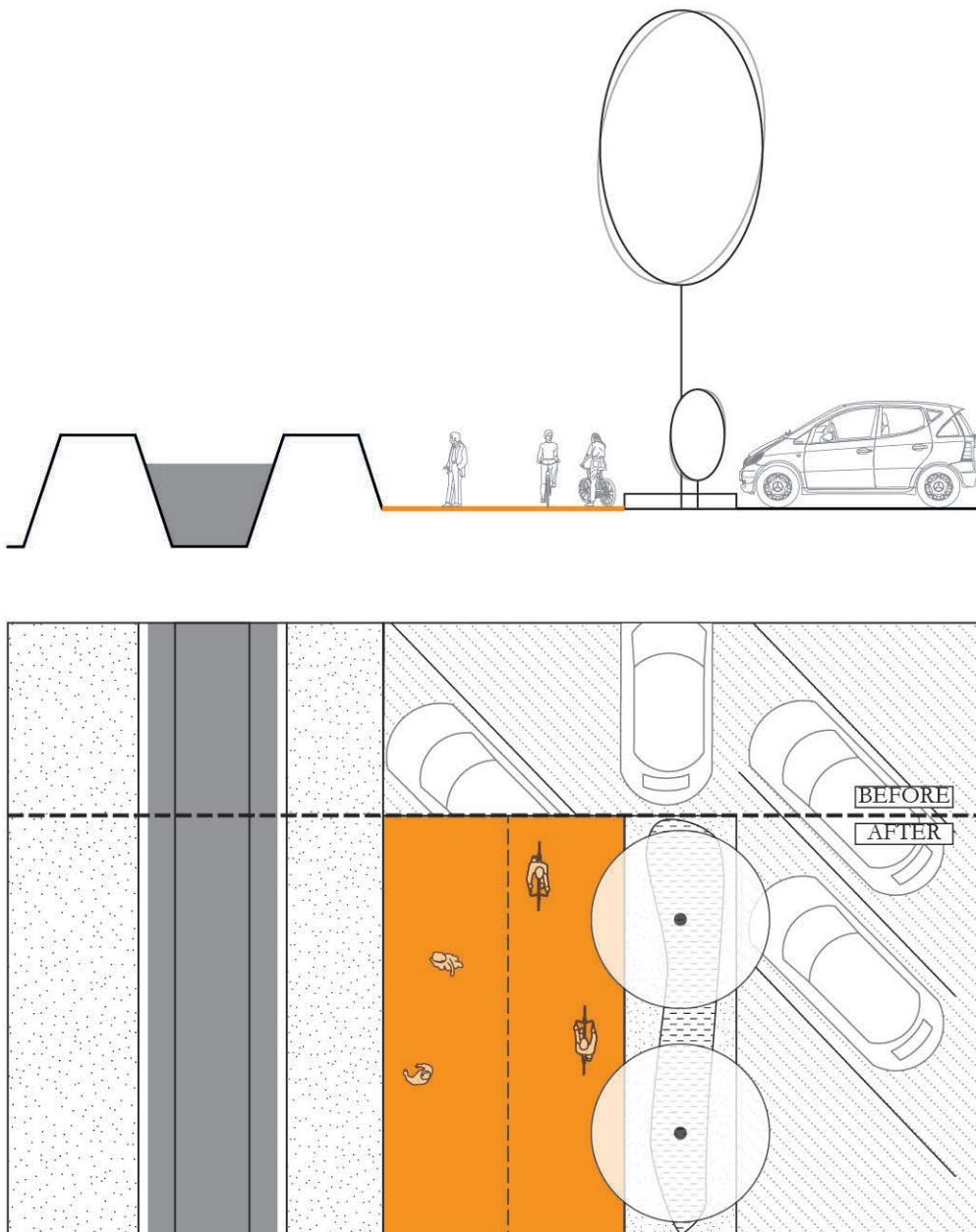
ECONOMIC BENEFITS

- Improved tourism and recreation facilities
- Lower healthcare costs

2.2 Mobility

Reduction of parking area

Parking lots can be reduced to maximise space in favour of cycle-pedestrian pathways and vegetation.





ENVIRONMENTAL BENEFITS

- Improved visual amenity
- Enhanced urban microclimate
- Improved air quality
- Reduced ambient noise
- Reduced atmospheric CO₂
- Improved environmental resilience

SOCIAL BENEFITS

- Encourages physical activity
- Provides more opportunities and places for children to play
- Improved mental health
- Creates and improves spaces for socialising, interaction and events
- Improved workplace productivity
- Reduces stress
- Improved quality of life and health and well being
- Ease of access to social, recreation and sporting activities



New public uses for parking lots



Cycle-pedestrian pathways and vegetation instead of too many parking lots

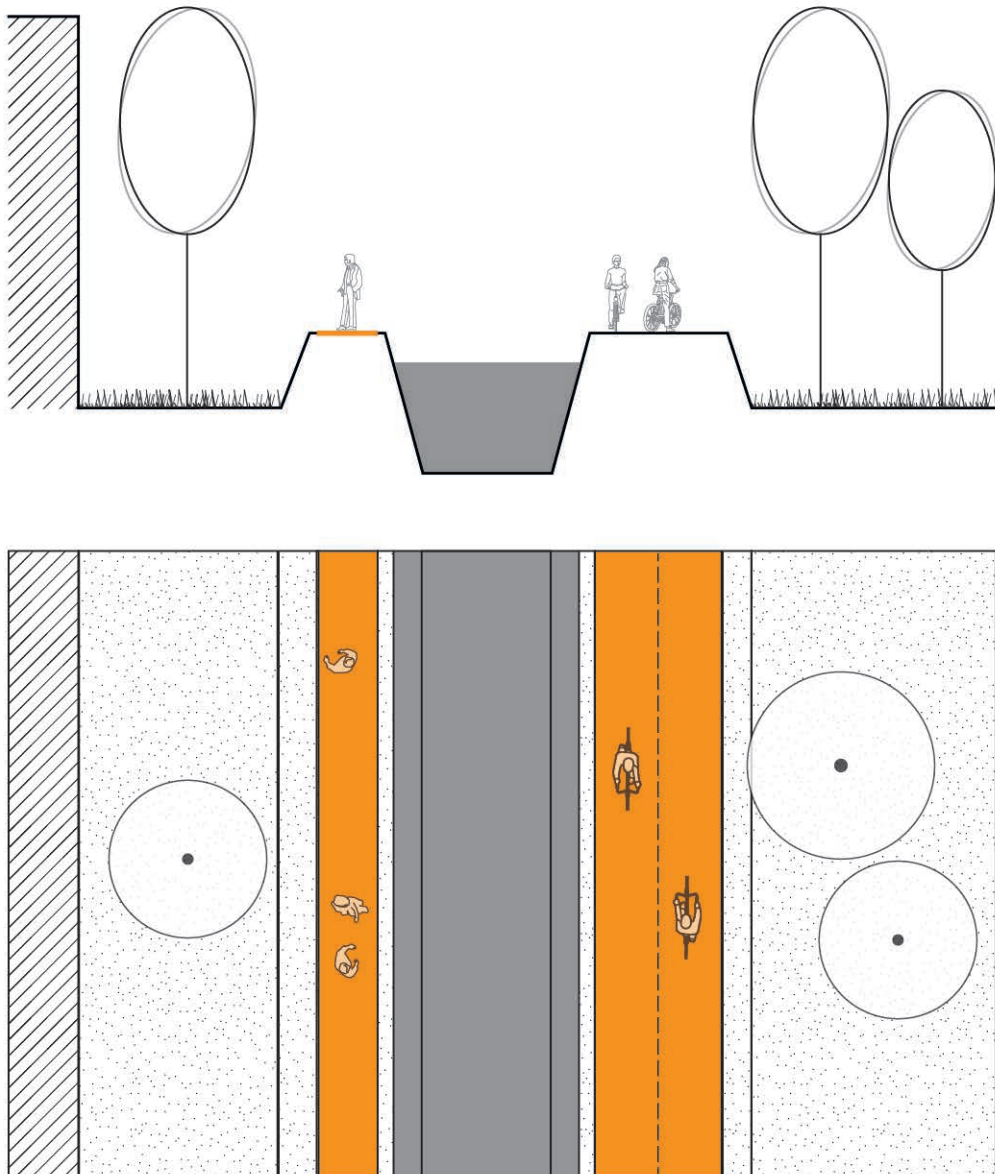
ECONOMIC BENEFITS

- Improved tourism and recreation facilities
- Lower healthcare costs

2.2 Mobility

Cycle/pedestrian paths on the embankments

The cycle and pedestrian routes are based on existing embankments and will be separated, wherever possible, to ensure safe travel. The materials will be adapted to the type of ride and the context.





Cycle route along the embankments

SOCIAL BENEFITS

- Encourages physical activity
- Improved mental health
- Reduction in crime
- Reduces stress
- Improved quality of life and health and well being
- Ease of access to social, recreation and sporting activities

ECONOMIC BENEFITS

- Improved tourism and recreation facilities
- Lower healthcare costs



Art/architectural elements along the path



Links for a mixed uses (seats, amphiteatre, path)

2.2 Mobility

Cycle pedestrian bridges along the creek

The Črnomerec river is crossed by many cycle pedestrian bridges, to connect the neighborhoods, especially in the south and central part, and to access the private house in the north.

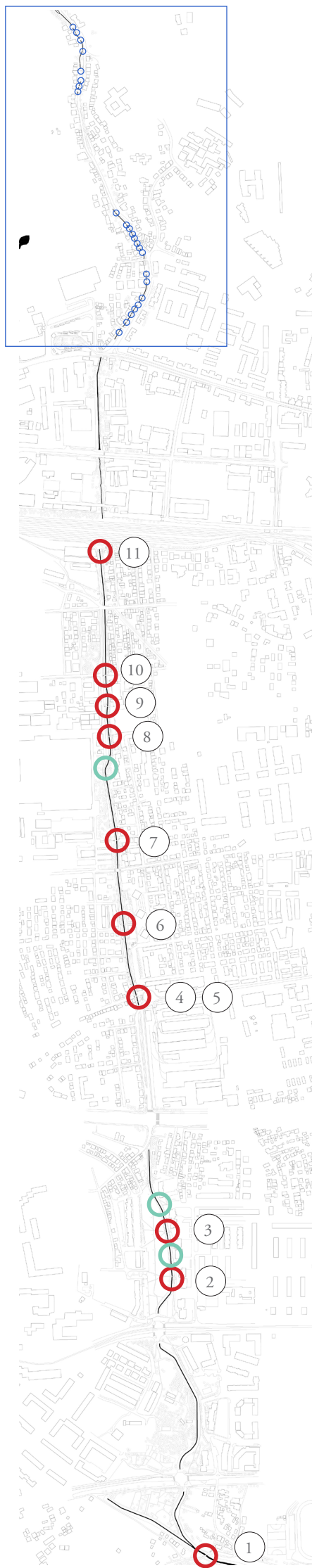
Nowadays most of these bridges are in degraded state, due to their state of conservation and materials and need to be restored.

In the upstream part there are more than 25 small private bridges that allow the access from Črnomerec street to the houses.

In the proposal project, which aim to create a one way loop for cars and buses in order to liberate one roadway, the number of private bridges should be reviewed in order to keep just the strictly necessary one.

For all the existing bridges the propose is to restore them in order to create a uniform identity with all the other small intervention along the linear park; after a structural verification of the elements, the restyle will concern the architectural elements: paving, railing, lighting.

Similar materials and style will be proposed to the 3 new bridges, 2 in the Central park and 1 at the end of Fallerovo šetalište, that are needed to create more permeability between the river banks.



More than 25 private bridges
(to access the houses)



11 existing bridges to be restored



3 proposed new cycle pedestrian bridges

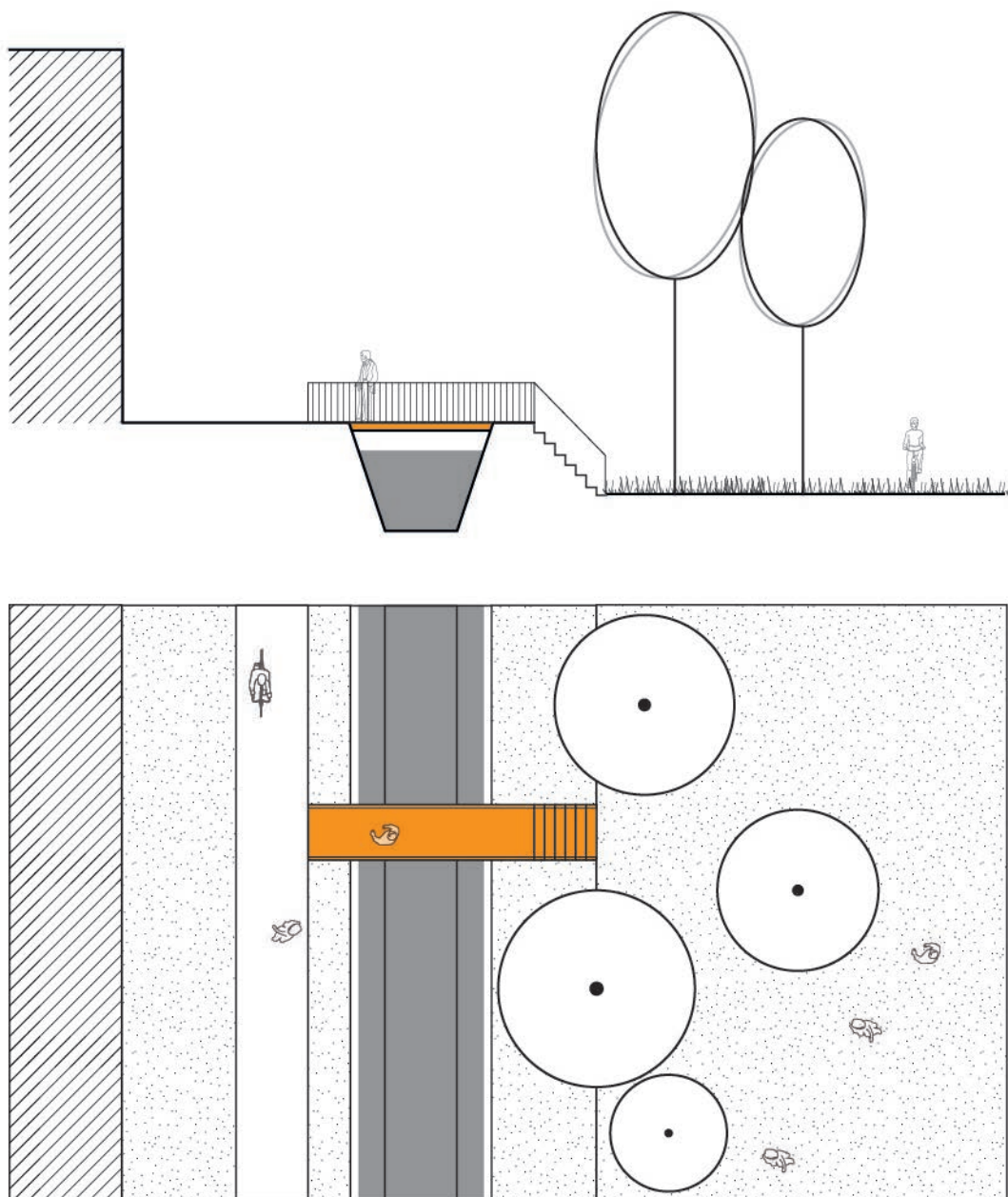




2.2 Mobility

Existing bridges: restyling of paving

Substitution of the existing degraded paving in asphalt with a deck in Ipè wood, characterized by extreme compactness and hardness that make it suitable for outdoor use; another option is to use colored concrete as the one used in the cycle path to keep the continuity.

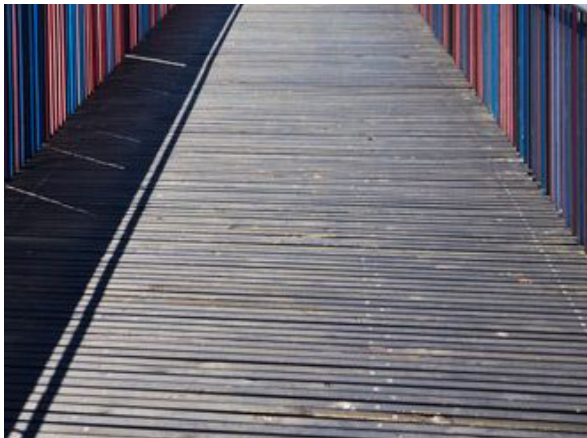




Ipe wood

ipe' DECKING BENEFITS

- Strong in nature, yet flexible.
- Can last up to 75 years depending on the surrounding.
- Resistance to fire.
- Insect resistant.
- Can be made available in different forms and sizes.
- Heat, insect, mold and weather resistance
- Slip Resistance to avoid any mishap



Example of wood decking on pedestrian bridge

COLORED ASPHALT BENEFITS

- Increase resistance to abrasion, UV rays, fuel and lubricants.
- Protect the pavement in bituminous conglomerate from thermal swings.
- Increase the durability of the work.
- Improve the aesthetics of flooring and reduce the environmental impact by choosing between different colors.

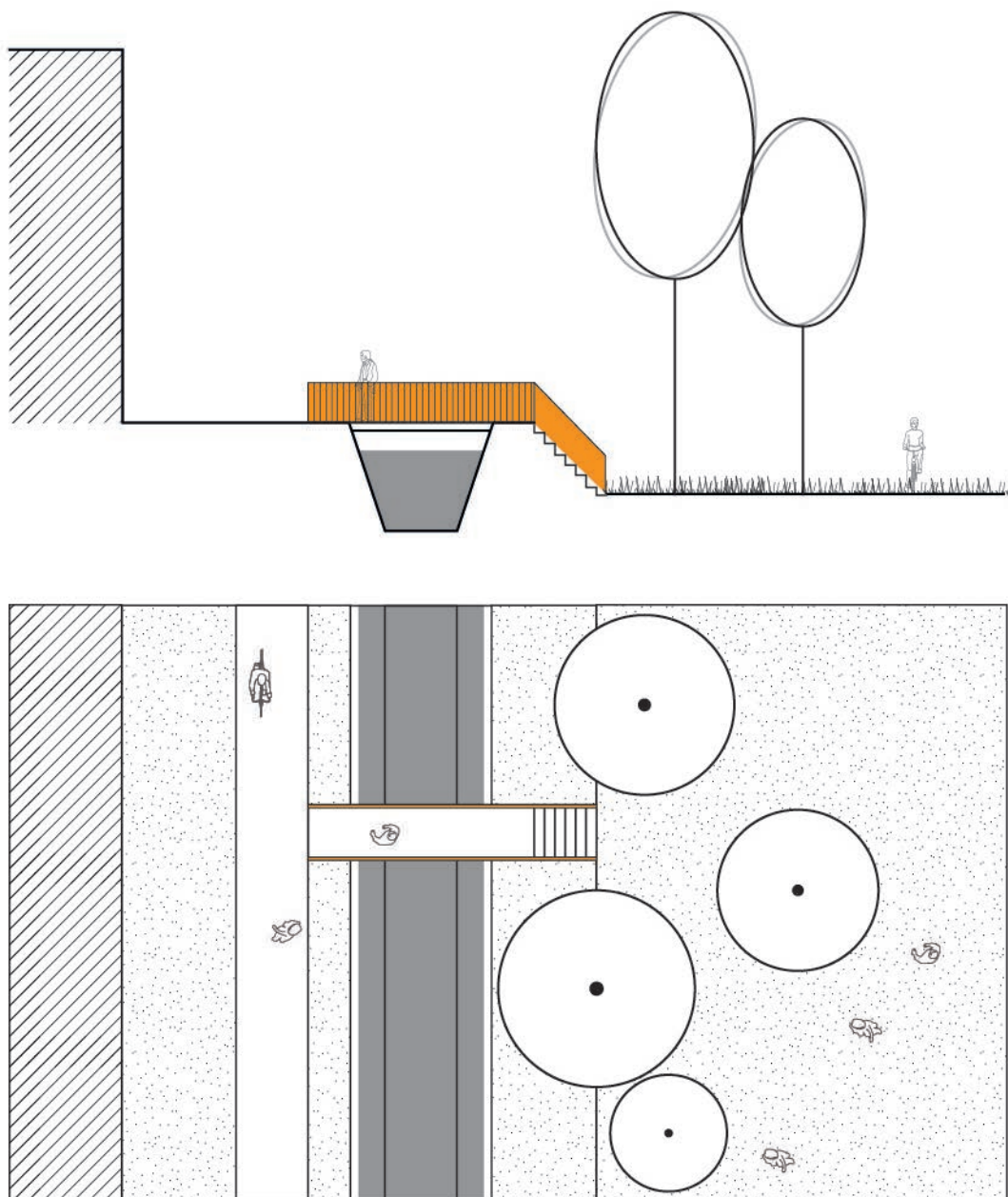


Colored concrete paving

2.2 Mobility

Existing bridges: restyling of railing

Substitution of the existing degraded railing with stainless steel cablesystem, which has very high performance of durability in time and also a pleasant, light, aestehic aspect wich allow visual permeability.





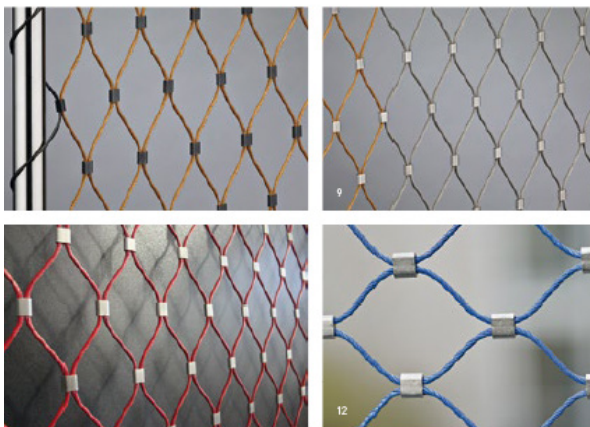
Stainless steel mesh



Stainless steel pillars

STAINLESS STEEL CABLE SYSTEM

- The stainless steel cable mesh opens up a whole new world of spatial design options using cables.
- The intelligent combination of stainless steel cables and ferrules is the key to a wide range of geometries for engineered cable mesh constructions
- Colours, consisting of coloured stainless steel cables, adds a blaze of colour to architecture. The decorative and emission-free polymer layer on the stainless steel cables is durable, weatherproof and physiologically safe.
- The mesh can work also as supporting structure for high-performance LED-strips, prepares the stage for commanding illuminations

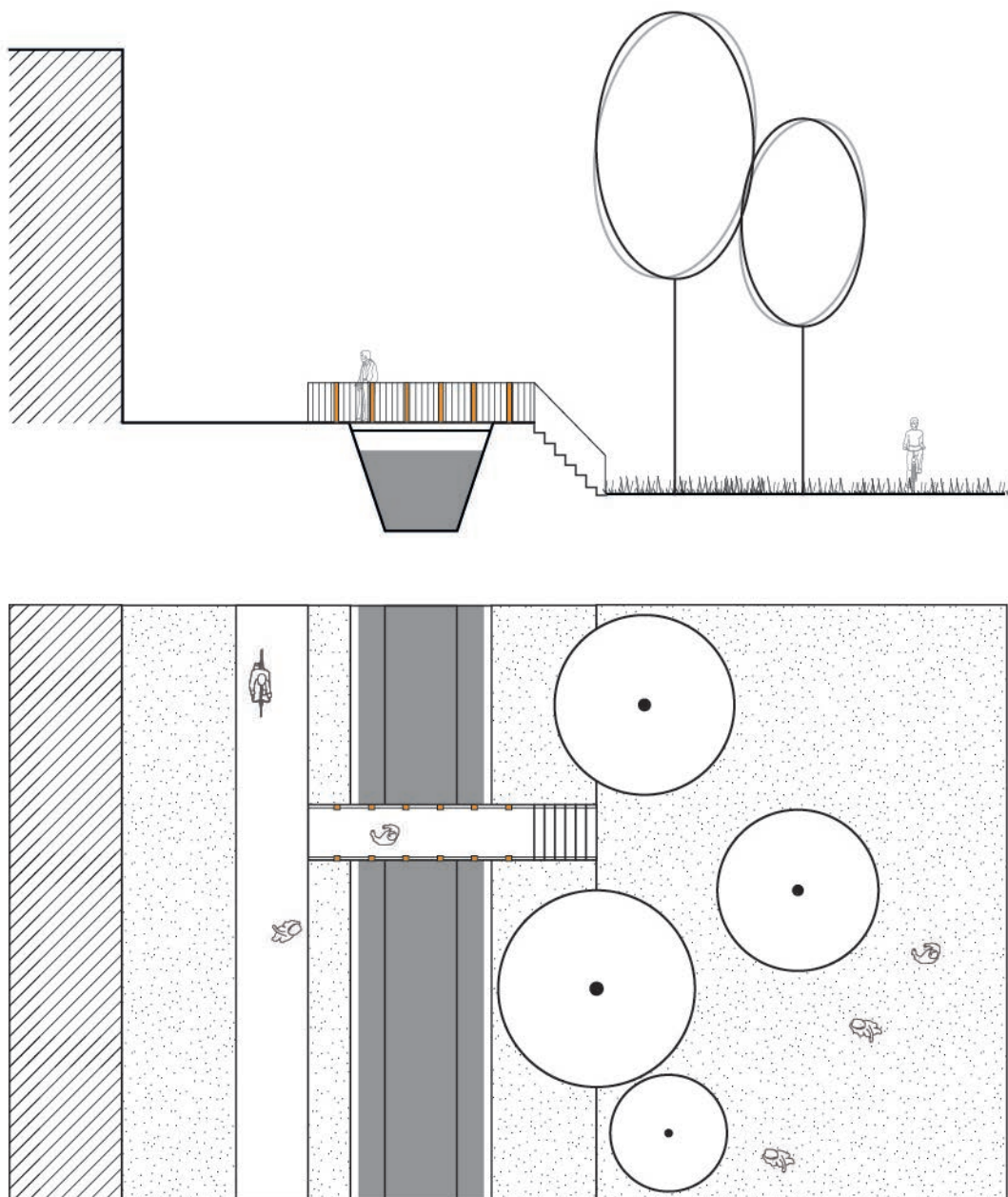


Different colors of steel cables

2.2 Mobility

Existing bridges: restyling of lighting

The lighting, which is to be realized with LED lights arranged along the pillars, wants to create a corridor of light of sure effect, considering also the “transparency” of railing. Also, LED technology is known in terms of performance, energy saving and lower maintenance costs.





Lighting on pillars



Lighting over the paving



Lighting on the handrail

LED LIGHTING BENEFITS

- LED lights are up to 80% more efficient than traditional lighting such as fluorescent and incandescent lights.
- contain no toxic elements
- have a better quality of light distribution and focus light in one direction as opposed to other types of lighting which waste energy by emitting light in all directions
- A longer life span means lower carbon emissions. LED Lights last up to six times longer than other types of lights, reducing the requirement for frequent replacements

2.2 Mobility

New bridges

For the new 3 bridges the propose is to keep a formal continuity with the finishing architectural elements of the restyled existing bridges.

For the structure the proposal is to use a

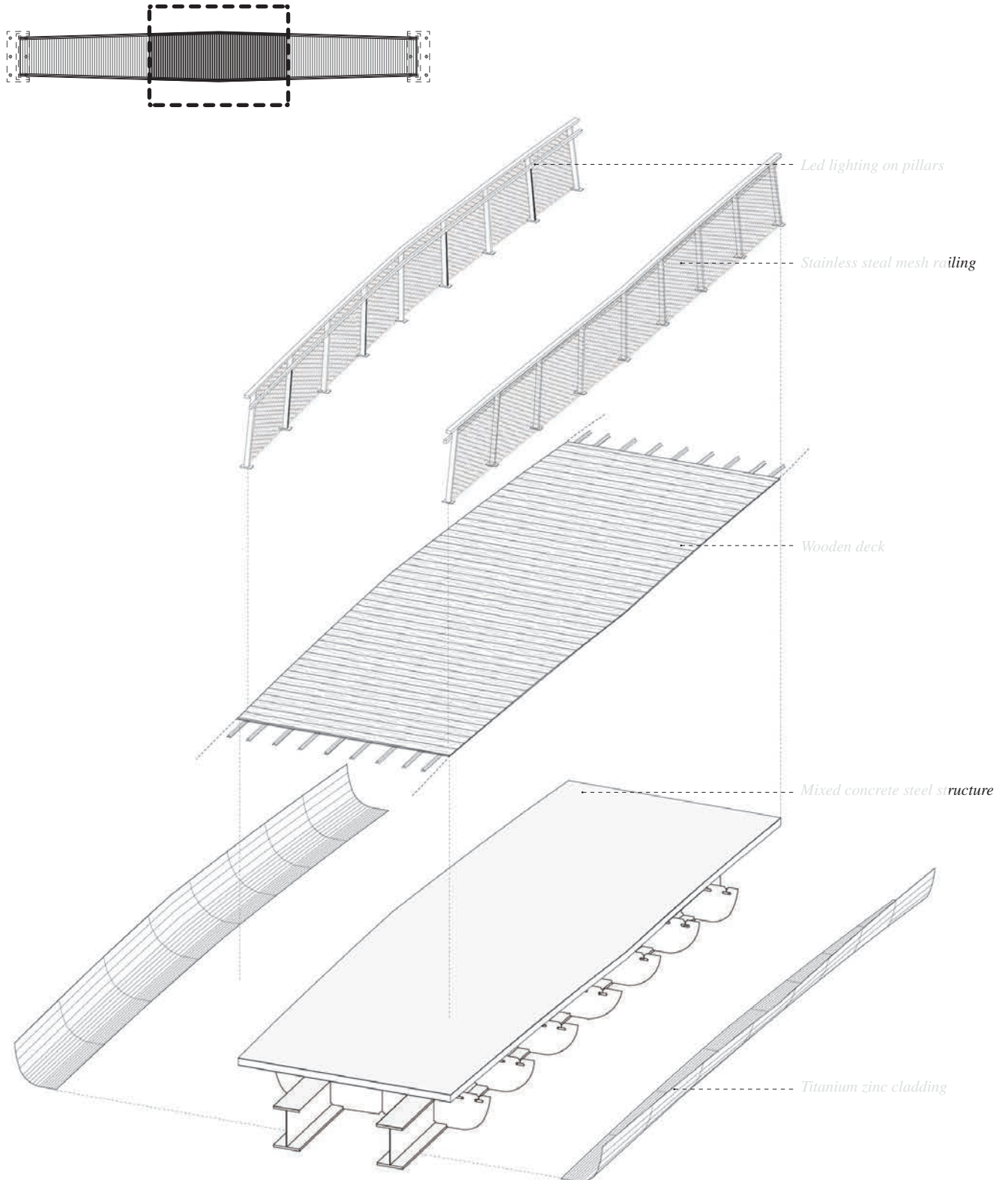
steel concrete structure both for the ease and simplicity of construction and for durability over time.



1 bridge at thhe end of Fallerovo šetalište

2 bridges on the Central park

Axonometric view of components and materials proposed for the new bridges.





Wood decking



Led lighting on railing



Titanium zinc cladding

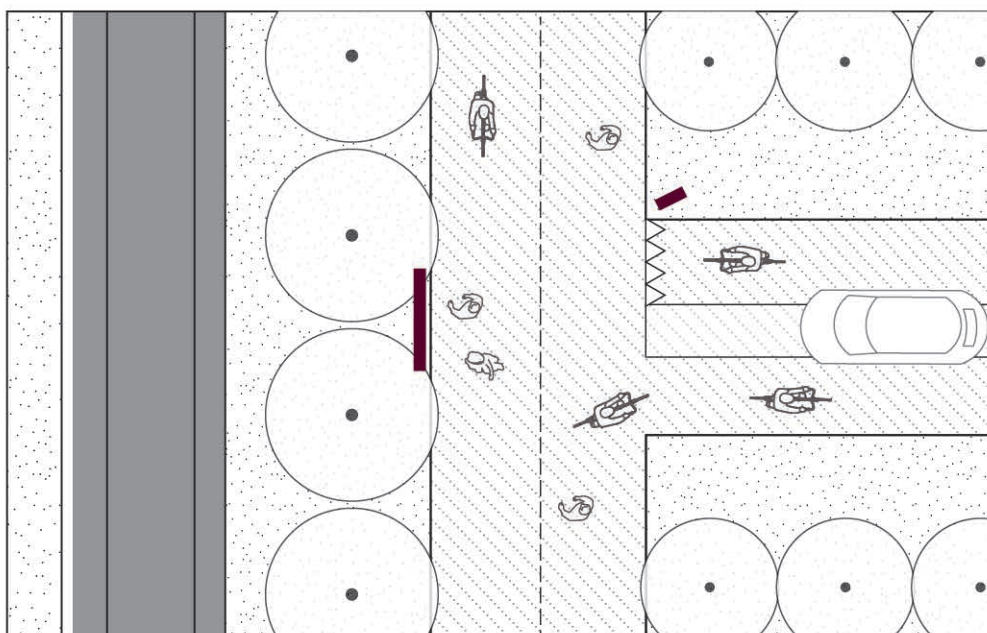
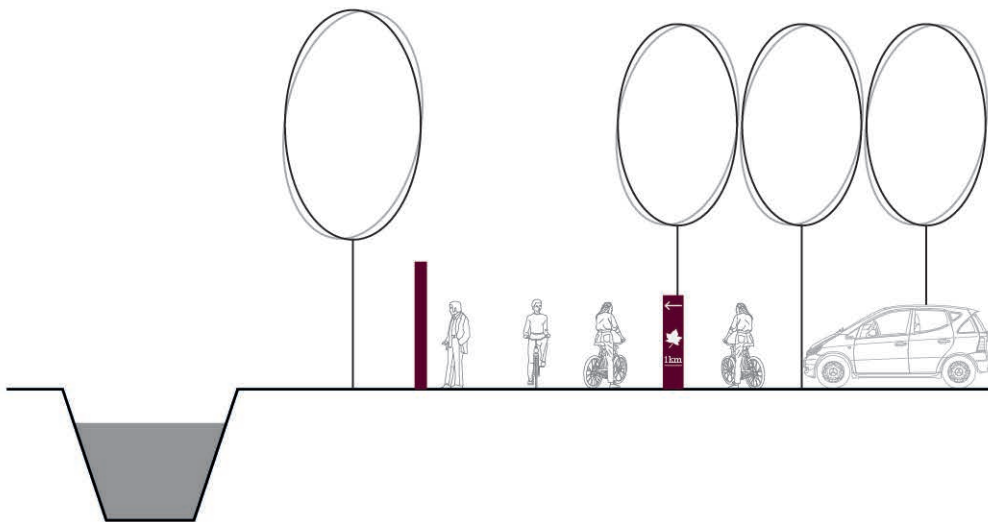
The propose enhances its constructive clarity through the simplicity and synthesis of the architectural elements:

- the parapet, consisting of a metal mesh hooked to the handrail and to the steel uprights, which guarantees visual transparency
- lighting with LED lights arranged along the uprights, to create a corridor of light of sure effect also in consideration of the “transparency” of the parapet, which ensure benefits in terms of performance, energy savings and minors maintenance costs
- the Ipè wooden walkway, characterized by extreme compactness and hardness that make it suitable external use
- the cladding of the metallic structure in zinc-titanium laminate gives the architecture elegance and formal cleanliness.

2.3 Identity

Vertical signage

The route is equipped with a coordinated signage system that provides indications of distance (kilometres, directions, distances) and naturalistic and general information on the river and the park.





SOCIAL BENEFITS

- Encourages physical activity
- Improved mental health
- Increased sense of community
- Ease of access to social, recreation and sporting activities

ECONOMIC BENEFITS

- Improved tourist and recreation facilities



Examples of route signage



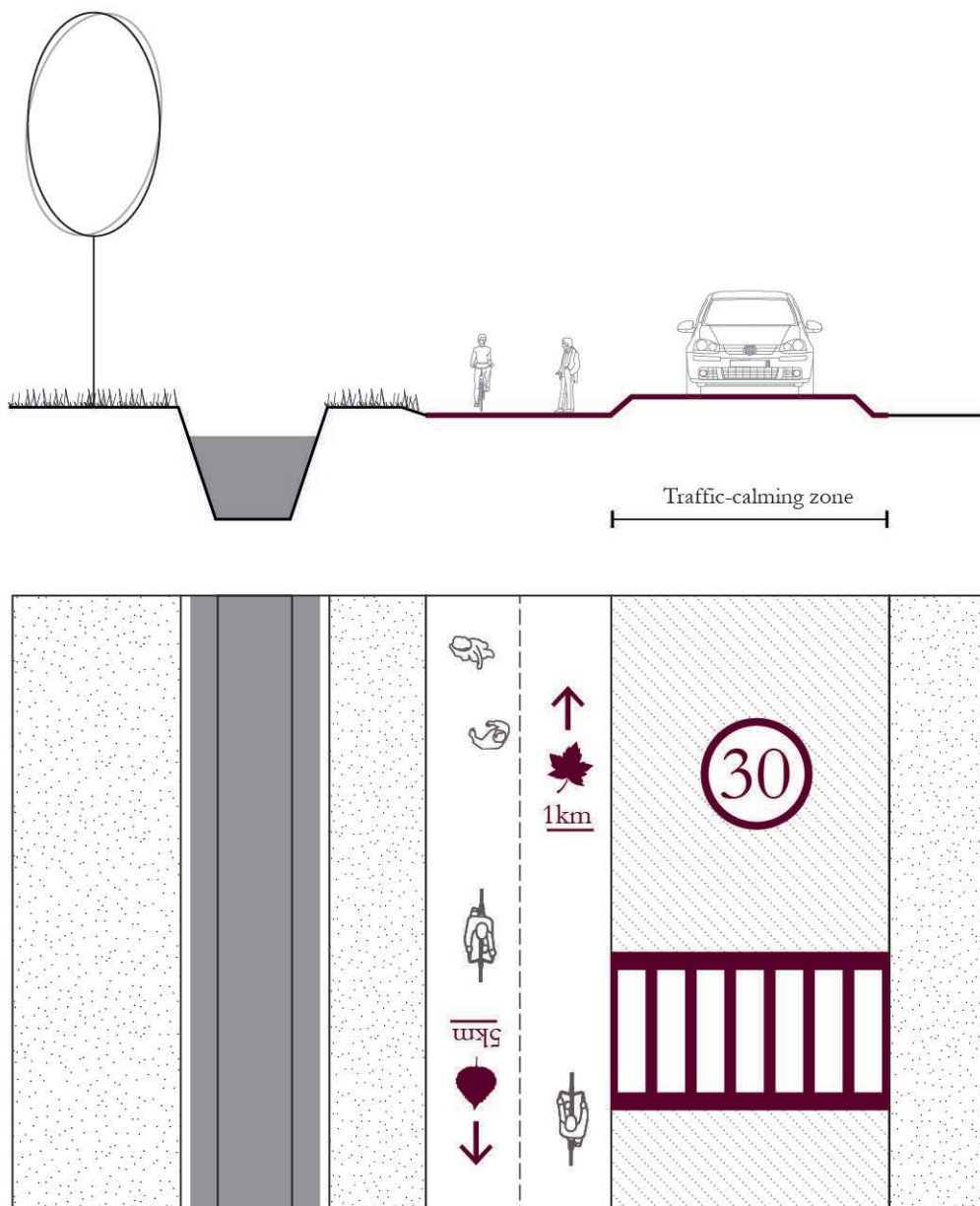
Examples of general information signage

2.3 Identity

Horizontal signage

The route is equipped with a coordinated signage system that provides indications of distance (kilometres, directions, distances) and naturalistic and general information on the river and the park.

In addition to the signage, on roads with limited traffic, there are also slowing down systems to ensure the safety of pedestrians and cyclists.





SOCIAL BENEFITS

- Encourages physical activity
- Provides more opportunities and places for children to play
- Improved mental health
- Creates and improves spaces for socialising, interaction and events
- Improved workplace productivity
- Reduces stress
- Improved quality of life and health and well being
- Ease of access to social, recreation and sporting activities



ECONOMIC BENEFITS

- Improved tourist and recreation facilities

Distance and routes signage



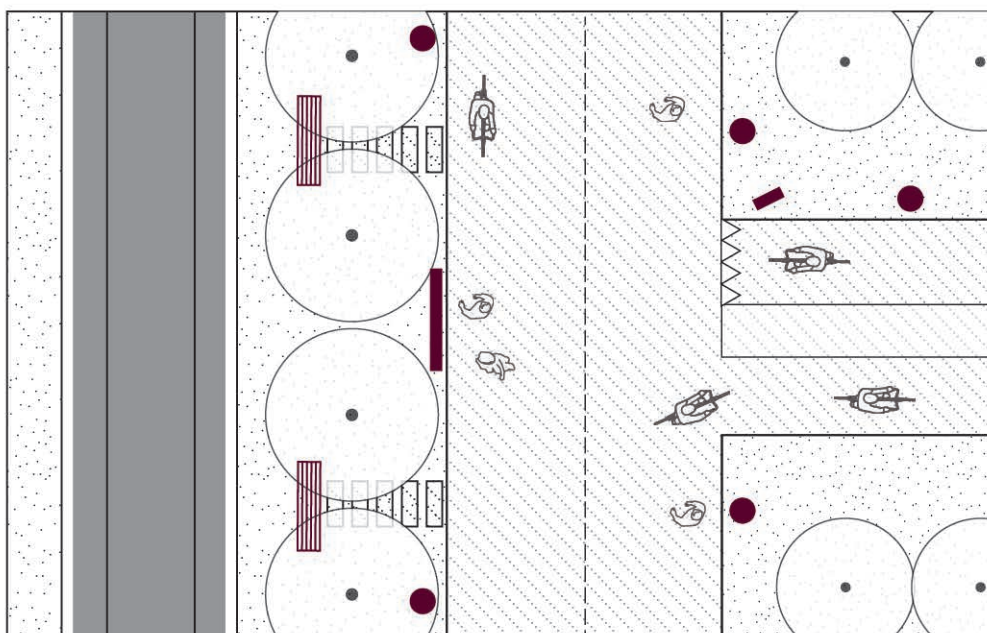
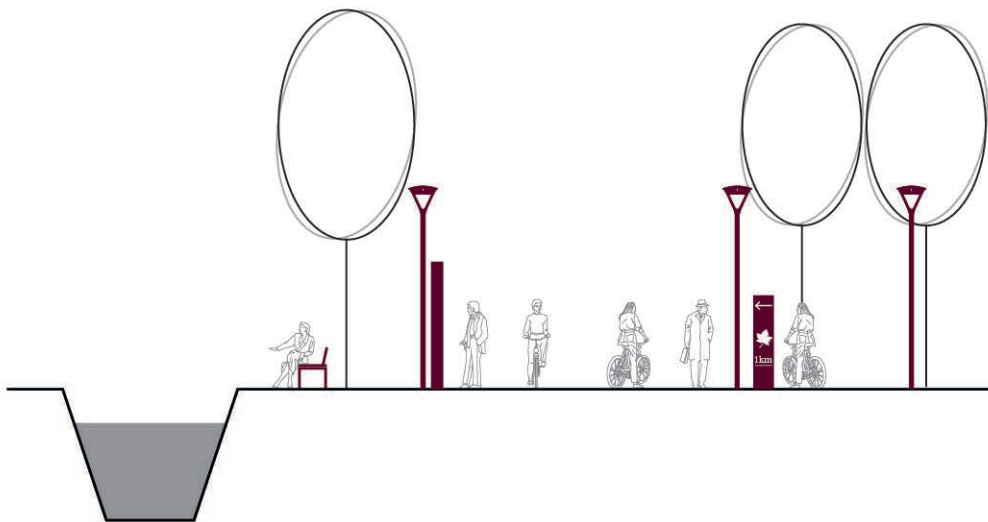
Thematic pattern



2.3 Identity

Urban furniture

The selection of coordinated furnishings characterize all new interventions in order to give identity and recognizability to the project.





SOCIAL BENEFITS

- Encourages physical activity
- Improved mental health
- Increased social cohesion
- Increased sense of community
- Ease of access to social, recreation and sporting activities

ECONOMIC BENEFITS

- Improved tourist and recreation facilities

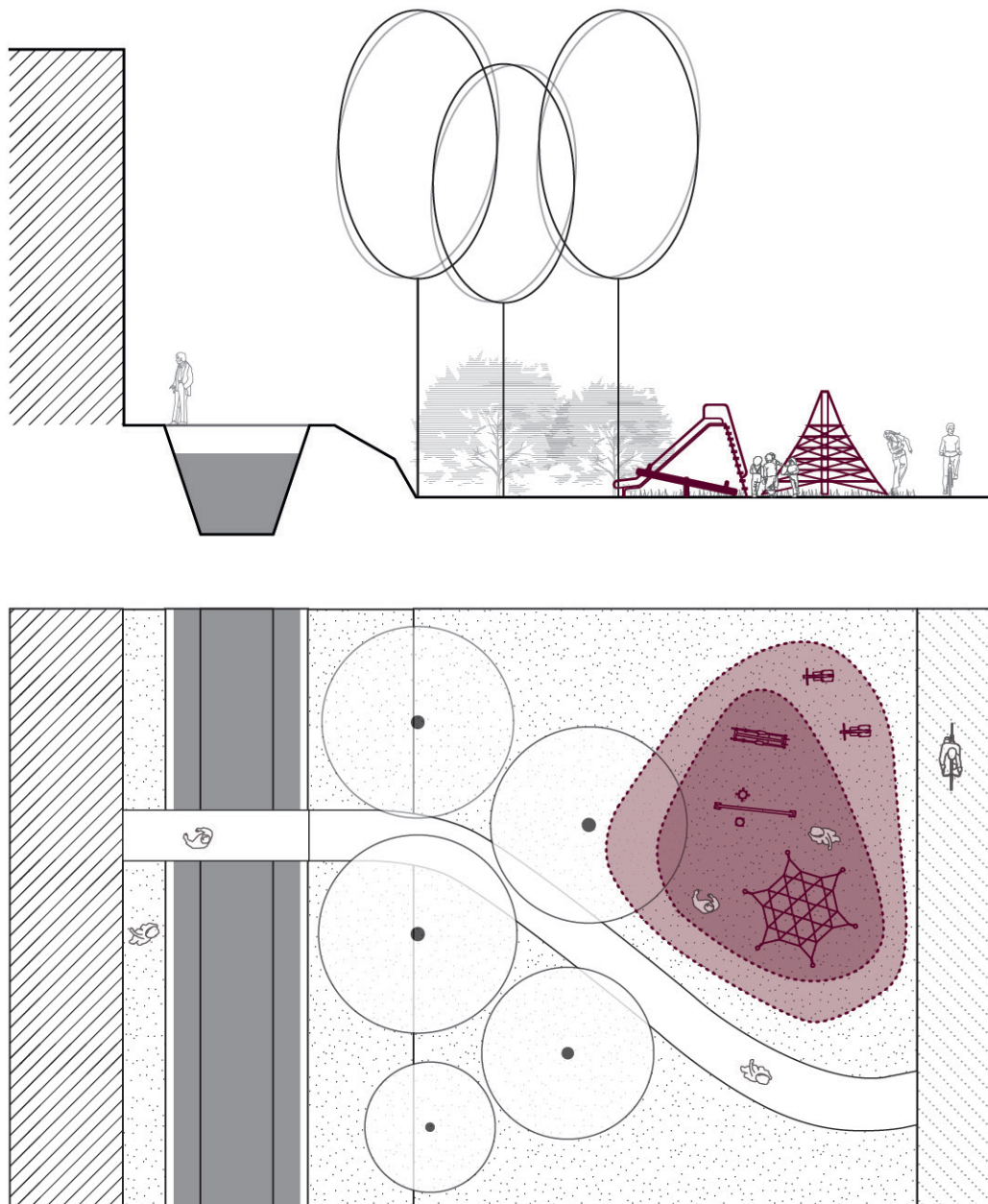


Coloured furniture to give identity and recognizability to the project

2.3 Identity

New activities

The project foresees the introduction of new activities for the community such as playgrounds, meeting places, dehors, shops, food trucks and, more generally, activities able to involve the neighbourhood.





New playgrounds for families



Meeting points for spare time



Neighborhood identity

SOCIAL BENEFITS

- Provides more opportunities and places for children to play
- Improved mental health
- Creates and improves spaces for socialising, interaction and events
- Improved workplace productivity
- Creates opportunities for community participation and volunteering
- Reduction in crime
- Reduces stress
- Improved childhood development
- Improved quality of life and health and well being
- Ease of access to social, recreation and sporting activities
- Increased social cohesion
- Increased sense of community

ECONOMIC BENEFITS

- Boosting property values including
- Faster property sales
- Encourages inward investment
- Improved tourism and recreation facilities

3. Project / concept

7. The upstream part / hillside

6. The corridor between the railway and Ilca

5. Green corridor (north segment)

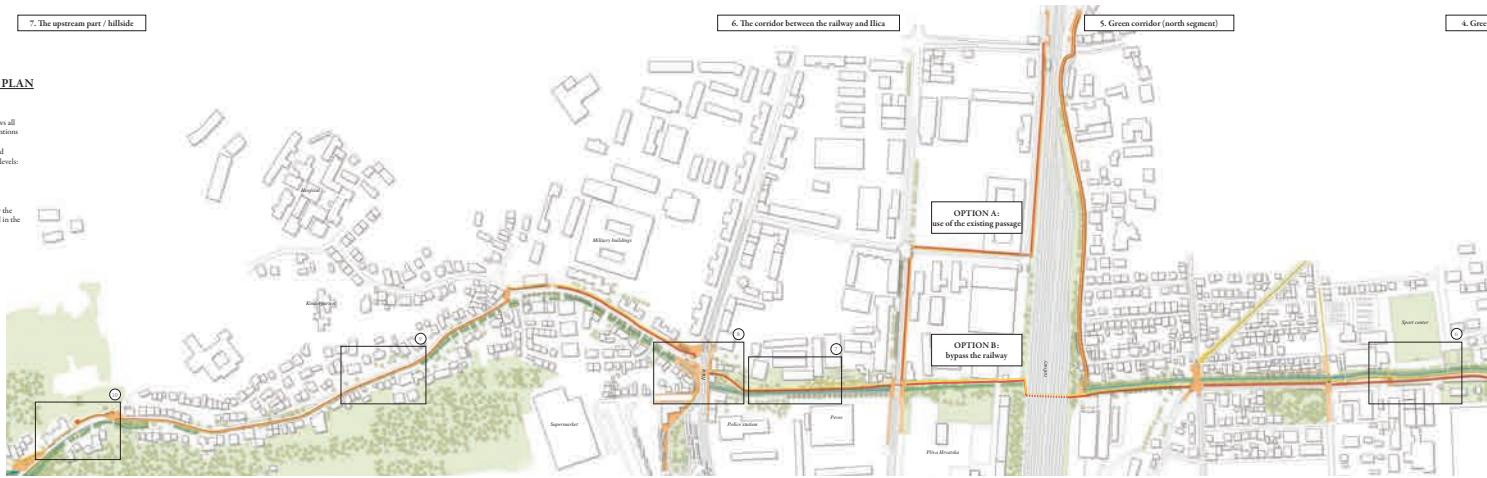
4. Green corridor (south segment)

STRATEGY PLAN

The masterplan shows all the strategic interventions proposed along the *Cruces*, analysed through three main levels:

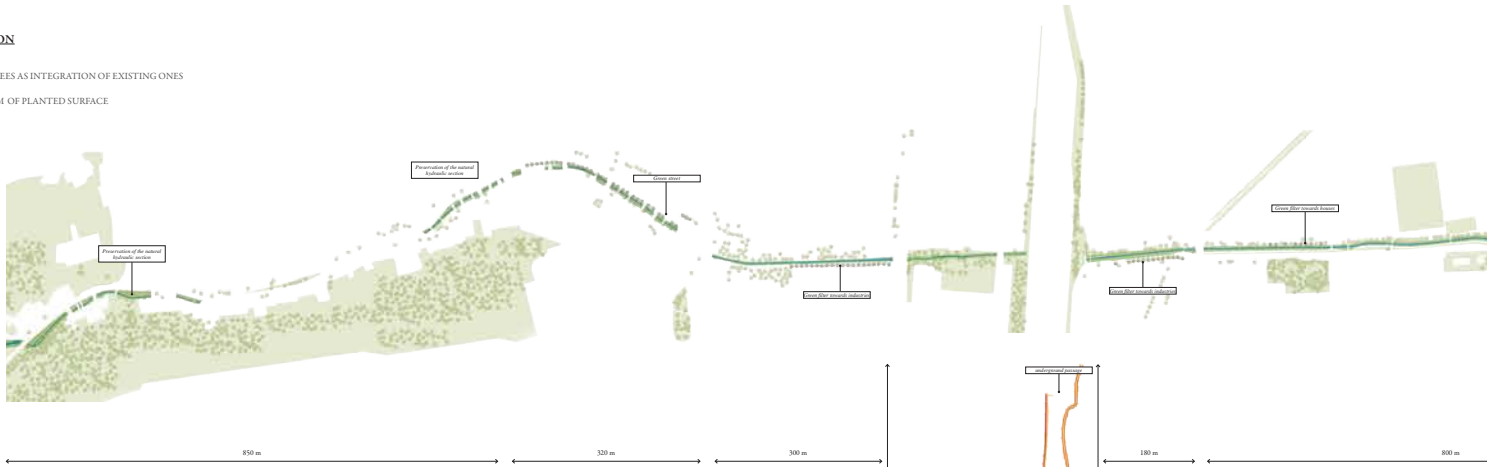
- vegetation
- slow mobility
- public space

For all the layers the interventions follow the guidelines explained in the attached document.



VEGETATION

500 NEW TREES AS INTEGRATION OF EXISTING ONES
30.000 SQM OF PLANTED SURFACE

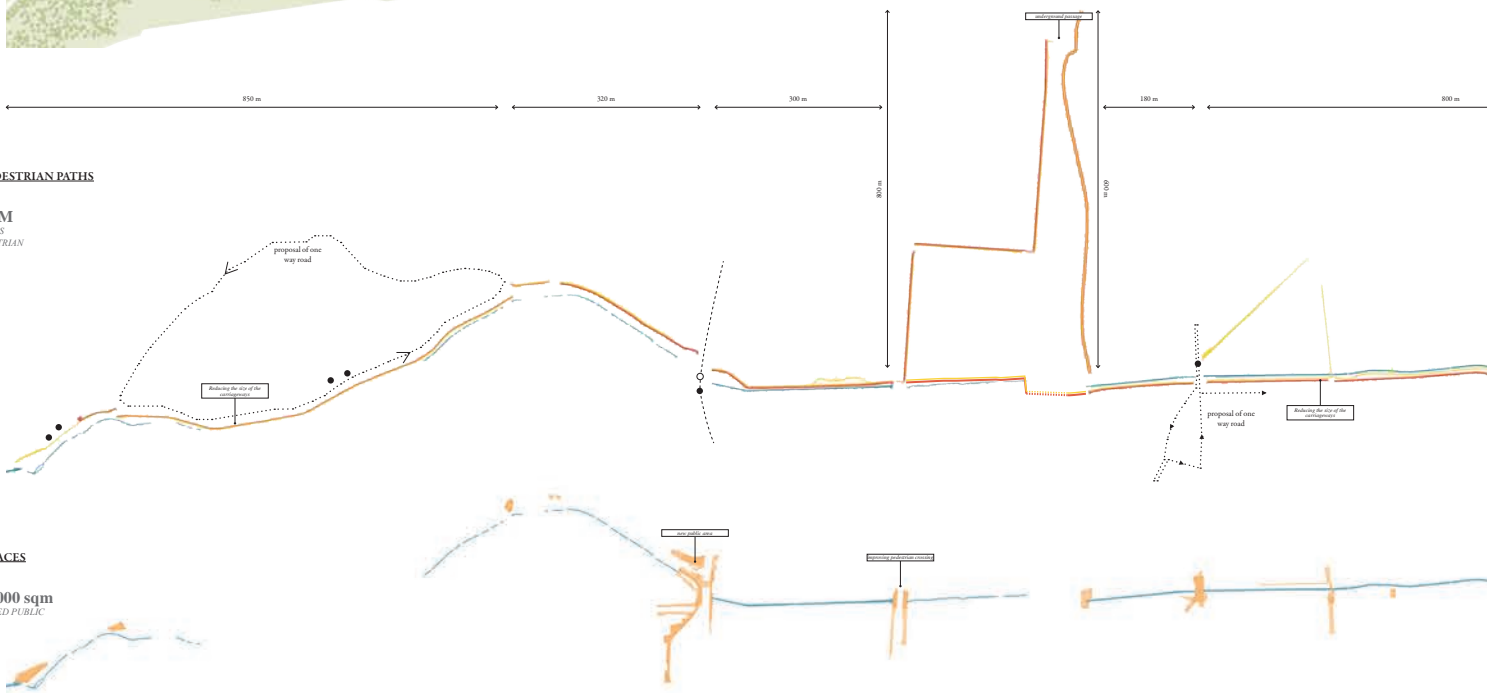


CYCLE PEDESTRIAN PATHS

NEARLY 6 KM
OF CONTINUOUS
CYCLE PEDESTRIAN
PATHS

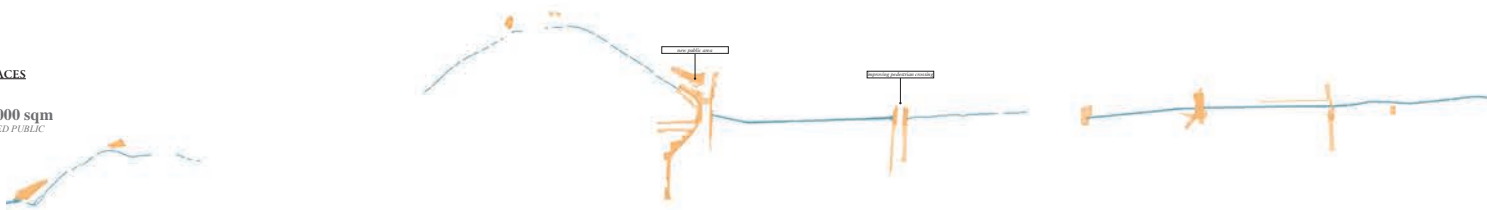
pedestrian path
cycle path

bus stop
train stop



PUBLIC SPACES

NEARLY 30.000 sqm
OF REVITALIZED PUBLIC
SPACES





3.1 The cars and the park(ing)

One way loop in Črnomerec road: now the cars have six meters. Creating a one way loop (in the image below in black) the slow mobility (in the image below in yellow) will have more space



east/west road connections

shared roads: 30 km/h speed limit

new north south tram link

Existing tramlines Existing railways

Possible new north/south tramway link

Črnomerec

one way roads

est west connections roads

30 km/h roads

● Bus stops

● Tram stops

bike paths (source GUP)

The park needs to fix three main conflicts between the traffic and the soft mobility:

1) From Jarun to the Medvednica mountain the continuity of the slow mobility paths have to be guaranteed by the “new” linear park.

To do so, some simple interventions should be tested where the pedestrian and the cyclist don't find any space: between Krčelićeva Ulica and Strma ulica the Črnomerec road has no space for slow mobility. In that specific case we propose to create a one way loop for cars and buses in order to liberate one roadway (3 meters of width) to dedicate it to bikers and pedestrians.

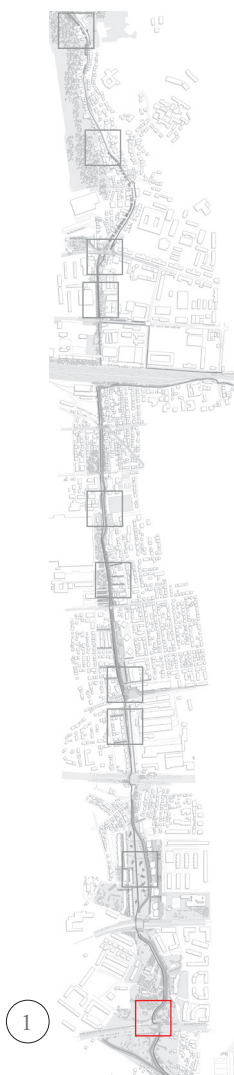
The east west road connections are maintained, but all the death end roads facing the park needs to be transformed in shared spaces, where the maximum speed allowed needs to be 30 km/h.

2) Our idea is that this huge space needs to become once again public. The operation of recycling all the asphalt surface nowadays dedicated to parking could have different degrees of radicalism: from very low cost solution (following the tactical urbanism logic¹) arriving to very definitive operation like the destruction of the asphalt. The range of the possible use in this new public reconquered from the cars could became space for temporary markets, playgrounds, or simply spaces dedicated to planting vegetations (which will help to combat the heating island effects).

1 Tactical urbanism is an umbrella term used to describe a collection of low-cost, temporary changes to the built environment, usually in cities, intended to improve local neighborhoods and city gathering places.[1] Tactical Urbanism is also commonly referred to as guerilla urbanism, pop-up urbanism, city repair, or D.I.Y. urbanism



A - Pedestrian and cycle paths with planted riverbanks and green filter along



1. The connection with Sava river and Potok Vrapčak - ecological park

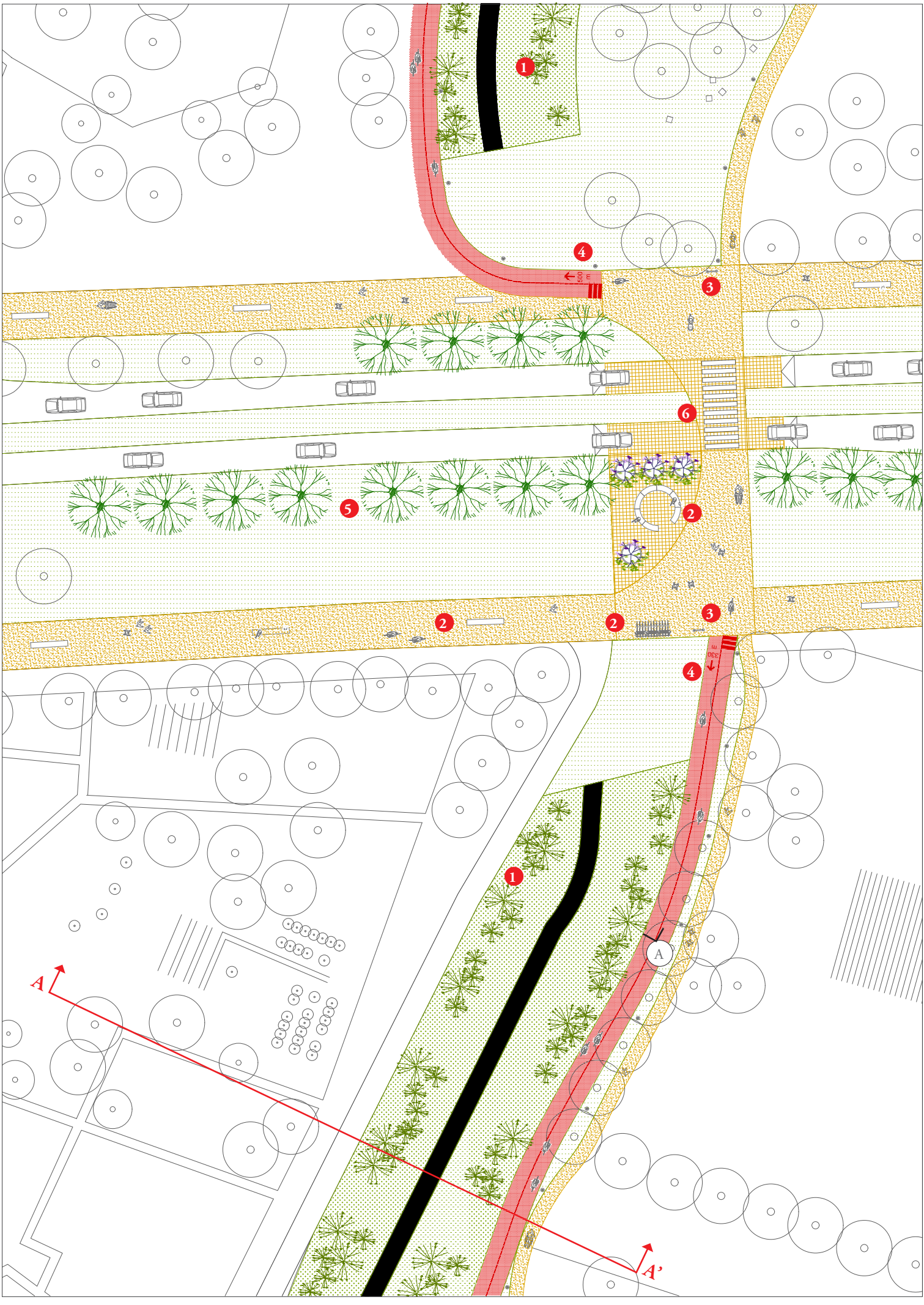
From Sava river to Jarunska ulica the new bike and pedestrian path is located in the East bank. The two paths are separated by vegetation. This part is already green and characterized by many gardens, but some new area could be planted. In the document SPASIMO POTOK ČRNOMEREC - Građanska inicijativa, Oct. 2018, a new bridge is proposed in this part.

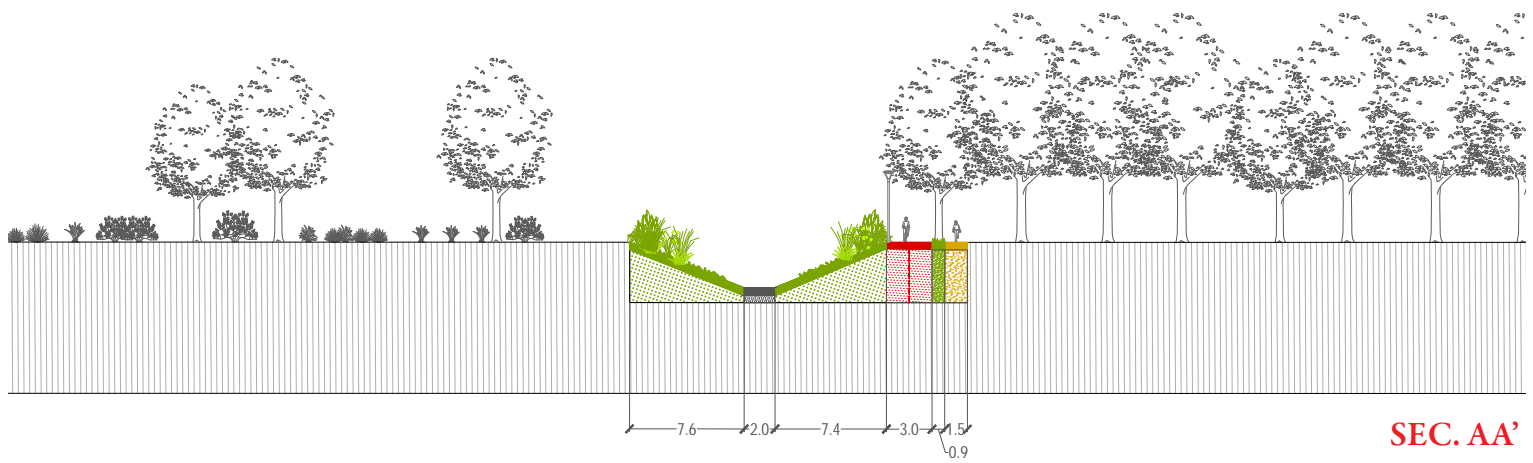
The new crossing on Jarunska ulica needs to be designed in order to augment the safety of the bikes and pedestrians. This crossing becomes the opportunity to design a new public space with benches and info graphics.

Continuing toward north, until Horvaćanska cesta, the length of the park is very generous and all the vegetable gardens are included in the design: they become the main material to build an area oriented to the ecology where the trees and the vegetation contribute to clean the air and offer a calm space for the loisir.

All the paths and roads connecting the neighbours are designed in order to signal the presence of the new linear park.

The existing playground (Ulica Jurja Neidhardta) is integrated in the project and will benefit of a new buffer area made of vegetation.

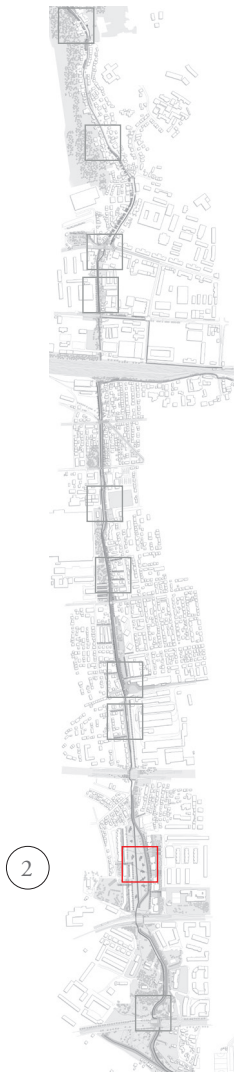




- ① Planting riverbanks
- ② Urban furniture (bicycle racks, benches, lights)
- ③ Vertical signage
- ④ Horizontal signage
- ⑤ Green filter towards the road
- ⑥ Improving cycle pedestrian crossing

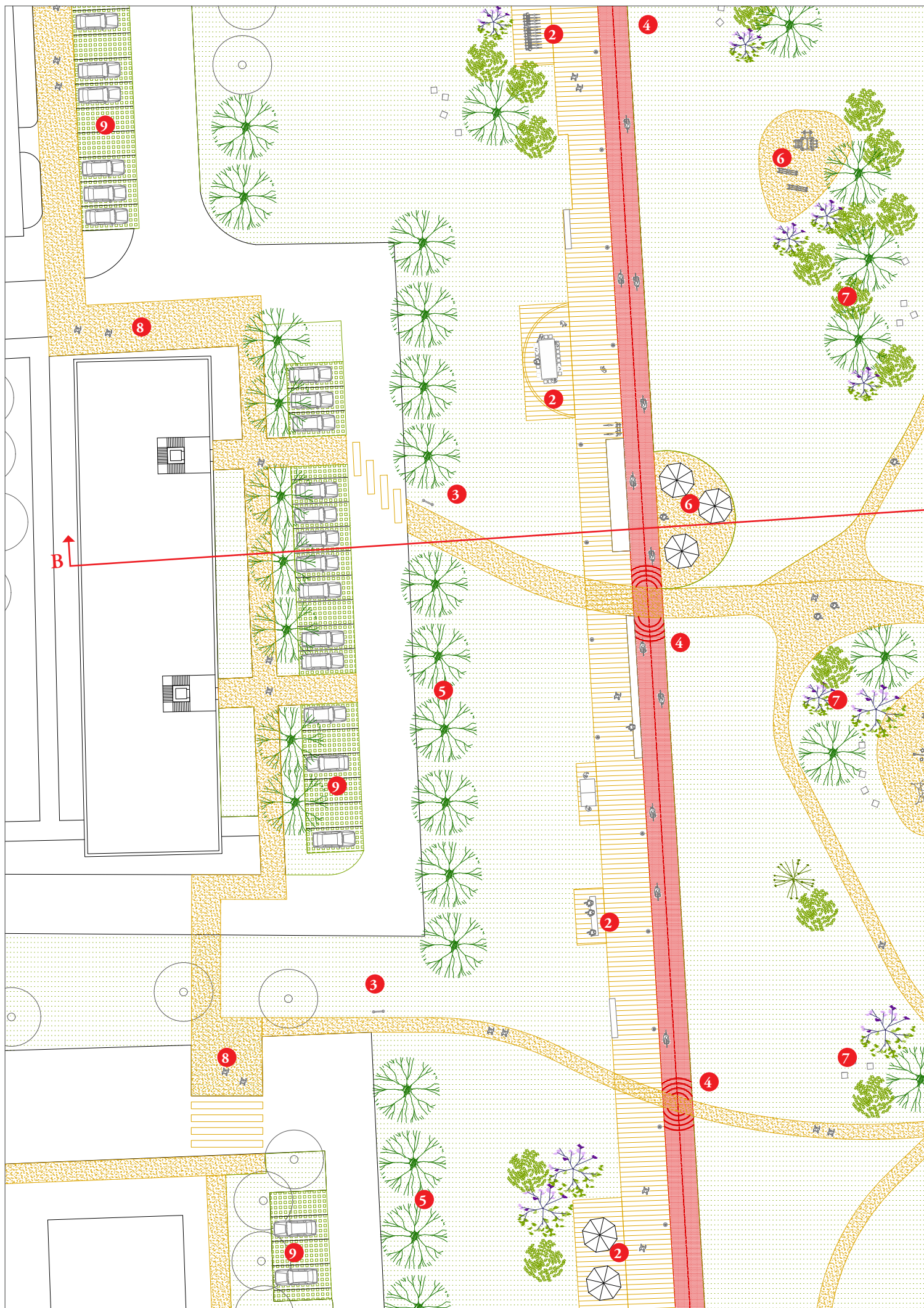


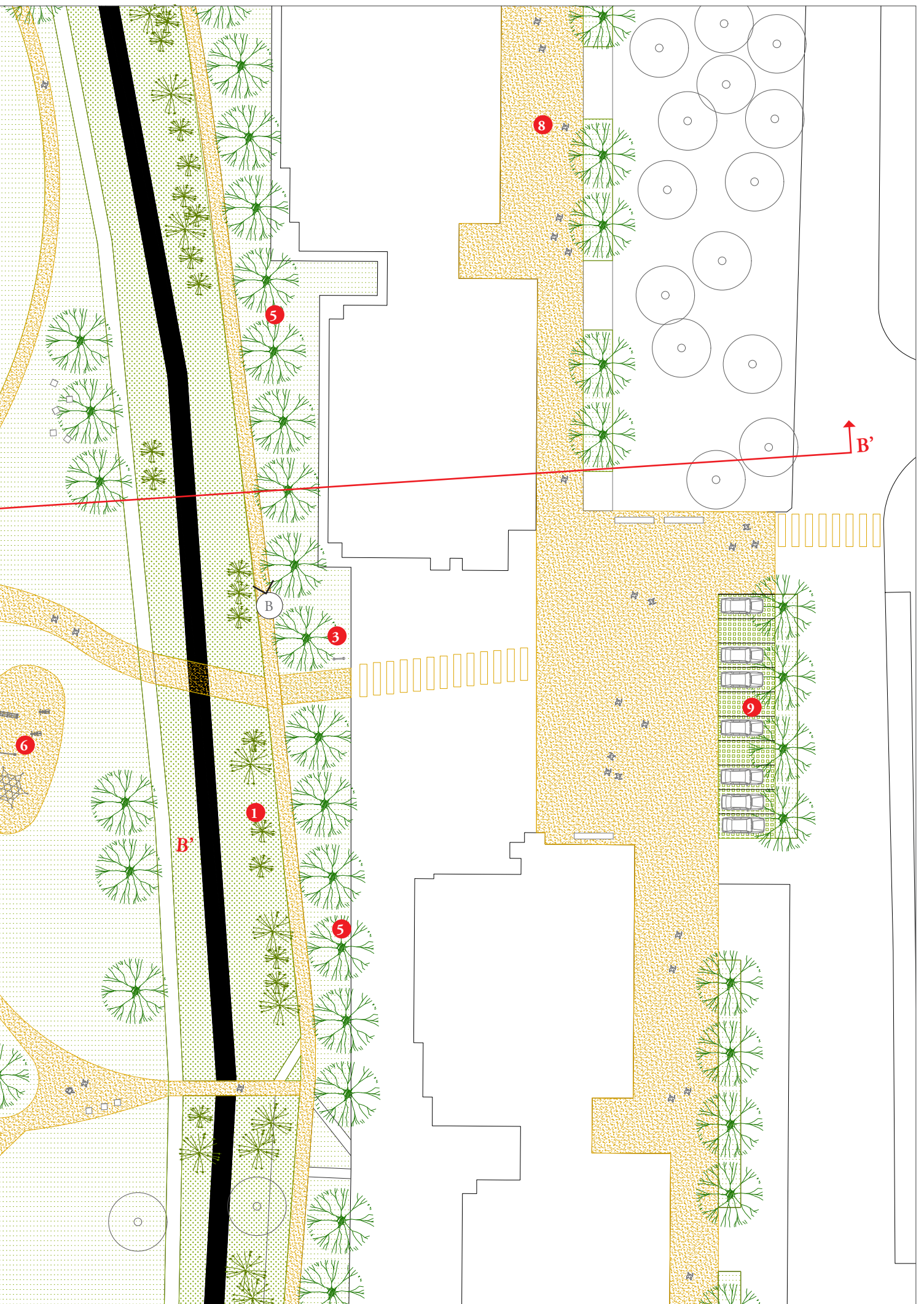
B - The path of the east side of the central park

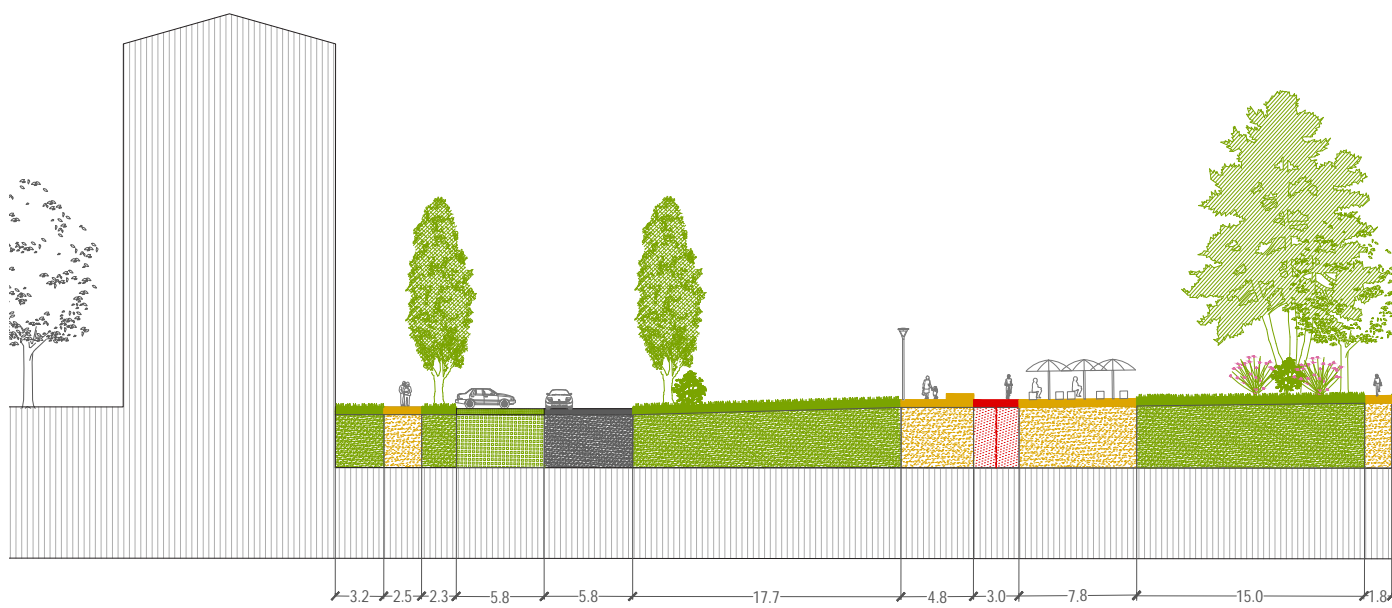


2. The central park

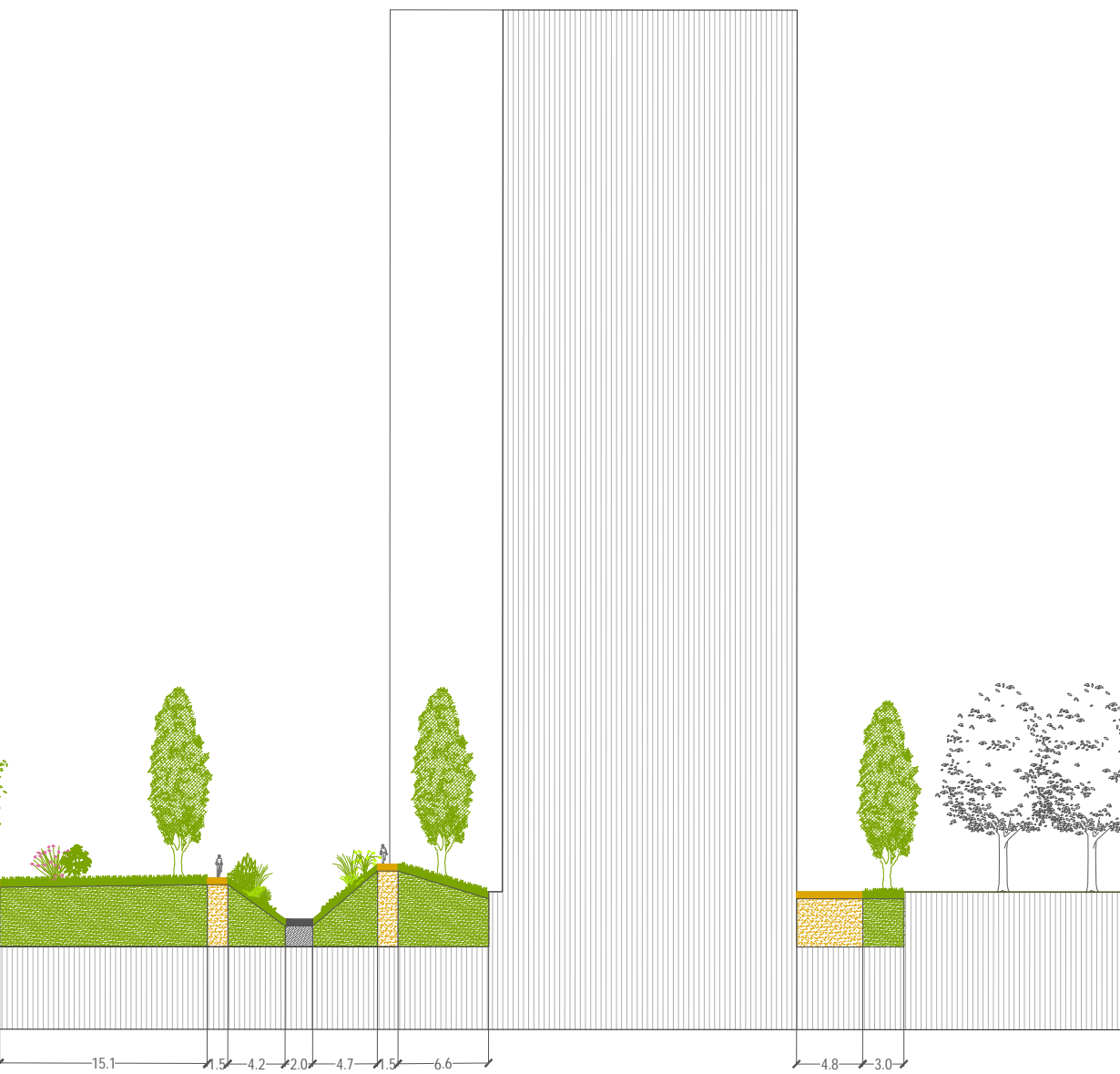
Walking from south to north, after the crossing of Horvaćanska cesta, where the tram stops has been integrated in the design of the new net of public space, a pleasant and a vast space pops up. The specific architecture which surround the existing park is a testimony of a specific national era. This peculiar aesthetics needs to be preserved. The ground floor design has been organized starting from the main north south axis - the bike highway and a large paved path. On this axis many playgrounds are connected and relax area furnished with benches. From the main axes a series of rounded path go towards the buildings where the parking surface has been rethought in order to mitigate - through green filters - the car presence and the public space has been designed in order to facilitate the connections between the building entrances, the shops and the new park.







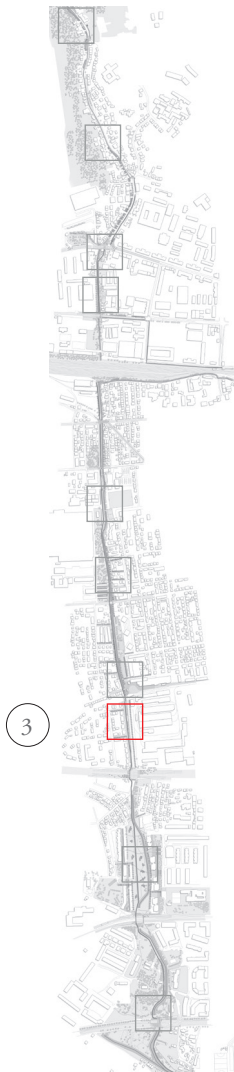
- 1 *Planting riverbanks*
- 2 *Urban furniture (bicycle racks, benches, lights, umbrellas, picnic tables)*
- 3 *Vertical signage*
- 4 *Horizontal signage*
- 5 *Green filter towards houses and parkings*
- 6 *New activities (playground)*
- 7 *Increasing biodiversity with new planting*
- 8 *New connections and public spaces*
- 9 *Green parking (permeable paving)*



SEC. BB'

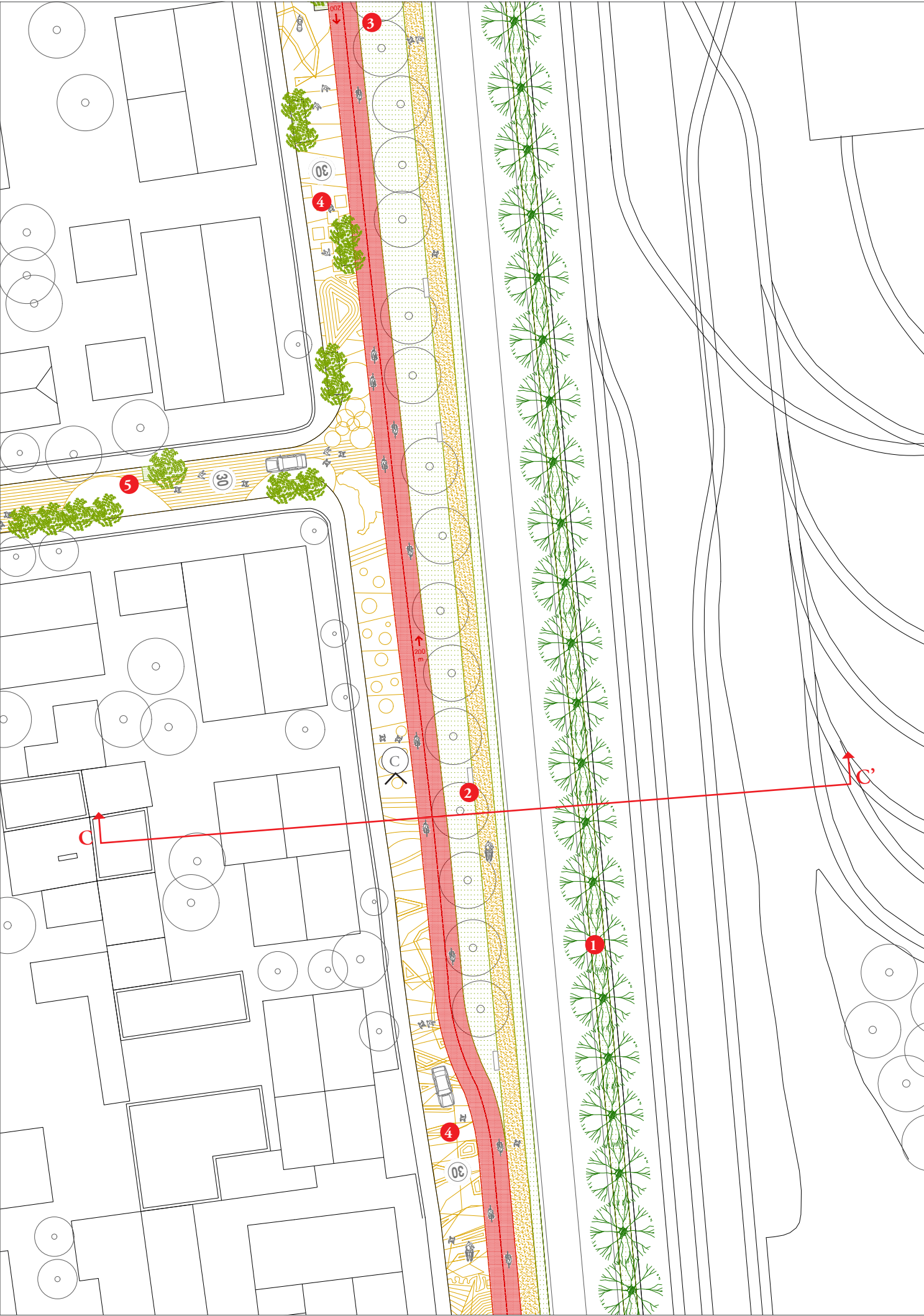


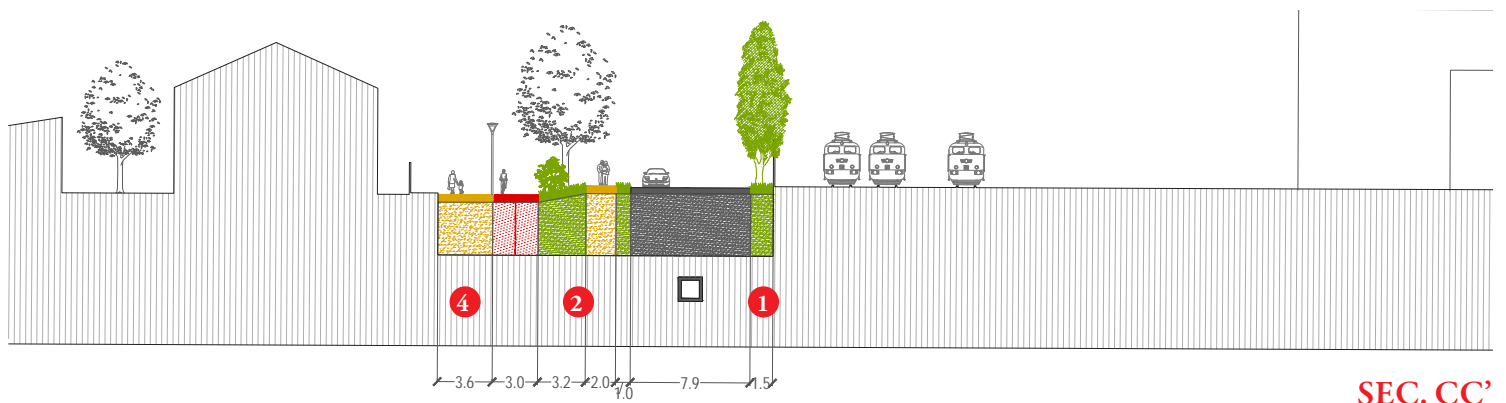
C - The new shared space: bikes, pedestrians and cars all at the same speed (30 km/h)



3. Culvert creek: along the tram deposit

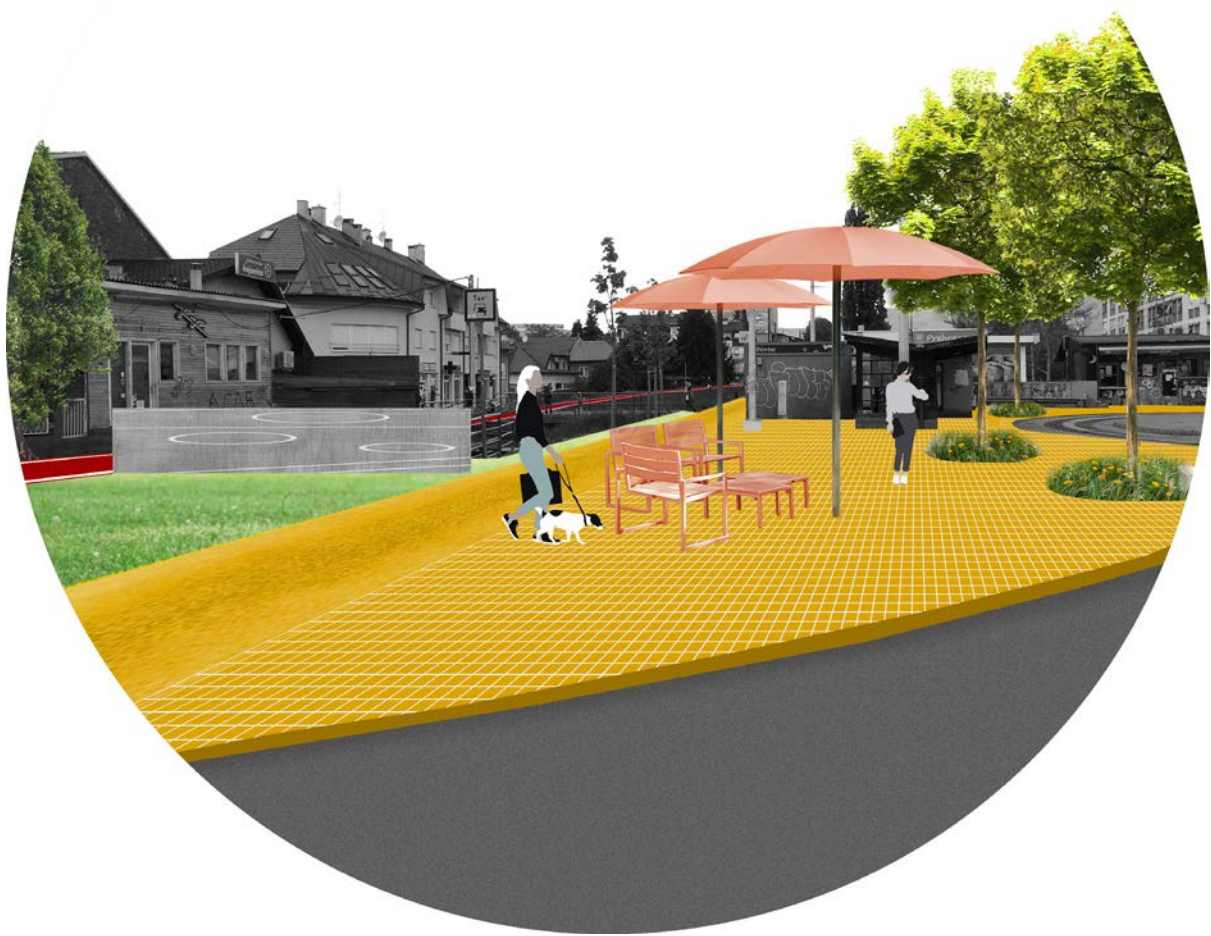
Walking from south to north, after the crossing of the very busy Zagrebačka avenija there is a part where the creek has been culvert. We think that the reopening of the creek is not necessary and its economic feasibility is very hard to be demonstrate, but the project anyway needs to signalize the presence of the Črnomerec. Here the strategy applied is to enhance the former space of the creek: this space becomes a shared space (where cars, bikes and pedestrians have all the same speed) through the process of recycle the existing asphalt: the act of painting it will declare to the car drivers that they are in a space where a maximum attention to the pedestrians needs to be applied.



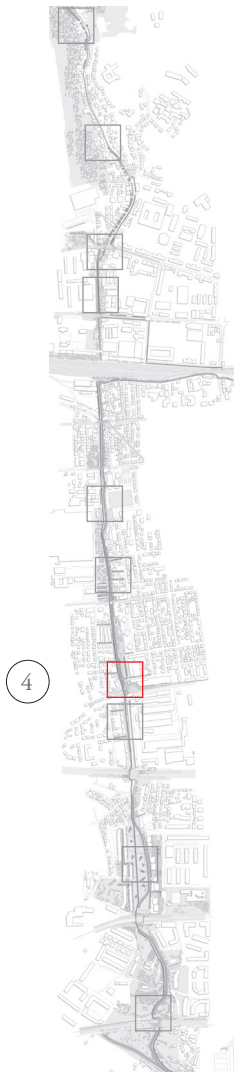


SEC. CC'

- ① *Green filter towards tram deposit*
- ② *Urban furniture (benches)*
- ③ *Horizontal signage*
- ④ *30 km roads with painted asphalt*
- ⑤ *Green connections towards residential areas*



D - The new Ljubljanska trg, a connective square between the north and the south segments of the Črnomerec.

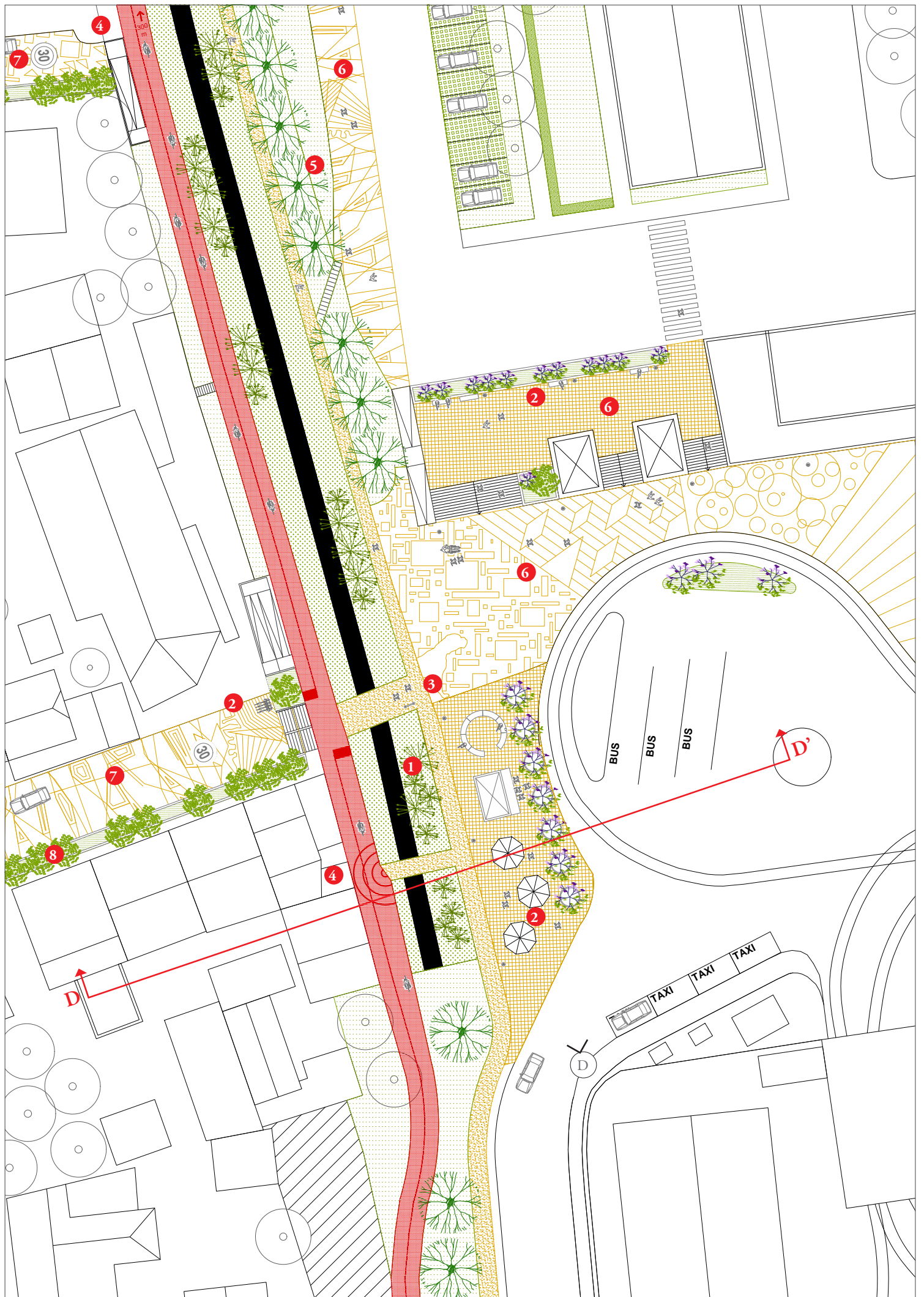


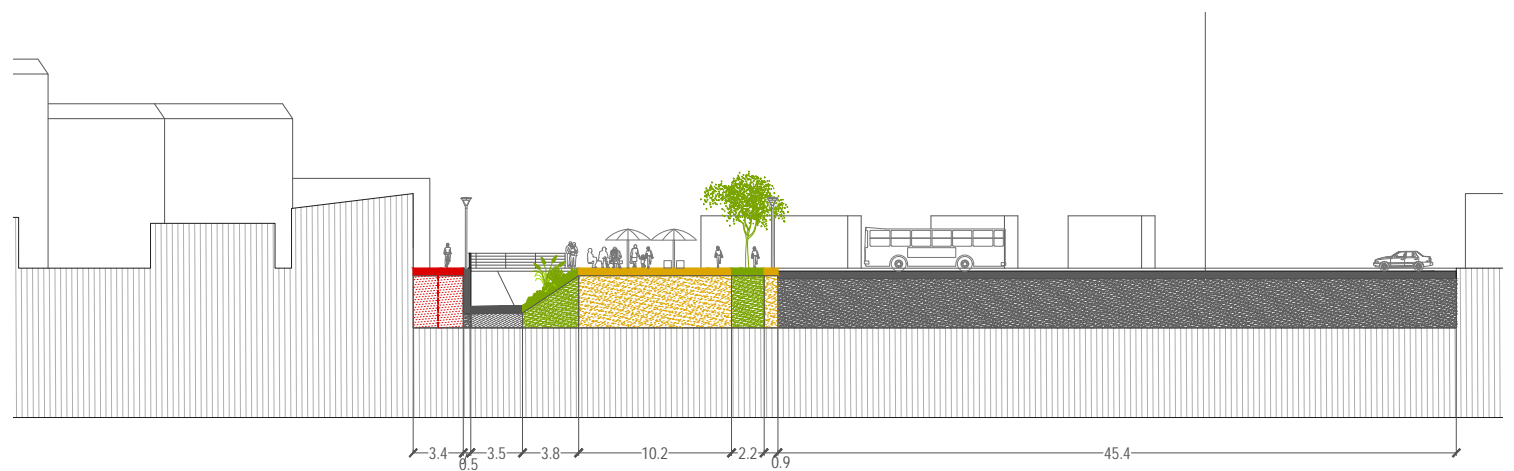
4. Green corridor (south segment)

Walking from south to north, the beginning of a linear path long almost two kilometres is marked by a new square: Ljubljanska trg.

This square off course is already there, is lived as a square but its design make it difficult perceive as a square. The design intention is first of all create a synergy between the new public space connecting the existing shops, the public transport stops and the new north south bike highway.

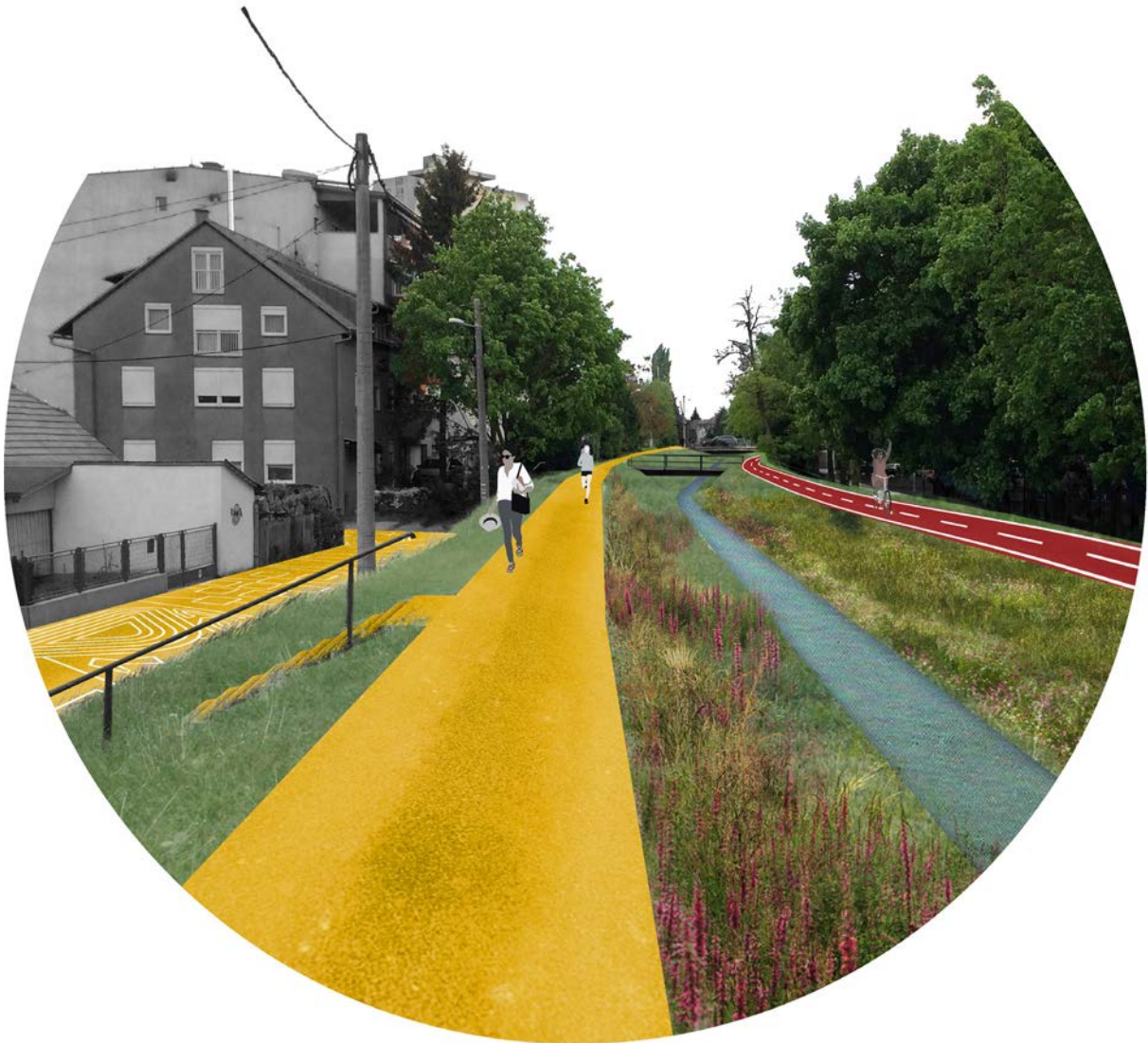
This synergy will create a vibrant public space. Continuing towards north the division of the flows (bicycles and pedestrians) is made thanks the creek: on the east side a pedestrian path is proposed and on the west side there is a 3 meters bike path. The bicycle path is enlarged thanks to a new support concrete wall.





SEC. DD'

- ① *Planting riverbanks*
- ② *Urban furniture (bicycle racks, benches, umbrellas)*
- ③ *Vertical signage*
- ④ *Horizontal signage*
- ⑤ *Green filter towards the parkings*
- ⑥ *New connections and public spaces*
- ⑦ *30 km roads with painted asphalt*
- ⑧ *Green connections towards residential areas*
- ⑨ *Green parking (permeable paving)*



E - Pedestrian and cycle paths are divided by the stream. The new shared asphalt space is painted.



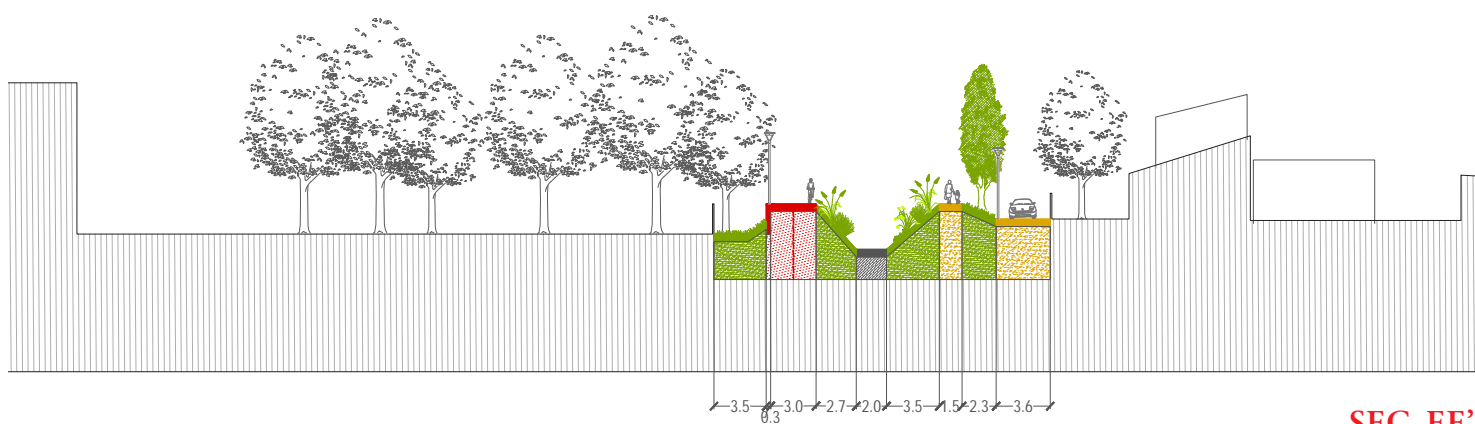
5. Green corridor (residential street)

Walking from south to north, after the crossing of Baštijanova ulica the type of section of the bike highway (with the flows divided) continues until Zagorska ul.

On the East side, the roads facing the creek along the residential area, characterized by small houses, need to be rethought, through a redesign that allows the shared use of the roads (pedestrian and only residential cars).

Going north, a new pedestrian bridge is proposed at the beginning of sport centre in order to maintain the flows separated.



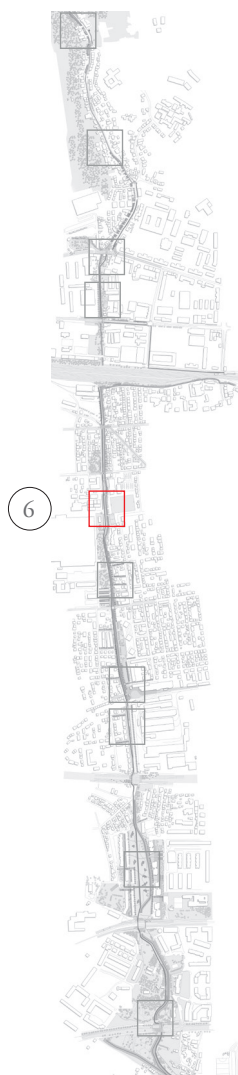


SEC. EE'

- ① *Planting riverbanks*
- ② *Vertical signage*
- ③ *Horizontal signage*
- ④ *Green filter towards the houses*
- ⑤ *30 km roads with painted asphalt*
- ⑥ *Green connections towards residential areas*



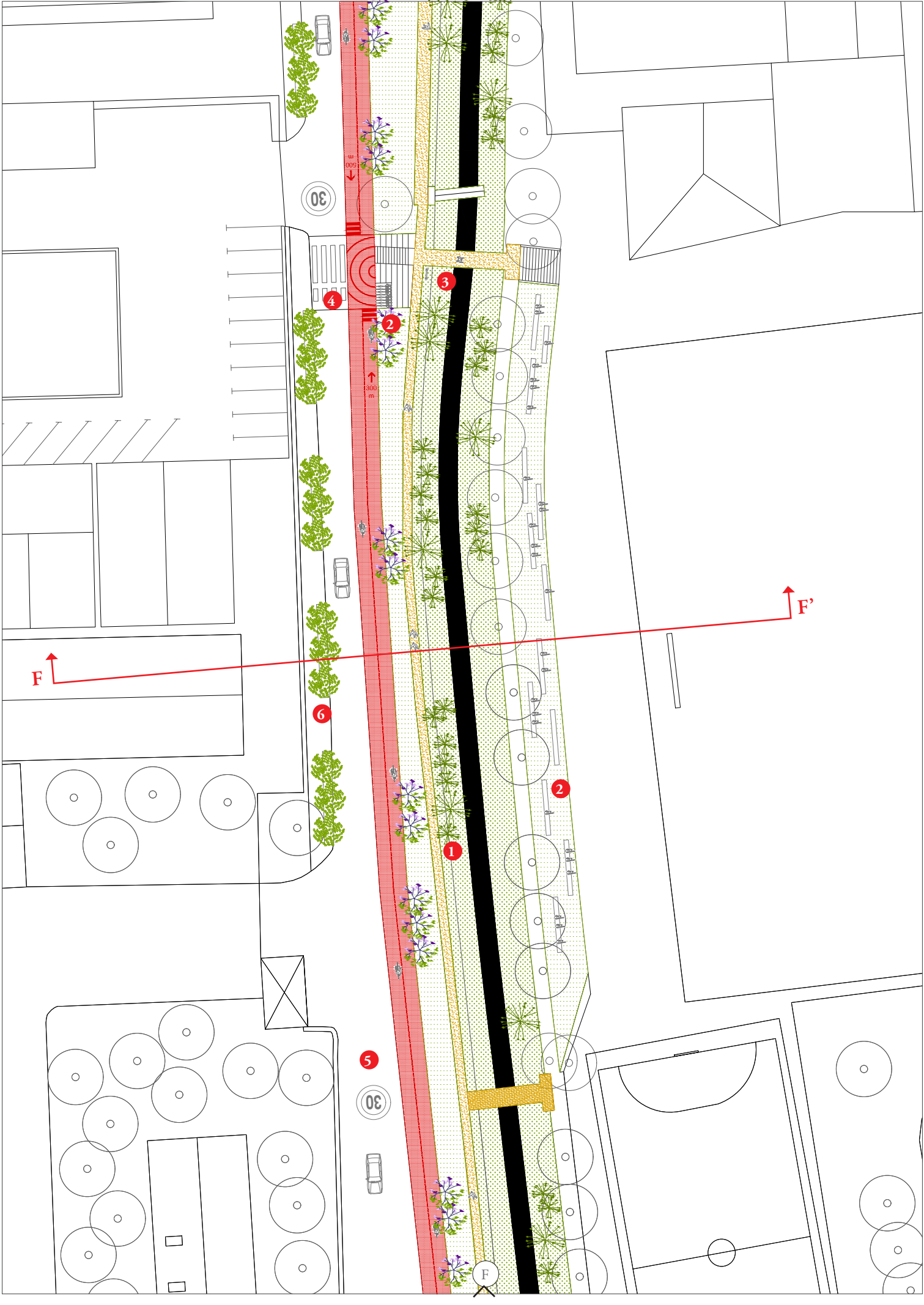
F - The pedestrian and the bicycle path is divided by a natural filter.

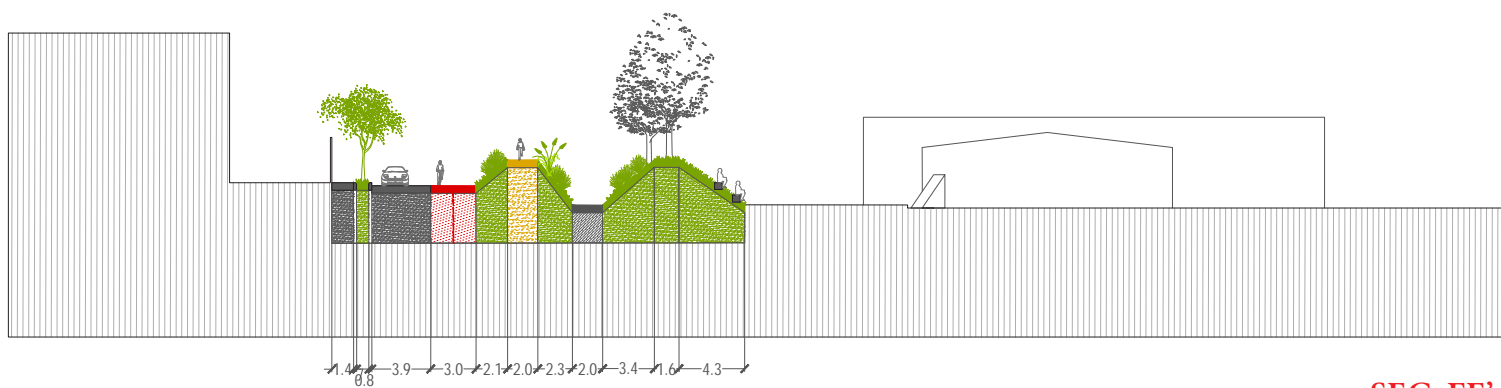


6. Green corridor (north segment)

Near the industrial area, the Fallerovo šetalište is totally rethought: a parkway, allowing the passage of the cars for the existing industry, with new trees and a generous bike path painted on the existing street and the pedestrian path above the embankment.

In order to underpass the railway is used Ivanečka ulica for reach the existing underpass, which needs to be refreshed, and north to the railway Gradišćanska ulica. In that way, adding a proper bike path and slowing down the speed of cars, it is possible to guarantee a safe and convenient way to reach the creek.

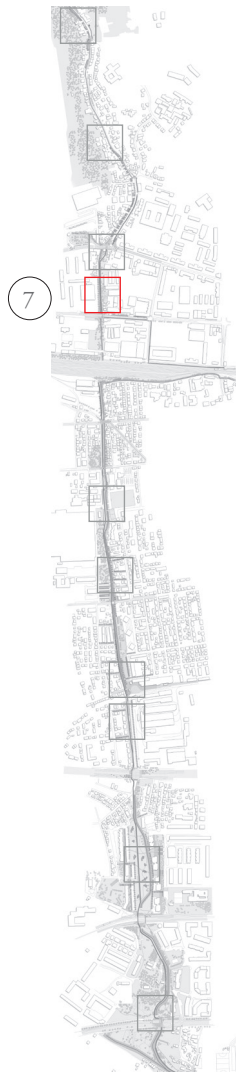




- ① *Planting riverbanks*
- ② *Urban furniture (bicycle racks, benches)*
- ③ *Vertical signage*
- ④ *Horizontal signage*
- ⑤ *30 km roads only for factories service*
- ⑥ *Green street*

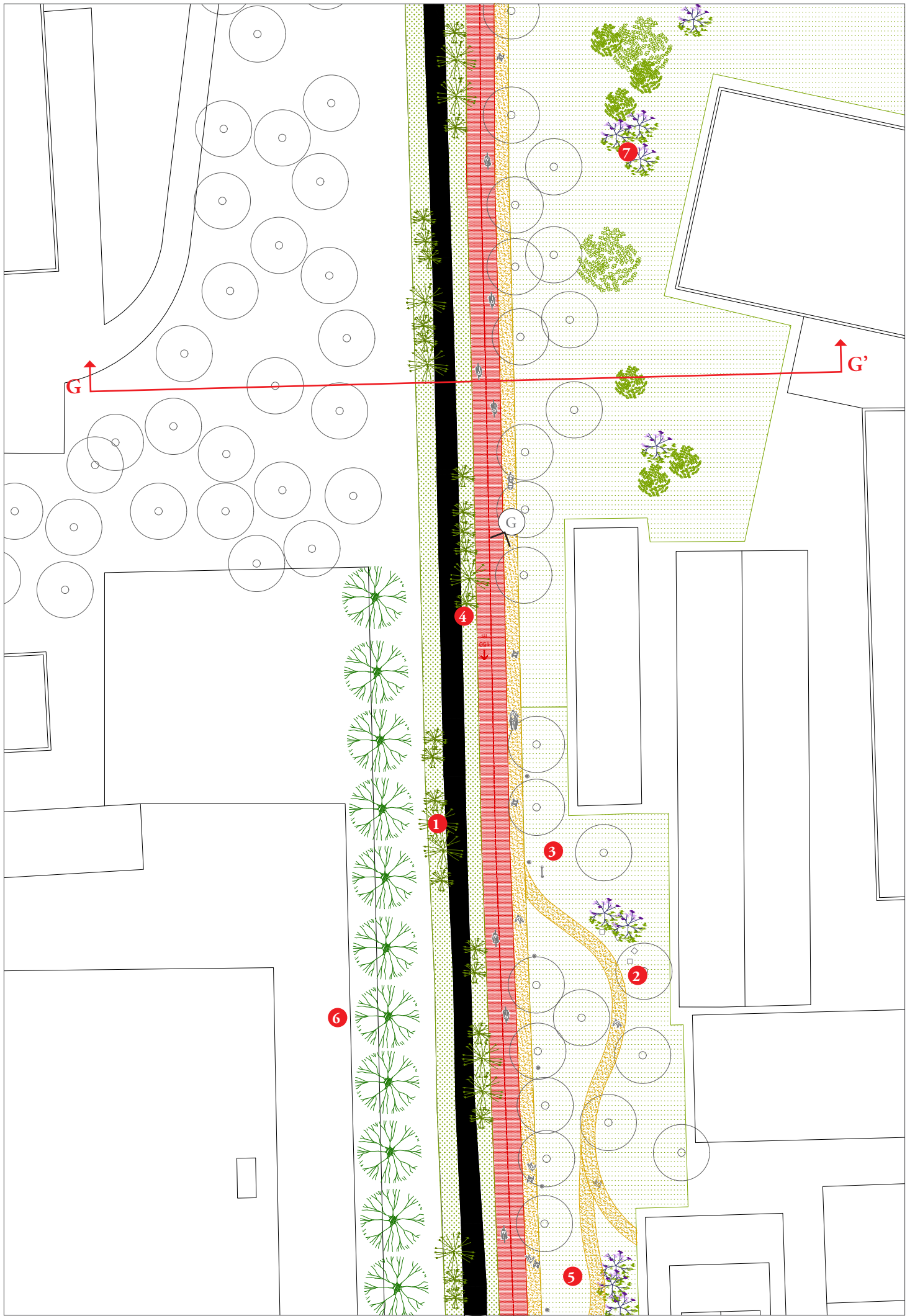


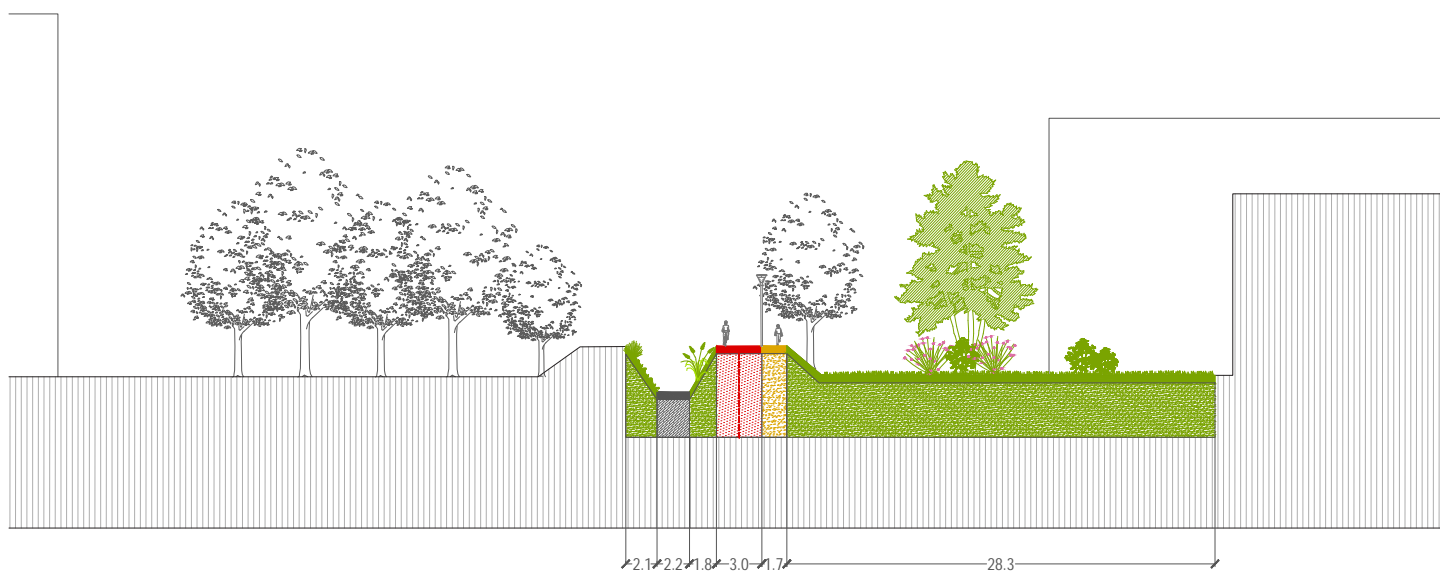
G - The pedestrian and the bicycle stay both on the east side of the stream. The organisation of the abandoned space allows a new public park.



7. The corridor between the railway and Ilica

Walking from south to north, after the pharmaceutical factory the path goes back to be along the creek. This is the opportunity to make order and space for vegetation in a part of the city characterized by many episodes of abandonment: we believe that re-designing the public space along the creek can contribute to the re-use of valuable buildings and sport fields nowadays abandoned. In that case the project puts both the bike path and the pedestrian path in the east side of the creek, while the west side is left free (having regard of the Pevec and the police station). The length of the space, on the east side, allows to imagine a more spacious green corridor.



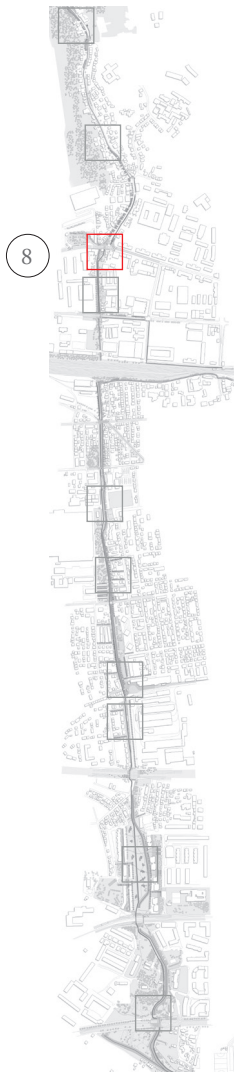


SEC. GG'

- 1 *Planting riverbanks*
- 2 *Urban furniture (benches)*
- 3 *Vertical signage*
- 4 *Horizontal signage*
- 5 *Increasing biodiversity with new planting*
- 6 *Green filter towards Pevec*
- 7 *Enhancing existing building*



H - The new crossing on Ilica is designed in order to augment the safety of the pedestrians.



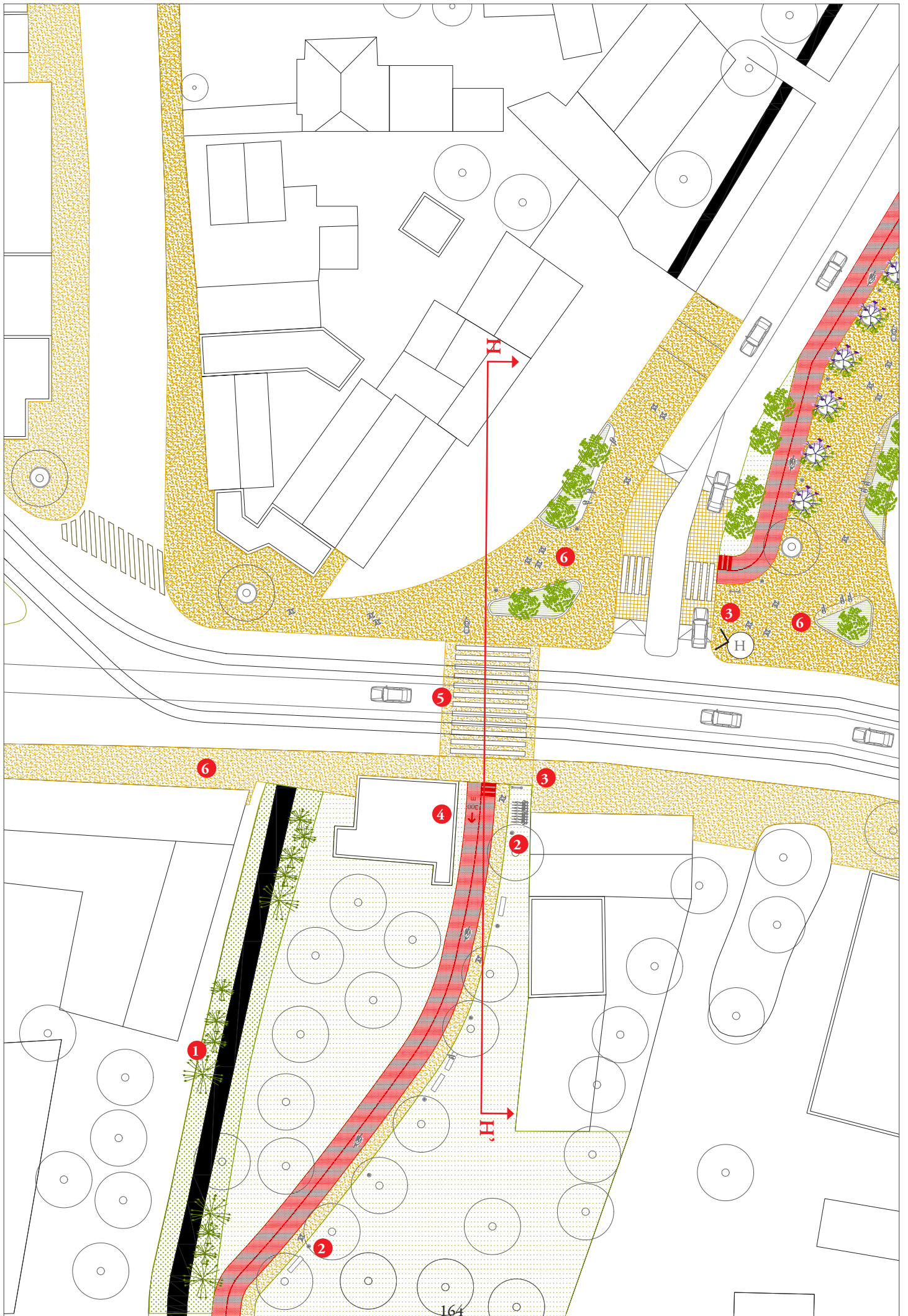
8. Ilica crossroad

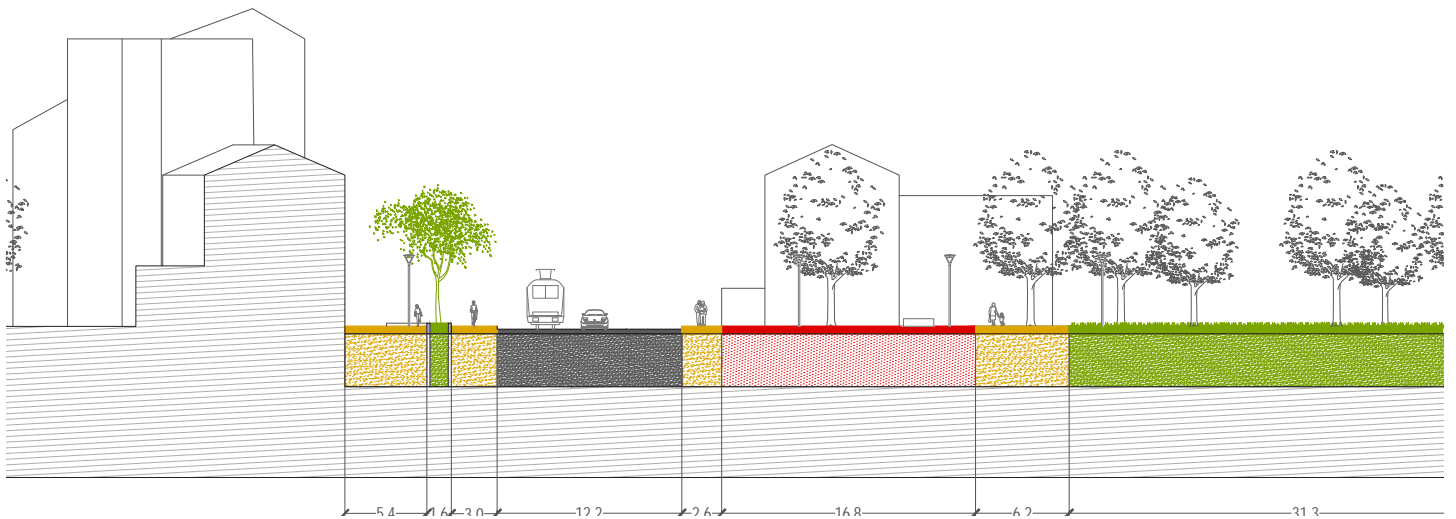
Ilica crossroad is nowadays a very congested area of the city, that needs to be rethought.

The propose is to widen the space reserved to pedestrians and cyclists by creating a public square with furnitures, flowerbeds with trees, and a clear crossing system.

From this point going north trough Črnomerec road, the section of the road changes and becomes more narrow, and also the creek has a more urban development.

For this reason it is important that Ilica crossroad becomes one of the main gate to access the new linear park.



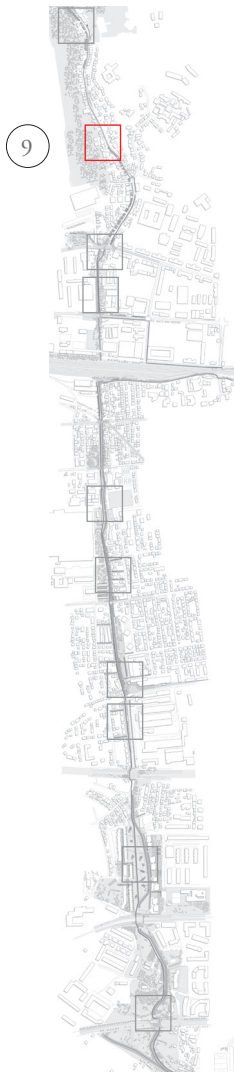


SEC. HH'

- 1 *Planting riverbanks*
- 2 *Urban furniture (bicycle racks, benches)*
- 3 *Vertical signage*
- 4 *Horizontal signage*
- 5 *Improving cycle pedestrian crossing*
- 6 *New connections and public spaces*



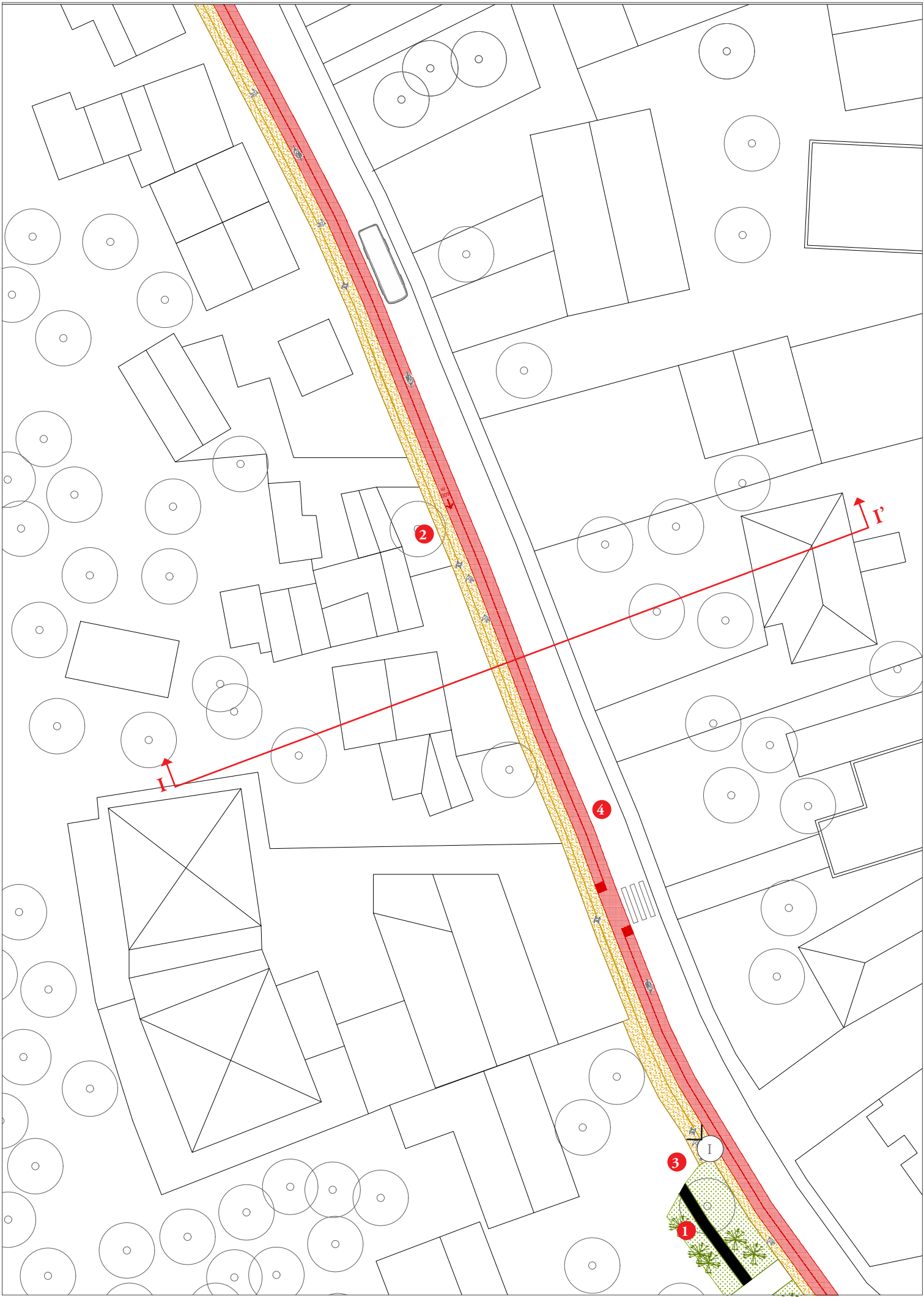
I - The Črnomerec road is transformed in one way road in order to give space to bikes and pedestrians.

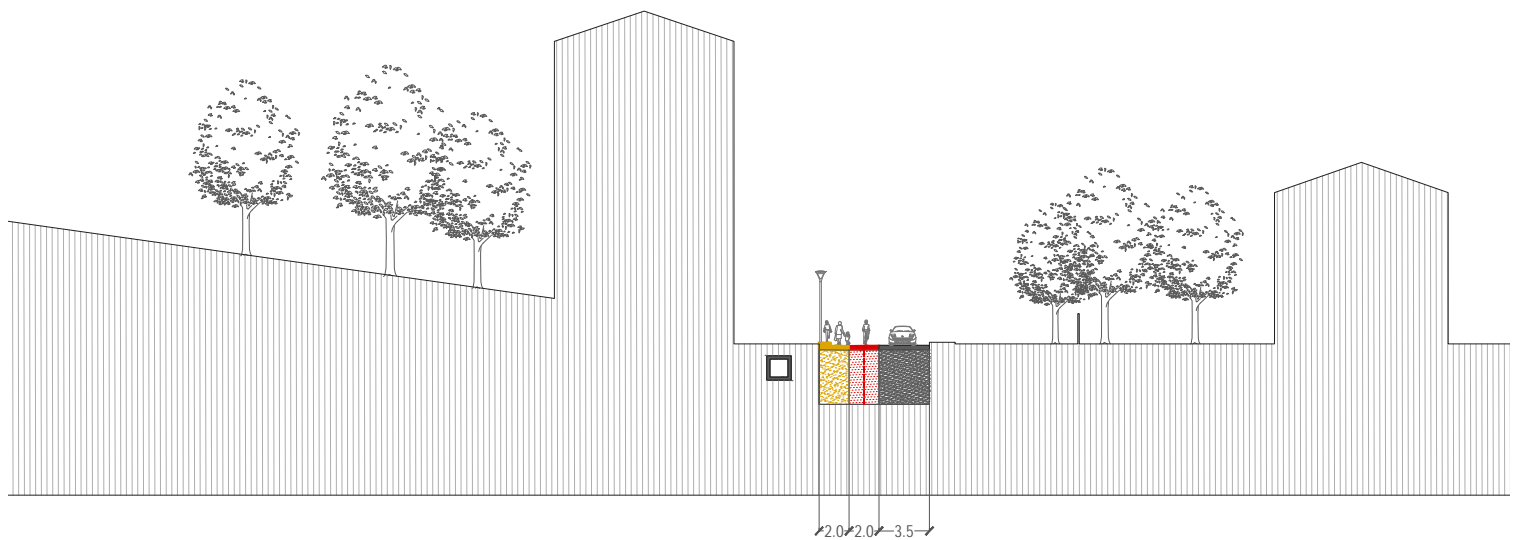


9. The upstream part / hillside

The road section of Črnomerec road currently does not allow to have space for slow mobility, so the project proposal is to create a one way loop for cars and buses in order to liberate one roadway (3 meters of width) to dedicate it to bikers and pedestrians.

The paths run along the creek side, and the banks need or to be planted in order to improve the biodiversity and the pleasant feeling while travelling along it, or to be reinforced (specially where the houses are constructed really close to the stream) through containment works based on naturalistic engineering techniques.



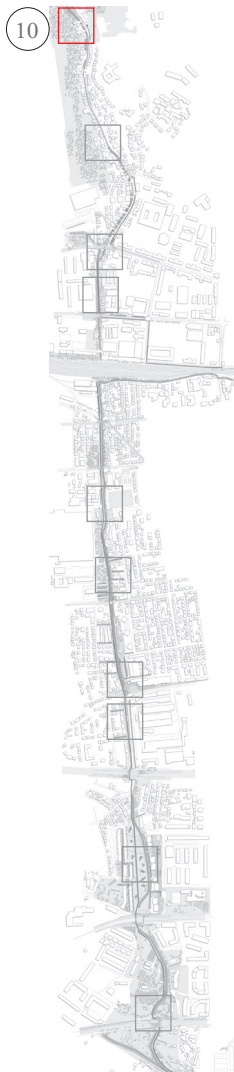


SEC. II'

- ① *Planting riverbanks*
- ② *Horizontal signage*
- ③ *Vertical signage*
- ④ *One way road*



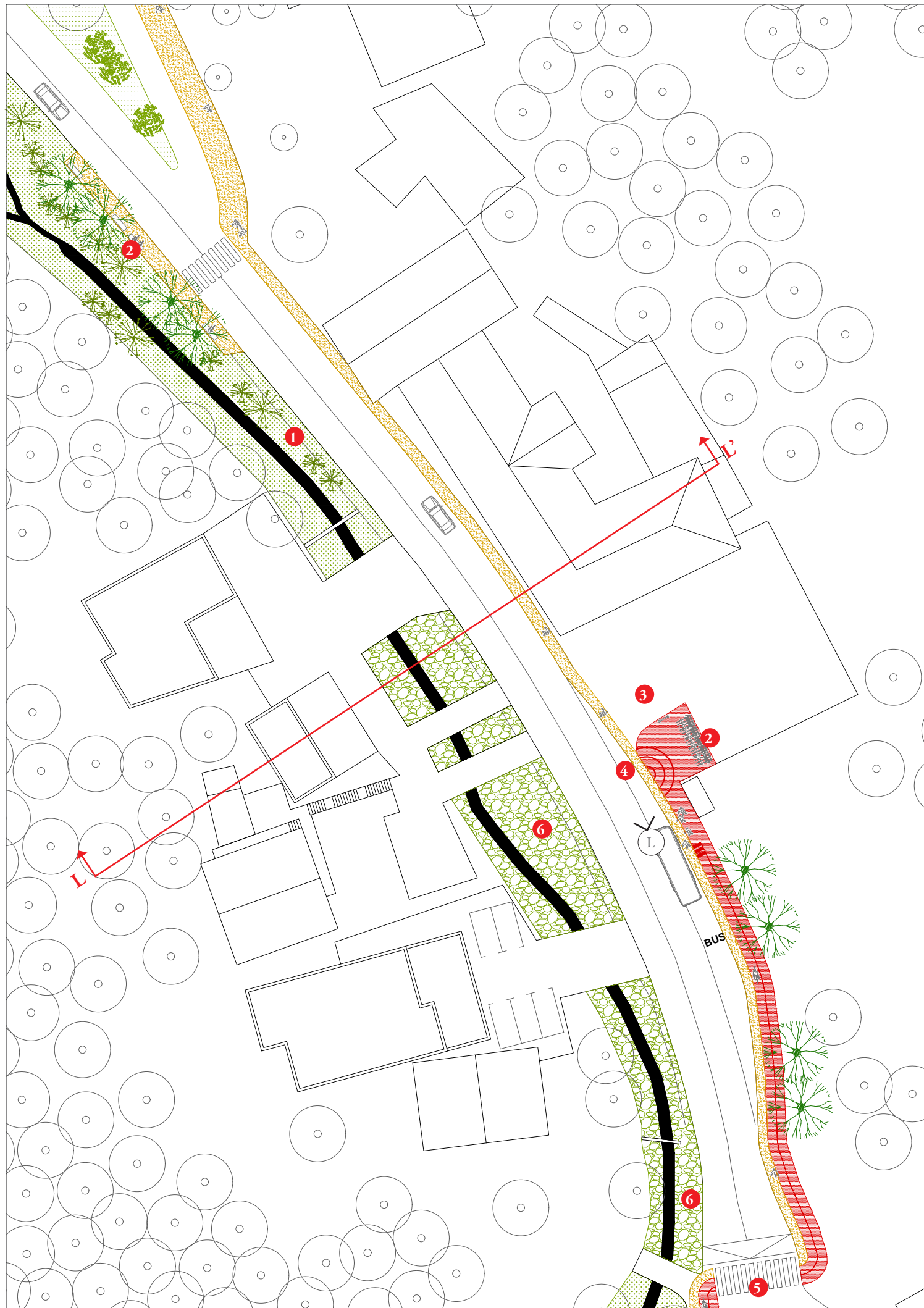
L - The final part of the path: the connection with the bus stop

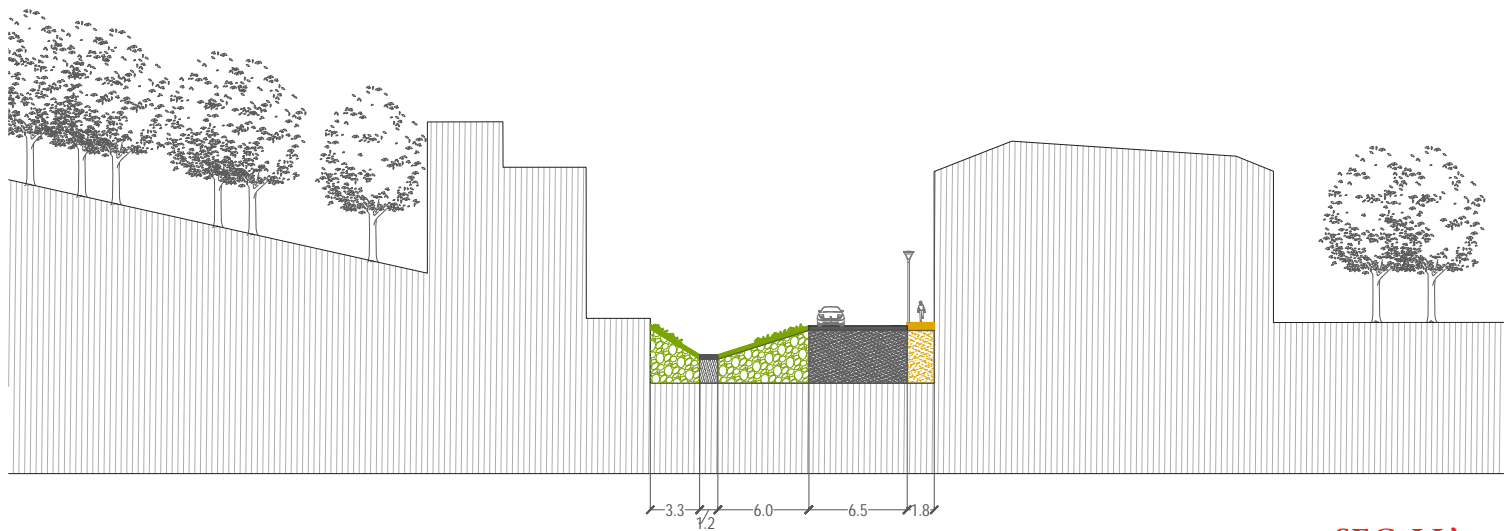


10. The upstream part / hillside

On the last part of Črnomerec road the section is too narrow to have both pedestrian and cycle paths, so the cycle paths stops (and starts) next to the bus stop, encouraging the inter modal transport.

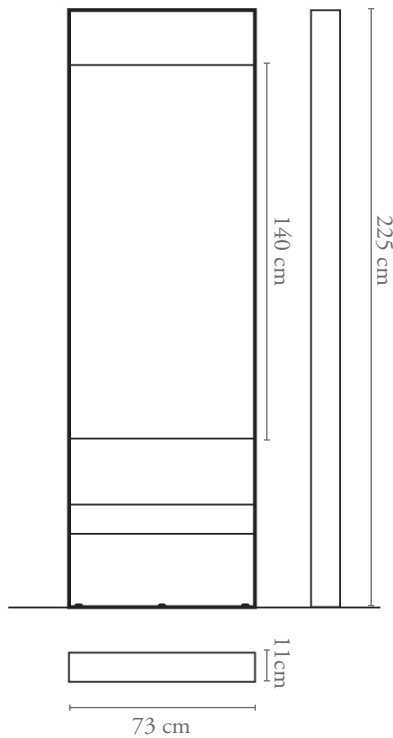
The pedestrian path continues, connecting further north to the natural park in the hills.





SEC. LL'

- 1 *Planting riverbanks*
- 2 *Urban furniture (bicycle racks, benches)*
- 3 *Vertical signage*
- 4 *Horizontal signage*
- 5 *Improving cycle pedestrian crossing*
- 6 *Rip-rap bank stabilization*



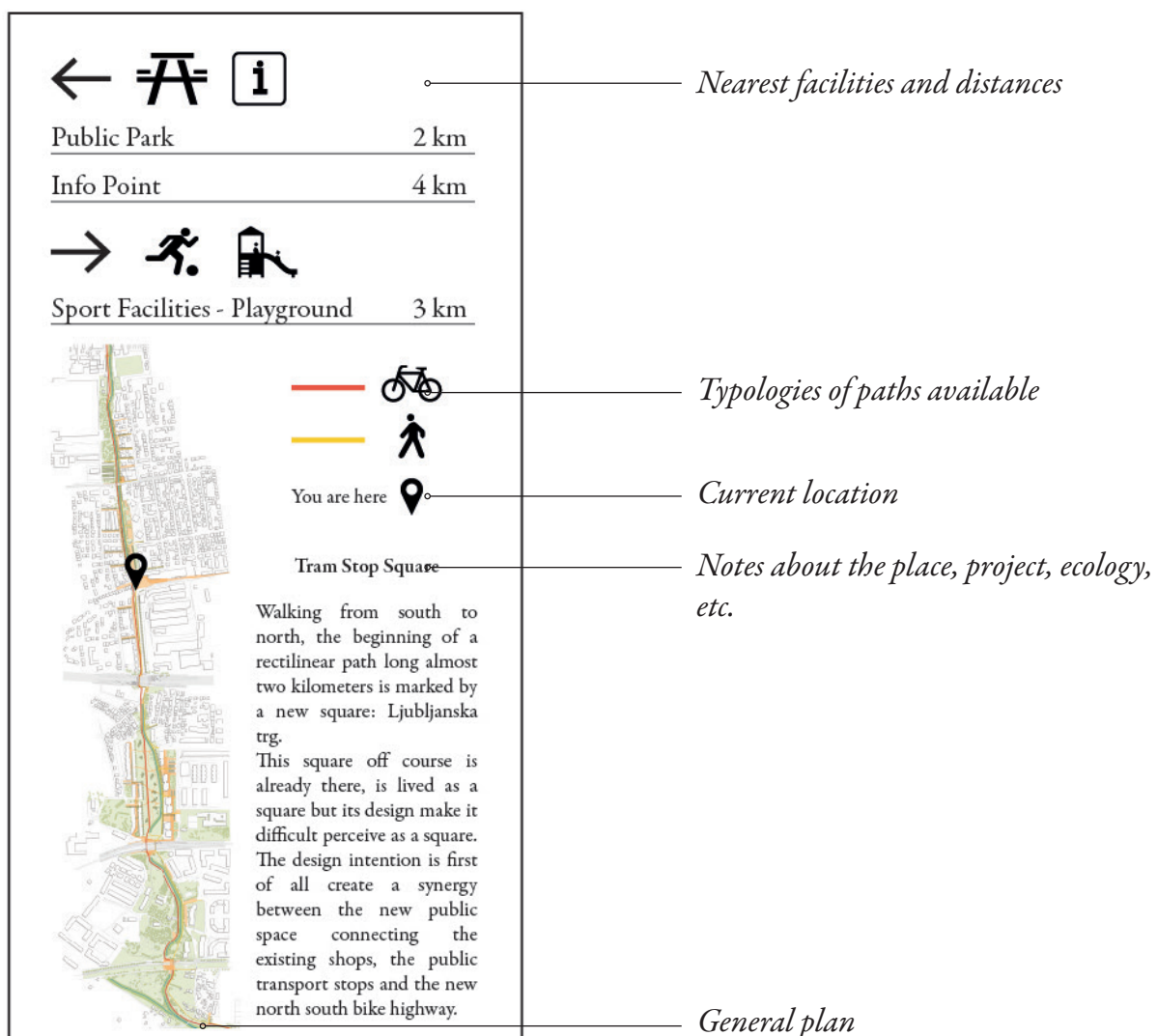
3.2 Signage system

Display stands.

Displays are composed of a structure in steel, with base plate and information table in aluminium.

The displays are used to show information about the location, the project and the distances of the nearest facilities.

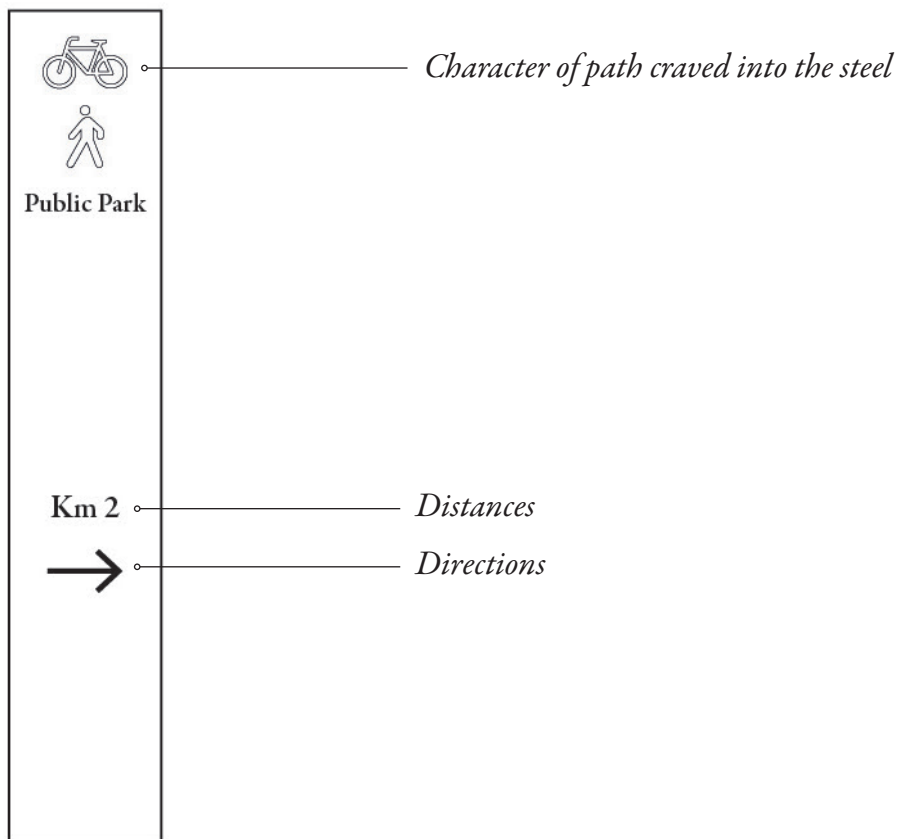
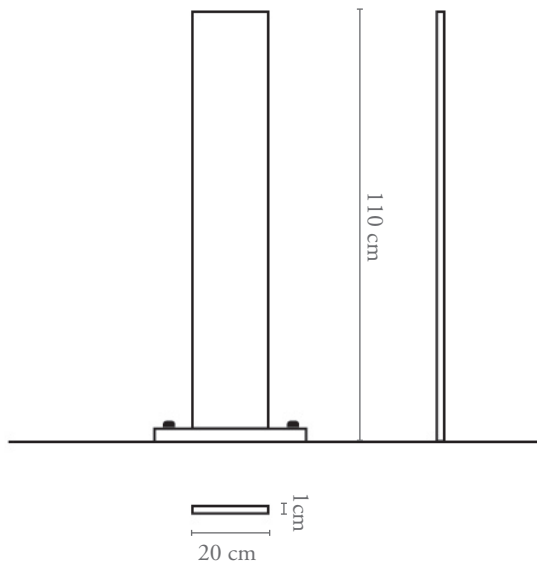
A general map are also shown to give information about the cycle/pedestrian paths.



Distance/directions displays.

Displays are composed of a structure in steel, with base plate fixed on a ground.

The displays are used to show the character of the path (pedestrian, cycle or mixed use), the kilometre of the path related to the total length and the direction of the way.



4. Draft of budget / working schedule

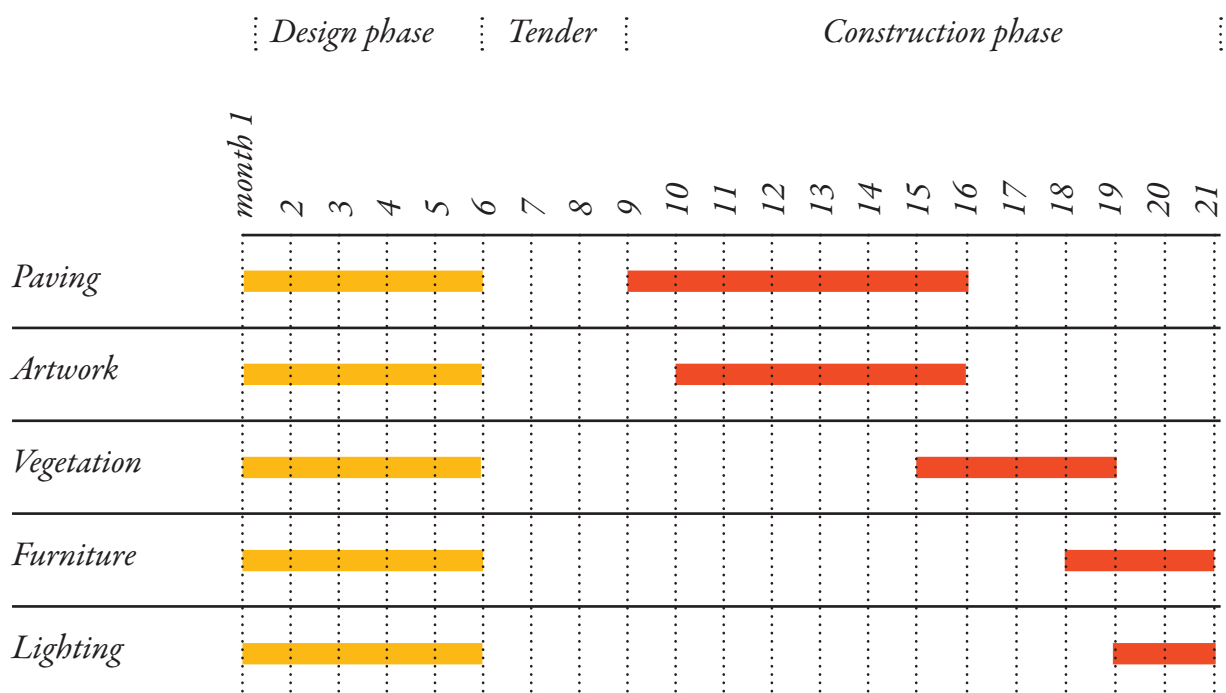
4. Draft of budget / working schedule

The calculation of the cost of the project has been made considering 5 main chapters:

- paving, considering all preparatory land works and the project coating surfaces, according to the existing materials (for example, recycling the existing asphalt where it is possible);
- artworks - masonry and engineering, bridges and the containment walls made in order to enlarge the bike path;
- vegetation
- furnitures
- lighting.

The calculation has been made considering 5 km of a fully equipped park. The last kilometre (north to Ilica) is considered partially equipped, having regard to the fact that in this section there are less interventions feasible.

The schedule can be changed according to the resources and the objectives decided by the client.



description		unit m
PAVING		
Cycle paths - ml (medium width 3 m)		Squa
	Aggregate concrete (50%)	
	Resine asphaltcoat (50%)	
Pedestrian paths (medium width 1,5 m)		Squa
	Natural stabiliser (60%)	
	Resine asphaltcoat (40%)	
Public areas		Squa
	Resine asphaltcoat (92%)	
	Wood (5%)	
	Rubber (3%)	
New parking		Squa
	Interlocking grass paver	
TOTAL PAVING		
VEGETATION		
Trees - Supply and put in place		
	Stem circ. (cm) 14-16 - (40%)	
	Stem circ. (cm) 18-20 (40%)	
	Stem circ. (cm) 20-25 (20%)	
Shrubs and igrophilus vegetation along banks		Squa
	Shrubs	
	Igrophylus vegetation (40% di entrambe le sponde)	
Grass surface		Squa
TOTAL VEGETATION		
WORKS - MASONRY		
New bridges		
Restyling existing bridges		
Containment wall		Linea
TOTAL WORKS - MASONRY AND ENGINEERING		

measure	quantities	Unit price	total price
ING			
re meters	6000		
	3000	90.00 €	270,000.00 €
	3000	20.00 €	60,000.00 €
re meters	7500		
	4500	45.00 €	202,500.00 €
	3000	20.00 €	60,000.00 €
re meters	25000		
	23000	20.00 €	460,000.00 €
	1250	125.00 €	156,250.00 €
	750	170.00 €	127,500.00 €
re meters	6050		
	6050	60.00 €	363,000.00 €
			1,336,250.00 €
TATION			
unit	500		
	200	150.00 €	30,000.00 €
	200	310.00 €	62,000.00 €
	100	470.00 €	47,000.00 €
re meters			
	1500	40.00 €	60,000.00 €
	4000	65.00 €	260,000.00 €
re meters	23000	3.00 €	69,000.00 €
			528,000.00 €
AND ENGINEERING			
unit	3	80,000.00 €	€ 240,000.00
unit	11	20.000 €	€ 220,000.00
ar meters	683	300.00 €	€ 204,900.00
			664,900.00

description		unit m
FURNITURE		
Urban and playground furniture (Bycycle rack, litter bins, benches, chairs, umbrellas,pic nic tables, playgrounds, display stands)		
TOTAL FURNITURE		
LIGHTING		
Installation		
Pole lighting		
Bollard lighting		
TOTAL LIGHTING		
TOTAL		

measure	quantities	Unit price	total price
TURE			
unit	1	-	€ 280.000
			280.000 €
TING			
	1	€ 80,000.00	€ 80,000.00
unit	160	€ 2,000.00	€ 320,000.00
unit	100	€ 500.00	€ 50,000.00
			450,000.00 €
			3.260.000 €

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